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AGE OF EURASIA

Future directions of knowledge, technology, money and sustainable geoeconomics

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EDITORS
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A study volume of the
Magyar Nemzeti Bank
on the opportunities of
Eurasian cooperation

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Foreword by Governor György H. Matolcsy

"Asia's emergence as the world's geopolitical and economic center has lent global prestige to a new paradigm for achieving sustainable growth alongside social solidarity. With many other countries already studying the Asian playbook, the United States and Europe could benefit from doing the same."

(Parag Khanna, founder of FutureMap,
best-selling author of *Connectography*
and *The Future is Asian*, 2019)

Over the past one or two decades, a changing world order and the emergence of Asia have become a common argument of geopolitical analysts, economists, politicians and decision-makers around the world. Today, the facts clearly show that this is not only a popular idea, but a reality unfolding before our eyes. While Asia had a share of about 27% in global real GDP in 1990 and the Western half of the globe (Americas and Europe combined) accounted for 68%, these ratios have changed considerably since then. As early as five years ago, in 2015, Asia already reached a share of 45% within global output, and the share of Europe and the Americas fell to 50%. Ever since, the East has been on the rise, which also became obvious amid the pandemic in 2020 when China was one of the few economies to record positive growth on an annual basis. Bloomberg Economics estimates that by 2035, China will have overtaken the United States to become the world's largest economy, but according to the UK-based Centre for Economics and Business Research and the Japanese Nomura Holdings, there is a good reason to believe that this date will arrive earlier, in 2028 or even in 2026. Furthermore, by the middle of the century, fast-growing emerging countries, located mostly in Asia, will produce almost 60% of global output, based on Bloomberg's calculations.

GDP, however, is far from being the only factor reflecting the rise of the East. Just to mention one more: technology. In the age of digitalization and the Fourth Industrial Revolution, the World Intellectual Property Organization (WIPO) has ranked Singapore, the Republic of Korea and China as the 8th, 10th and 14th most innovative countries respectively (Global Innovation Index 2020). This is an amazing result, which has been achieved by these nations in only a couple of decades through systematic efforts to build up local ecosystems for high-tech research and development.

Although these developments underline the role of Asia, I believe there is an even larger community of common destiny which is set to achieve great success: Eurasia. The Eurasian supercontinent is the largest, most populous and best-connected continental area on Earth, and its economic, social and cultural linkages stretch back to ancient times, the age of the old Silk Road. While history has created separate notions for Europe and Asia, these two parts of the huge Eurasian landmass have never ceased to be intertwined. Today, in the face of modern-day challenges such as digitalization and the fight against climate change, the cooperation of Asia and Europe may be more important than ever. Eurasia is emerging as a new global power center, suggesting that the unipolar world order – represented by the Atlantic bloc – is giving way to a new age of multilateral cooperation.

To reap the benefits of this historic process, Europe and Asia need to create even more effective channels for communication, information sharing and mutual understanding. In recognition of this, three years ago the Magyar Nemzeti Bank (MNB), the central bank of Hungary, launched its flagship event, the Budapest Eurasia Forum, in order to establish a new platform for Eurasian dialogue and cooperation. The conference is organised annually, and every year it strives to understand the most recent patterns in three megatrends shaping the future of Eurasia: the growing

significance of geopolitics, the technological revolution and the transformation of money.

There is indeed one omnipresent concept framing all of our discussions: long-term sustainability. The global economy obviously needs a complete reboot in terms of achieving a zero-carbon and circular way of generating welfare. But sustainability is even more than that. We need sustainable solutions in all aspects to be high on the agenda of our Forum. That is, as regards geopolitics, we need a new balance between the East and West. As for technology, we need a new harmony between new solutions (like artificial intelligence) and our societies, health and well-being. Last but not least, with regard to finance and money, we need a sustainable, stable and efficient financial system.

This thinking is well reflected in this new volume of studies, which the MNB decided to publish in order to collect and promote the most relevant thoughts of renowned experts regarding Eurasian cooperation. This volume is a unique initiative by a central bank in Europe – not only due to its topic, but also because it brings together several authors from China, Russia, the Republic of Korea, Singapore, as well as the United States, Norway and Hungary, inter alia. Thus, the volume is itself an excellent example of Eurasian cooperation. Its topics resonate well with 21st-century megatrends and examine geopolitics, multilateral cooperation, economy, finance, technology, infrastructure and education as connected parts of the "big picture". I sincerely hope that this kind of thinking will become more and more widespread both in Asia and Europe, and I believe that this volume makes a major contribution in that regard. The MNB is grateful to all of the authors for sharing their valuable thoughts.

György H. Matolcsy
Governor
Magyar Nemzeti Bank

Foreword by the editors

Mihály Patai, Deputy Governor, Magyar Nemzeti Bank

Marcell Horváth, Executive Director for International Relations, Magyar Nemzeti Bank

Although the rise of Eurasia as a new power centre is one of the hot topics of our decade, those who wish to dig deeper in this topic might be surprised by the scarcity of comprehensive literature on this subject, i.e. the relatively low number of works analysing the notion of Eurasia using a truly multidisciplinary approach. This recognition motivated the central bank of Hungary to create a unique volume of studies which combines several fields of social sciences to better understand the patterns of the "Age of Eurasia". We believe that the global community is at the dawn of a new era, characterised by a multilateral world order and the prominence of Eurasia as one of the most important players on the international stage. Thus, leveraging the MNB's international network, we invited several experts to discuss different aspects of Eurasian cooperation, including economy and finance, infrastructure and connectivity, geopolitics and education. In doing so, we created a collection of the thoughts and perspectives that have been reflected in the annual Budapest Eurasia Forum organised since 2019.

In this volume, readers from various backgrounds – be they researchers, academics, government officials or members of the business community – can find valuable content and input for their work. The studies provide insights not only into the historical foundations of Eurasian partnerships, but also the rise of the supercontinent as a new power centre and the most significant hub of the 21st-century megatrends: the emergence of geopolitics, sustainability, digitalization and the transformation of money. The

volume elaborates on specific current topics such as the prospects of different regional cooperation formats, the role of central banks in greening the economy and fostering human capital, or best practices to encourage innovation and build smart cities, to name but a few. In the following summaries, we capture the essence of the studies, which are all intended to be the part of the same "puzzle", the same big picture highlighting the opportunities of the "Age of Eurasia".

To set the stage, the volume starts with an introductory study by Marcell Horváth, Executive Director for International Relations, as well as Eszter Boros and Györgyi Puhl, international advisors at the MNB. The authors' goal is to give a better understanding of the constantly changing world order and how the rise of our supercontinent could influence global developments. The study first examines the concept of Eurasia from historical and geopolitical aspects, and shows that Eurasian cooperation, for example along the ancient Silk Road, was always present and has had a great effect on European and Asian societies. Today, Russia, Kazakhstan and Turkey have also developed their own Eurasian vision, and China, reviving the ancient Silk Road, has launched the Belt and Road Initiative (BRI), which might have the biggest impact on the multipolar world order. The paper shows that the 21st-century megatrends of sustainability, digitalization and the future of money offer good opportunities for broader Eurasian cooperation. Partnership in these fields serves the interests of both Asia and Europe.

The first chapter is about geopolitics. The study by Dmitry Erokhin, Sergey Tkachuk and Elena Rovenskaya, experts at the International Institute for Applied Systems Analysis (IIASA), reflects on the global spread of COVID-19, which is changing the opportunities and trends all across Eurasia. During the fight against the pandemic, nations had to realise that effective measures could only be taken in cooperation with the international community. Behind the scenes, a new kind of relation system

building was seen as well, due to the interdependence of nations. Eurasia is a great example for the building of new economic centres in the world. The Eurasian multilateral cooperation had an outstanding period during the first wave of the pandemic. Thus, it is a time to rethink the mutually beneficial cooperation platforms and continue building Eurasian geo-economic relations.

David A. Jones, Professor of the Institute of International Relations at the University of Warsaw, also highlights the new trends arising in Eurasia owing to the pandemic. According to Jones, Eurasia has embarked on its own path to becoming a power-centre of the world politics in the next decade. Nonetheless, different superpowers can influence the political developments in the European and Central-Asian countries. China is clearly strengthening its position as a superpower with the Belt and Road Initiative, while the USA and its Atlantic allies can also achieve new kinds of roles, especially in Europe. Meanwhile, soft-power tools have become even more important in political and economic connections in Eurasia. This also underlines the fact that global geopolitical relations will not be the same as they were before the pandemic.

Sharing this conclusion, three international experts at the MNB – Nóra Anna Sándor, Dávid Szabó and Péter István Szabó – examine the US-China-EU triangle from a geopolitical point of view. They find that the USA, through its Atlantic alliance system, is the most influential power regarding developments in the European Union, but that China is also growing its interests in Europe. The Asian giant would like to build an alternative alliance system in order to strengthen a G2 world power system at the global level in future decades. Against this background, European nations intend to build an interest-based common foreign policy system at the EU level. It is a clear interest of the European countries to find a balance between the West and East and choose the most appropriate investment and development opportunities offered by the global superpowers.

The second chapter examines a related topic: multilateral cooperation. The paper by Norbert Csizmadia, Head of the Board of Trustees of the Pallas Athene Domus Meriti Foundation (PADME) in Hungary, presents an interesting discussion on the role of the BRI and the Digital Silk Road in creating a new and interconnected Eurasia. The author shows that economic geography, the geography of knowledge and the fusion of places ("geofusion") are playing an increasingly important role in our age as competition is for markets, talent and technology, rather than territory. The initiatives under the umbrella of the BRI, such as the Digital, Green and Health Silk Roads offer various opportunities for high-quality, open, zero-carbon and inclusive development.

The thoughtful paper by Zhimin Chen, Vice President of Fudan University, and Xiaotong Zhang, Professor of Fudan University, also analyses China's Belt and Road Initiative. The authors argue that the BRI goes beyond classical geopolitical theories which put excessive emphasis on competition between land and sea power. The authors show that the project aims to connect land and sea via a complex network of ports, roads, railways and power grids, and therefore create a free and open functional zone, maintained by the logic of the market, rather than power and conflicts. These important findings are even more remarkable in the post-COVID era when "maximal connectivity" needs to be restored to reap economic benefits on a global scale.

The next paper by Márton Ugrósdy, Director of the Institute for Foreign Affairs and Trade in Hungary, is a real "gap filler" in the field of multilateral cooperation, as it takes stock of the different regional initiatives throughout Eurasia, such as ASEAN, the Shanghai Cooperation Organisation, the Eurasian Economic Union, the Turkic Council, the Free and Open Indo-Pacific and the Quadrilateral Security Dialogue. The study not only describes these formats, it also compares them in terms of their membership, goals and influence. The discussion is embedded in a broader

geopolitical context of the great power rivalry between China and the United States as "heartland" and "rimland" powers. The author concludes that small regional formats could flourish even in the current geopolitical setting, if they address the real and tangible needs of their members.

These insights provide the background for the third and fourth chapters on economy and finance. In the third chapter, Barnabás Virág, Deputy Governor of the MNB, draws attention to the role of environmental considerations in the field of monetary policy. He highlights several efforts by the MNB to encourage green growth, underpinned by the new sustainability mandate of the central bank, enacted in 2021. The MNB has adopted a "Green Toolbox Strategy", and the bank's Bond Funding for Growth Scheme has taken green bonds onboard. The analysis of these measures rests on an international outlook proving that many central banks in Eurasia have started to incorporate green aspects in their policies as a new opportunity for multilateral cooperation.

In line with efforts for high-quality economic growth, the paper of Junkuo Zhang, Vice President of the Development Research Center of the State Council of the People's Republic of China, provides first-hand insights into another important field of human development: innovation. Zhang describes the policies of "reform and opening up", which have helped China to become one of the world's leading scientific and technology powerhouses. The main element of these policies is the establishment of different types of innovation zones. The paper discusses the achievements in the field of scientific development, such as the rapid increase in the number of Chinese patent applications. Sharing the experience of the innovation zones helps other Eurasian countries to create more efficient policies as well.

In the same spirit, Sang Hyeong Lee, Deputy Governor of the Bank of Korea (BOK), sheds light on Korea's comprehensive development strategy, the world-renowned Korean New Deal project. The paper also summarizes the BOK's stance on CBDC,

climate change, payment and settlement system, among others. The author argues that since the outbreak of COVID-19, many countries have been pressing forward with the transition to digital and low-carbon economies; however, it seems that these efforts cannot be achieved by a few countries alone. Given the similarities between the Korean New Deal and the EU's approach toward climate change, there will likely be fruitful policy cooperation with regard to circular economy and green finance.

The chapter on finance starts again with green development, but focuses this time on the greening of the financial system. The paper by Csaba Kandrács, Deputy Governor of the MNB, and Balázs Sárvári and Renátó Ritter, analysts at the MNB, highlights the impact of climate-related shocks, which lead financial institutions to seek to embed climate-related effects in their models and central banks to integrate this issue into their mandates. The study also shows the differing positions on central banks' mandate and climate change and different taxonomies in Europe and Asia. The authors review the development of the green bond market and factors supporting green bond issuance. They argue that given the scale and complexity of the issue of climate change, a humble approach from regulators to cooperate with each other and with other related actors would be necessary.

In the next paper, Xiaochuan Zhou, Vice Chairman of the Board, Boao Forum for Asia (BFA), draws attention to the key aspects of the digitalisation of China's payment system. The study discusses China's great achievements with regard to digital currency and electronic payment (DC/EP). Although the incumbent technology serves perfectly for financial transactions, trade settlement and investment settlement with regard to cross-border payments, there is still room for improvement in the case of tourism, internet shopping and remittances. The new system of China must remain consistent with the existing policy framework. The study highlights the importance of modernization of retail payments,

which is key to boosting cross-border transactions and multilateral cooperation as well.

The fifth chapter takes a close look on the hot topics of technology and infrastructure. First of all, Eng Chye Tan, President of the National University of Singapore (NUS), and his colleagues, Chye Kiang Heng, Ke Fan and John Chye Fung, lay down a conceptual framework to explain the mutually constructive relationships between smartness, city and health by studying four cases in high-density Asia – Shanghai, Kashiwa-no-ha, Songdo and Singapore. Urbanisation poses multiple challenges globally, such as pollution, urban congestion and poor sanitation, which may affect human health significantly, yet little is known about how smartness, city and health can be connected. The authors highlight that through a people-centric paradigm, smart city technologies improve the urban living experience; therefore, they are integral parts of the solution for urban problems.

Smart technologies are related to a larger issue: the Fourth Industrial Revolution, which is examined by Glenn Diesen from a geo-economic perspective. He discusses how rapid technological changes undermine the foundations of the US-centric liberal international economic system. As a Professor at the University of South-Eastern Norway specializing in the political economy of Greater Eurasia, Diesen has a deep knowledge of the historic dynamics of technological competition and cooperation. His paper points to the fact that due to the widespread use of digital solutions, technological sovereignty becomes strongly interlinked with political sovereignty. As a result, states will increasingly adopt a swing power strategy to mitigate dependence in the digital realm. Technological cooperation and competition across Greater Eurasia are thus the manifestation of the emerging multipolar system based on a balance of dependence.

Khee Giap Tan, Associate Professor at NUS Lee Kuan Yew School of Public Policy, discusses how technological innovation could exacerbate the problems already caused by globalization, such

as the widening income disparity and the worsening social division. The unequal distribution of the benefits of trade and investment and the lack of digital infrastructure for quick access to market information has led to an uneven playing field between multinational corporations and SMEs, while vital financial resources have been directed away from economic development and infrastructure upgrades as a result of the pandemic. The author stresses that – given the emerging market imperfections – coordinated efforts by governments are paramount for addressing these issues, such as supporting people in acquiring skills and knowledge to make the best use of the latest technology.

Last, but not least, the sixth chapter elaborates on a topic that is becoming more and more important in the age of knowledge-based societies: education. The first paper is written by Levente Horváth and Kristóf Lehmann, both of whom have outstanding experience in managing central bank educational initiatives in Hungary, as Director of the Eurasia Center at John von Neumann University and Director for Training of Economic Sciences at the Magyar Nemzeti Bank, respectively. In their paper, they argue that modern-day economic development is closely linked to the creation of a knowledge-based society. Therefore, central banks also engage in a wide range of educational activities, also in cooperation with universities and think tanks. The authors first describe international examples for that, ranging from East Asia to the Middle East. Thereafter, they stress the role of the central bank of Hungary in the academic world, which has already produced tangible results for Eurasian cooperation, including the double degree programme of Fudan University in China and Corvinus University of Budapest in Hungary.

In the last paper of the volume, Zongxian Feng, a prominent scholar at Xi'an Jiaotong University (the university having initiated the founding of the University Alliance of the Silk Road), sheds light on an interesting aspect of scientific and social development: the role of think tanks, including university-affiliated ones.

According to the paper, China has a long-standing tradition of relying on experts and facilitating the establishment of think tanks. Moreover, Chinese think tanks are gradually increasing their international impact and recognition. This development provides a solid foundation for cooperation with Europe and other parts of the world. One important platform for that cooperation is the University Alliance of the Silk Road, with 151 universities from 38 countries as its members. The author convincingly demonstrates that such academic exchanges not only promote mutual understanding, they also increase the international impact of think tanks in both China and Europe.

We believe that even these short summaries demonstrate the rich and insightful content presented in the volume. We thus hope that all readers will find interesting and useful thoughts in these pages, supporting their research activities and deepening their knowledge of Eurasia. Have a good read!

The Concept of Eurasia and Global Megatrends in the Context of Eurasian Cooperation

Marcell Horváth – Eszter Boros – Györgyi Puhl

Over the last one or two decades, one increasingly pronounced process has been the disintegration of the unipolar world order and the parallel rise of a multipolar order. In addition to the United States of America as a centre of power, the Eurasian supercontinent – the largest landmass on Earth – and its economies are emerging as a challenger. A strengthening China has become essential for the future of the economies and societies of the supercontinent. But the question arises, how can Eurasia be defined? This paper examines this issue first from a historical and geopolitical perspective. Different, but interconnected concepts of Eurasia see the Eurasian region as a chosen central area. Eurasian cooperation has always been present in history, although to varying degrees: the ancient Silk Road of China stimulated the development of the nations living there since before the Common Era, through the exchange of goods, knowledge, culture and technology. Russia, Kazakhstan and Turkey have all developed their own Eurasian visions, and China – reviving the old Silk Road – has launched the Belt and Road Initiative (BRI) that is shaping the multipolar world order of our time. Reinforced by the coronavirus crisis, the megatrends of the 21st century provide a good opportunity for the development of broad Eurasian cooperation, as represented by the BRI. Examining the trends in the future of

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sustainability, digitalization and money, the study concludes that the interests and aspirations of Europe and Asia are most closely aligned regarding the climate-neutral transition, and accordingly there is great potential to exploit synergies between green strategies. There are also important interests in an international consensus on the fundamental issues of technological progress, and most recently, there are examples of direct European-Asian cooperation on the future of money, including central bank digital currencies.

Journal of Economic Literature (JEL) codes: F02, F21, F43, F50, O11

Keywords: Eurasia, geopolitics, international cooperation, China, megatrends

1. Introduction

Over the past one or two decades, the geopolitical-economic argument that the era of a unilateral world order dominated by the United States is coming to an end and that a new powerhouse – the giant supercontinent of Eurasia – is emerging, has become increasingly commonplace (see, e.g., *Frankopan, 2015*; *Matolcsy, 2019; Khanna, 2019*). This idea is based largely (though not exclusively) on the rise of China, one of the most remarkable phenomena of the 20th and 21st centuries. China's "return to the world stage" will mark the end of a world order where the centre of gravity of global governance and economy, and the dominant civilizational model, for more than 300 years, has been provided only by the West. At the dawn of a new era, a new – if you like Eurasian – pole is being organized around China in narrow and broad concentric circles.

The shift in the balance of power is again taking place within the Eurasian supercontinent, the processes and patterns of development of which have always determined the evolution

of the world throughout history. If we look at the patterns and megatrends of this development – such as the development of knowledge, technological innovations, money and the economic changes based on such – we can see that the cooperation, interaction and competition between the West and the East have led to the cyclical alternation of the rise of different poles of power in the Eastern and then the Western hemispheres. Thanks to geographical opportunities, the east-west axis of the Eurasian continent has since the dawn of humanity created the possibility for knowledge and technological innovations – whether they concern food production, writing, money, state organization, military techniques or industrial solutions – to flow freely between the emerging centres and compete with each other by constantly developing common solutions. The ancient Silk Road was one of the first initiatives linking the centres of Eurasia, China, India, Persia, Arabia, Egypt and Rome, with spices, goods, money, ideas, cultures and knowledge exchanged along this route.

At the dawn of the last geopolitical shift between East and West from the 16th century onwards, following a plague – which probably originated in the East and shook what was then the West – a renewed Europe embarked on a 500-year journey of conquest. Over the past few centuries, the West has conquered and controlled the world through military, industrial and monetary revolution as well as constant technological innovation. Accordingly, the world's economic centre of gravity shifted from East to West. In the 21st century, however, the global order is once again in transition amidst a new pandemic, and the centre of the world economy is once again moving eastwards, with technological innovations emerging in the old-new centres (China, India, Arabia). Indeed, Asia and Asian countries are no longer imitators in the field of technology. Apart from being pioneers in innovation, they are also at the forefront of integrating innovation into society. Asia is not afraid of technology: the latest solutions are adapted quickly and successfully, ranging from

mobile payments and robotics to synthetic biology. For whether a state is democratic or autocratic, rich or poor, one measure of its success and competitiveness is the extent to which it makes widespread use of advanced technologies and innovation-based economic policies. So Asia is no longer just catching up, it is making a giant leap to gain a huge competitive advantage through new technologies, their application and creative economic policies. Trends in sustainability and technology in recent years demonstrate once again that the triad of knowledge, technology and capital plays an increasingly important role (and has now become decisive) in the rise of nations or regions *(Matolcsy, 2021)*.

While it is currently difficult to imagine Eurasia united under a single power, sustainable and competitive economic cooperation can be achieved through regional networks in the long term, and Eurasia can once again become a leading power in the world order. More and more people around the world are recognizing this, but at the same time, as part of the discourse on this issue, the question quickly arises as to how to define Eurasia and what a "Eurasian force field" and "Eurasian cooperation" mean in practical life, in the realm of international relations.

The answer to this question is only apparently simple, since different interpretations of the external-internal relations of this vast landmass existed, exist and are still being formed. This paper therefore primarily seeks to answer the question of how Eurasia can be defined from a historical-cultural perspective and especially in the current global economic-geopolitical context (*Chapter 2*). Building on these different approaches, a broad vision of Eurasia is unfolding, outlining a "Lisbon to Shanghai" cooperation, with mutual benefits for the otherwise very different European and Asian countries. This potential can be seen in all three major trends of the 21st century, be it the carbon-neutral transition, digitalization or the renewal of the monetary system. *Chapter 3* therefore addresses these three megatrends, examining

the existing Eurasian linkages, networks and opportunities for cooperation in the area. In this context, the paper focuses on how China's rise and its technological and sustainability turnaround are reshaping today's global processes, and what challenges and opportunities this presents for Eurasian cooperation.

2. Different interpretations of Eurasia from a historical and geopolitical perspective

2.1. Geographical, historical and cultural interpretations of the European and Asian continents and the Eurasian supercontinent

To this day, there is no consensus among geopolitical scholars either on the exact meaning of the word "Eurasia", on the definition of the geographical boundary between the two continents, or on the interpretation of Europe and Asia as a single "supercontinent". To outline some sort of a definition, it is worth drawing on the still highly relevant field of geography. The primary geological basis for the interpretation of the two continents as a single continent is the Eurasian Plate, which covers most of Eurasia, including Europe and Asia. In terms of the geographical continuity between the continents of Europe and Asia, the Eurasian region is the largest contiguous land area on Earth and it can be seen as a kind of a chosen one, in terms of history. Over the centuries, the geographical continuity linking Europe and Asia has provided an opportunity to learn about each other, but also to fight for power, giving rise to some of the world's most important civilizations and cultures. Throughout history, the civilizations of the Eurasian region have had the greatest impact on the development of humanity and have alternately witnessed the rise of the Western and Eastern regions. Apart from the United

States, currently Eurasia represents the world's geopolitical and economic powerhouse (China, Germany, India, France, Japan, the UK, South Korea, Israel, Russia, Turkey), home to 70% of the world's population, 70% of global GDP and 75% of the world's known energy reserves.

The concept of the Eurasian continent or Eurasia was first mentioned in the early 1880s by Austrian geographer Eduard Suess who first suggested that the continent of Europe and Asia, separated by widely disputed geographical boundaries, was in fact a vast, contiguous "supercontinent". Later, British geographer Sir Halford Mackinder, one of the most important figures in Anglo-Saxon geopolitics, was the first to define Eurasia according to geopolitical aspects. Mackinder's Eurasia means not only that Europe and Asia are geologically one continent, but also that the nations and states of Europe and Asia are the centre of world power. In his 1904 paper "Geography as the Key to History", he referred to the area from the Ural Mountains east to the Pacific Ocean as an important pillar or "heartland", where the dominant ethnic group could become the ruler of the whole world *(Macaes, 2018).* This theory was further developed by Nicholas J. Spykman from the perspective of American foreign policy, but his emphasis is no longer on the core area, but rather on the surrounding periphery (Europe, the Arab region, Southeast Asia, i.e. the so-called "rimland") and its domination. By the end of the 20th century, the political concept of Eurasia had become a strategic issue primarily for American geopolitical thinkers. Zbigniew Brzezinski looks at Eurasia from the perspective of US geostrategy, where the most important thing is to maintain US influence and geopolitical pluralism with the aim of creating a US-led trans-Eurasian system. Brzezinski considers that on the Eurasian chessboard the important players are

- Europe led by France and Germany – with a special focus on Central Europe – as the western bridgehead of Eurasia;
- China as the secure point of the East, leading the eastern hemisphere of Eurasia as the Greater China, bringing together the Southeast Asian and Central Asian regions;
- Russia as a non-imperial, modernized economic centre;
- Turkey as a force capable of stabilizing Central Asia and the South Caucasus;
- Iran, which would balance power aspirations in the region including Turkey;
- India, which should be China's power counterpart based on democratic principles; and
- Japan, which is seen not so much as an Asian regional power, but rather as a representative of the US in Asia.

From these actors, a more cooperative Eurasian system of cooperation could emerge as the successor to the unilateral superpower represented by the United States (*Brzezinski, 1997*).

While the Eurasian political concept as conceived and used by Anglo-Saxon thinkers in the modern era has been centred on the total geopolitical and economic domination of the region and on the acquisition and securing of external influence, in earlier periods of history, cooperation and peaceful coexistence between the interconnected countries and the rising and falling empires of the Eurasian region was always present. In this cooperation, knowledge has migrated and developed from region to region, empowering nations. Thus, for example, food production and agricultural innovations, initially from the Fertile Crescent and China, started and spread across Eurasia, creating the opportunity to cultivate knowledge and stimulating the creation of new technologies. The emerging Eurasian power and economic centres

have also become centres of technology and innovation. However, the vast majority of technologies in general were not invented in one place, but were adopted from other societies, from copying models to transferring ideas. This transfer of knowledge could take place through peaceful trade, espionage, immigration or war (*Diamond, 2007*), and knowledge transferred in any of these ways was further developed and transmitted by competing societies, and this process was intertwined with money almost from the beginning. Ancient Mesopotamian clay tablets already show that the first written records of human activity do not deal with historiography or literature, but with trade; they describe a new financial technology. Clay tablets from 5,000 years ago were a kind of ancient financial instrument for repaying loaned goods. This ancient Babylonian system was also based on the credibility of the promise of payment, with the holders of the clay tablet trusting that if a certain condition was met, they would be entitled to a certain amount of silver if they presented the tablet. Just as the modern man trusts that by showing electronic money on his mobile phone, he will receive a specific good or service in return (*Ferguson, 2009).*

These factors – knowledge, technology, capital – already contributed to the unique heritage of the ancient Chinese Silk Road. Silk itself, the silk fabric that gave its name to this ancient connectivity, has played an important role in the lives of people from the East and West since ancient times. Chinese silk appeared in Europe as early as the 6th century BC, and remains of Chinese silk garments have been identified in a noble tomb near Stuttgart dating from the 6th century BC. Through the interconnectedness that began in the 2nd century BC, the cities, explorations and peoples along this route from the Mediterranean to the Pacific developed at the most dynamic pace over the centuries, as they exchanged knowledge, innovations and the latest technologies alongside trade in commodities. Chinese rulers have long recognized that learning and mastering the latest methods is

essential for progress and the development of cultures, economy and governance. However, the great discoveries of the 15th century completely upset the trade system, and the centre of gravity of development slowly shifted to the West, rearranging political and economic relations *(Frankopan, 2015)*.

Many experts attribute the rise of the West from the 16th century onwards to geography, as the geography of Europe had a decisive influence alongside the geographical discovery of America. Europe was divided by many great rivers, mountain ranges, dense forests and swamps, and on this difficult terrain many smaller or larger, rival states were created, and the states were further divided into rival orders, such as nobility, clergy and burghers, on which the ruling power could rely. Thus, the states of Europe were in a constant and multi-level competition and warfare with each other. This constant warfare facilitated the development of military techniques, which in turn influenced the development of other techniques. If an effective and proven innovation was created in one state, its rivals could not afford not to adopt it and possibly develop it further, otherwise they could easily be at a disadvantage. This is how the technology of sea navigation evolved to reach ever more distant areas, or how Chinese gunpowder was improved and military technology was renewed from time to time. However, this constant warfare mostly required money and more money, and thus indirectly the constant warfare also encouraged the financial system to innovate. Thanks to financial innovations, ways of collecting revenue to finance wars became increasingly efficient. To give a few examples, as a precursor of modern bonds, new types of state loans were introduced, following the Italian example, or the world-shaping innovation of the Dutch financial system was born and spread, establishing the Dutch and later British trading empires, namely the trading monopoly of joint-stock companies, one of the conditions of which was providing military assistance against enemy powers (*Ferguson, 2011*).

At the same time, the rise of the West, its discoveries and industrial revolutions, restrained the dynamic development of cooperation between the two hemispheres and eclipsed the importance of the supercontinent as a whole in global terms. From the first industrial revolution onwards, the West underwent a complete economic transformation, where innovation fused with entrepreneurship. Science joined the power competition and, in alliance with government, technology, commercial and financial innovations were all at the service of this competition. This led Europe to seek to gain a further advantage by conquering distant lands – starting with the New World and continuing with Eurasia.

By contrast, the Eastern empires, which had dominated Eurasia economically and technologically until the 15th century, were left behind. Among the reasons for lagging behind, it is worth highlighting that Asian countries have clung to old traditions and legacies of past achievements in order to preserve the power of strong centralized control, and have not taken steps to promote the widespread economic use of innovation and entrepreneurship. In the Chinese bureaucracy, built on the tradition of Confucianism, there was competition regarding the knowledge of officials, but this did not promote innovation, only perpetuated the power of the conservative elite. This approach led to seemingly disastrous setbacks, such as the abolition of the Treasure Fleet in 1433, which had been exploring Asia. The Treasure Fleet, led by Admiral Zheng He and consisting of nearly 320 ships and a crew of 30,000, sailed to India, the Arab world and the coast of East Africa, as well as Southeast Asia (some authors say as far as the coast of America), creating the opportunity for China to explore and dominate the world. However, for internal power reasons, expeditions were cancelled and several innovative developments that could have launched an industrial revolution in China were halted (*Diamond, 2007*). Along with China in the 15th century, Japan was completely closed to all outside influences and innovations until the 19th century. Much of Europe's classical knowledge, astronomy,

optics, medicine and the mathematical innovations that underpinned the Italian financial revolution, came to Europe thanks to Islam, but the Arab world itself was so overwhelmed by religious thought from the 12th century that the region fell behind in scientific development (*Ferguson, 2011*).

Although the importance of the Eurasian region (as a whole) has often vanished into oblivion during the centuries dominated by the West, the cultures and religions there have encouraged each other's development and growth. This had an impact on the development of the countries of Western Europe and, indirectly, on the strengthening of the United States. In recent years, we have again witnessed transformations that are once again making room for comprehensive Eurasian cooperation. Global changes are being brought about by, among other things, the faltering superpower of the United States, the rapid economic rise of China, the weakening of Western countries, the resurgence of Russian power, and the ongoing struggles and unresolved problems arising from uneven development (e.g. terrorism) *(Li, 2018)*. The shift in power, the spiritual, cultural and economic rebirth of Eastern cultures, and the numerous global problems are shifting the centre of gravity of the world back to where it was thousands of years ago *(Frankopan, 2015).* The changes are giving way to the rise of new international initiatives, such as China's Belt and Road Initiative (BRI) or even the Russian-led Greater Eurasia Concept, which could play a key role in the "comeback" of the Eurasia region. The power and influence of the Atlantic bloc itself seems to be gradually weakening with the rise of Asian countries. This is why Francis Fukuyama's idea that the Eurasian concept could be a better, 21st century version of globalism and Atlanticism is thought-provoking *(Lukin, 2018).*

2.2. Main geopolitical approaches to the Eurasian idea

At different stages of history, historians, philosophers and leaders of different nationalities have developed different ideologies or political concepts of Eurasia and its framework, according to the power visions of their respective countries.

China

China – or Zhongguo, the Middle Empire – has always seen itself as the centre of the world. China's ancient Silk Road and its foreign policy show that the Far Eastern country has for centuries seen the development potential of the Eurasian region as a key *(Csizmadia, 2020)*. In October 2013, Chinese President Xi Jinping announced the Belt and Road Initiative strategy for international cooperation and common development to revitalize the ancient Silk Road. The initiative aims to lay the foundations for a more active, long-term Chinese geostrategy. Regular political consultation, infrastructure interconnections, free trade, increased financial flows and dialogue between nations should be strengthened, in order to ensure broad cooperation (*Xi, 2013*).

President Xi's initiative fits in well with the Chinese Communist Party's vision of a "Chinese dream", through which China can be reborn and regain its rightful place in the international order. This idea is flexible enough to allow for a range of interpretations and to be applied to renewing objectives. When Xi Jinping took over in 2012, he gave a new ideological interpretation that combined old-style Chinese socialism with the expectations of young generations for the future. Xi offered a qualitative leap, a better and more equal way of life for Chinese society through economic development and an overall increase in living standards. The core values of this "Chinese dream" are prosperity, harmony, freedom, equality, justice, integrity and patriotism. Xi also linked the state, the nation and the individual into a unity of common destiny, the smallest element of which is the family. In the "Chinese dream",

he included China's 5,000 years of tradition and China's past greatness, as well as the model of national economic and social governance that has evolved over the past 30 years, the "policy of reform and opening up". To do all this effectively, Xi asked for and received an unprecedented strong leadership mandate. Thus, building on the results of rapid and sustained economic growth, there is a growing confidence in China's foreign policy. Resembling an "awakening dragon", a triumphant foreign policy stance has emerged in the Chinese administration. Xi has launched several foreign policy programmes, the three most important of which are:

- a new kind of power relationships, aiming to act as an equal to the US on the global stage, in international institutions;
- to act as a helping "big brother" regarding neighbouring countries;
- the Belt and Road Initiative, which proposes a new cooperative direction for Eurasia.

Beyond the clear internal economic and financial goals – such as developing the western provinces, strengthening the international competitiveness of Chinese firms, utilizing excess industrial capacity, strengthening the international acceptance of the RMB and achieving international reserve currency status, etc. – the BRI is a long-term geopolitical plan that requires long-term thinking and logic similar to a game of Eurasian "go" to increase influence. China's goal is to transform itself from a regional power in Asia into a global power by building economic and trade links, and for this it needs the cooperation of the BRI countries, including Europe. The main focus is therefore on win-win cooperation (*Ferdinand, 2016*).

The programme will give China and its partners the opportunity to work together on joint projects to develop trade, infrastructure,

sustainable green and digital developments, which appear now as a major trend *(Li, 2018)*. In this context, China is promoting a two-way relationship: i.e. in addition to strengthening its own exports, it also welcomes investment and goods to China. The initiative to strengthen the multipolar world order fits perfectly into the megatrends shaping today's world, both in responding to the challenges that emerge and in contributing to the development of the partners along the Eurasian axis. In the context of the BRI, by January 2021, 171 countries and international organizations had signed a total of 205 cooperation agreements with China to jointly build the new Silk Road *(Xinhua, 2021a)*.

Russia

In addition to the Chinese strategy, the 20th century saw the emergence of other ideas for Eurasian cooperation in the region, of which the Russian-initiated geopolitical concept, presented in detail by *Mostafa (2013)*, is one of the most frequently mentioned.

In the context of the Russian Eurasia idea, classical and neo-classical thinkers mainly focus on Russia's strategic, geopolitical and security interests. They argue that the Eurasian region is the main pillar of the world, with Russia at its centre, which has a natural right and power to govern the region. The main argument of Russian Eurasian thinkers is that Russia's territory spans both Europe and Asia, and that the people living in the country as well as its geography and culture, bear the elements of both. According to Leonid Gumilev, one of the most influential figures in the Russian Eurasian thought, Russia is a central power not only historically and culturally, but also politically, economically and geographically, located in the middle of the world, in the Eurasian region, with the main goal of finding a balance between European and Asian interests. In the 21st century, this idea was further developed by Alexander Dugin, a major figure in the new Russian geopolitics, who created the idea of Russian Neo-Eurasianism. By this definition, Russia is neither

East nor West, neither Europe nor Asia, but Eurasia. The main objective of the new Russian geopolitics is to build a multipolar world order, as opposed to a unipolar world order governed from the Atlantic space, which should unite into geo-economic zones along the Moscow-Berlin, Moscow-Tehran, Moscow-Tokyo and Moscow-Beijing axes. But Russia must not fall into the trap of a regional empire, because Russia is unthinkable without an Empire (*Szilágyi, 2019*).

All of this illustrates well that Russia has always sought to reaffirm its status as a great power, which was the focus of Russian foreign policy under both tsarist Russia and the Soviet Union. Following the break-up of the Soviet Union, Russian political scientists developed the concept of a "Greater Eurasia" after Russia's and China's relations with the West began to weaken. The essence of the concept of cooperation bringing together India, Central Asia, China and Russia is to join the Eastern powers, which are being side-lined by the West in the global system, and to become the economic and political centres of an emerging multipolar world.

Russian President Vladimir Putin has frequently spoken about Eurasian identity and cooperation, and in 2016 at the St. Petersburg International Economic Forum, he presented the Greater Eurasia Concept strategy, which fits in with Russia's "Pivot to East" foreign policy *(Li, 2018).* While the concept does not yet contain concrete measures, it does signal a clear commitment to a multipolar world order in which Russia, together with other powers in the region, is a shaper of geopolitical and geo-economic processes. The concept aims to create and strengthen a cooperation "from Lisbon to Vladivostok" which can be primarily perceived as an economic cooperation by removing trade barriers and encouraging investment. One form of this could be the Eurasian Economic Union, established in 2015 with Russian participation, which covers the country's primary zone of influence, but Eurasian cooperation in a broad sense is also open

to European countries. In this sense, the focus of the geopolitical, economic and ideological strategy is to establish an economic and trade cooperation involving both the European Union and China. A particular feature of the Greater Eurasia Concept is that it is open to the accession of new countries and partnerships with other international partners, as opposed to the previous Russian foreign policy direction. This is evidenced by President Putin's plans to consult with the Shanghai Cooperation Organization (SCO), the Association of Southeast Asian Nations (ASEAN) and the Eurasian Economic Union (EAEU) to secure a broader partnership.

Kazakhstan

The Eurasian concept and cooperation are manifested as a concrete ideology in Kazakhstan, where the country's leadership refers to the Eurasian idea as a means of ensuring and maintaining peace, solidarity and unity between the different ethnic groups living in the country *(Mostafa, 2013).* Geographically, Kazakhstan is an Asian country (although 10% of its territory belongs to Europe), but its ethnic diversity and geopolitical, geo-economic and historical characteristics make it a Eurasian state.

The Eurasian concept developed by the Kazakh leadership in the 1990s was based on the premise that the country is located on both continents and therefore acts as a bridge between Europe and Asia. The concept was first put forward by President Nursultan Nazarbayev at the Moscow State University in 1994, and was followed by a number of systemic programmes, including the creation of the Eurasian Union. According to the president's vision, if we draw a vertical line from Russia to India in a north-south direction, we see a "zone" of "Eurasian" countries that are not connected to either the West or the East. The countries in the zone are at the heart of the Eurasian region and, despite their many differences, they form an important group of countries with potential resources that affect not only the balance between Europe and Asia, but also the geopolitical balance of the world.

Nazarbayev also argued that the Eurasian Union should be competitive in the global economy and that integration should have a place in the new global financial system. Furthermore, the Union can be a bridge over the dynamic development processes in the European Union, East, South-East and South Asia, which require an ever wider range of actors and the support of society on a voluntary basis *(Mostafa, 2013)*.

The Kazakh Eurasian concept serves both foreign policy and domestic policy objectives. In terms of foreign policy, the leadership wants to build a partnership with Russia and other countries in the region through Eurasian cooperation and to act as a bridge between Asia and Europe, building on Eurasian solidarity to ensure peace, mutual understanding and stability between the two continents. The government's domestic policy objective is to develop a national attitude to ensure peaceful and harmonious coexistence of ethnically and religiously diverse groups through the idea of Eurasia.

Other approaches

For the Turkish, Eurasia means the territory inhabited by the Turkic peoples, and so their vision of cooperation is to create a Turkic commonwealth by uniting the Turkic peoples living outside Turkey, in Russia, the Balkans or other Central Asian countries. The Turkish concept was initiated after the collapse of the Soviet Union by Turkish-Muslim thinkers living in Russian territories, who believed that they themselves were the embodiment of Eurasia, and that Russia could only become the leading power in the Eurasian region if the Muslim population was taken into account. However, the Turkish concept was only developed in academic circles and did not become a fundamental guiding concept in Turkish foreign policy *(Mostafa, 2013)*.

In a broader geographical interpretation of the Eurasian idea, it is also worth examining the European Union's attitude towards the Russian concept of Eurasian integration, the Eurasian Economic

Union, and the Chinese Belt and Road Initiative. In view of the rapid development of Asian economies and their close trade relations with the EU, the EU created the "Connecting Europe and Asia – Building Blocks for an EU Strategy" in 2018 to develop relations with Asia and is increasingly seeking to sign free trade agreements with Eastern countries, such as a strategic partnership with ASEAN. According to the "Connecting Europe and Asia" document, the EU's preferred principles of connectivity are sustainability, a comprehensive approach (digital and physical networks for trade, energy and transport) and international rules-based connectivity. In this spirit, the EU wishes to work with its neighbours and Asian partners in three main areas:

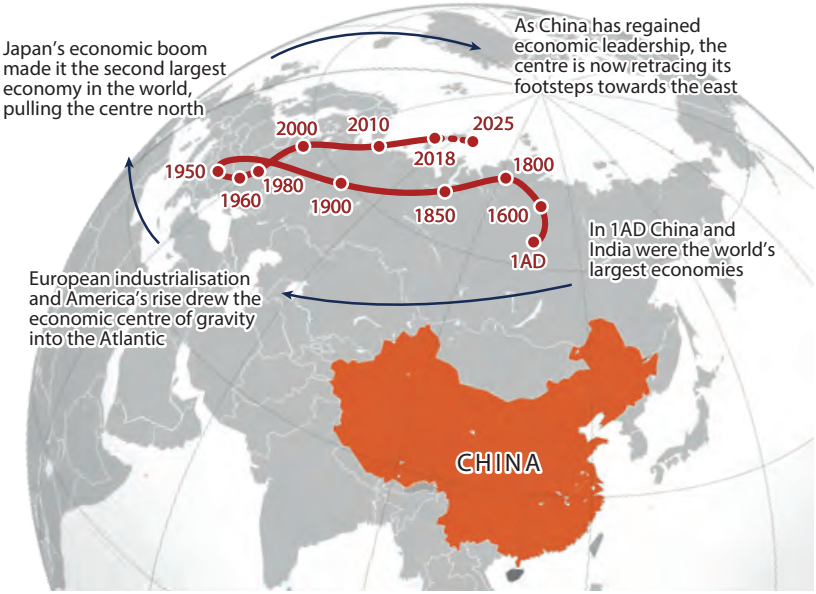
- Priority transport corridors, efficient digital connections and energy interconnections that serve public interests;
- Rules and standards designed together for a more efficient flow of people, goods, services and capital;
- Mobilizing resources towards sectors and regions facing an absence of investment *(European Union, 2018)*.

These EU ambitions and the acknowledgement of the rise of the Eastern countries could be seen as an initial sign of broader Eurasian cooperation in the longer term *(CEPS, 2021)*.

Lessons from different approaches

In the 21st century, the geopolitical importance of the region has been greatly enhanced by the growing economic role of Asian countries, especially China, and it is not for nothing that experts call this period full of changes "the century of Asia" or "Eurasia" *(Macaes, 2018)*. These conclusions are supported by the theory of Danny Quah, Dean of the Lee Kuan Yew School of Public Policy, that the centre of gravity of the world economy is steadily shifting from West to East, more specifically to the Eurasian axis, due to the rise of China and the East Asian countries *(Figure 1)*.

Figure 1: Map of the world's changing economic centre of gravity



Source: The Economist (2018)

The current economic performance of countries that were economically peripheral in previous decades, such as China, has a significant impact on the state of the world economy (*Quah, 2011*). Thus, in recent years, but especially in the pandemic year 2020, it became clear that the rapidly developing countries of the Eurasian region can have a decisive impact on the growth of the world economy and can be the shapers of changes in the balance of power. Global problems have reinforced the need for multilateral cooperation. If connectivity alone is taken as a basis, the Asian Development Bank's 2017 forecast calls for USD 26,000 billion (USD 1,700 billion per year) worth of infrastructure development in Asia by 2030 which also includes the costs of climate change. The crisis following the COVID-19 outbreak has shown that there is a growing need to jointly develop Eurasia's infrastructure connectivity to ensure the smooth functioning of supply chains *(ADB, 2017)*.

Although the different traditional concepts of Eurasia partly stem from different national aspirations and cover different regions, they still illustrate that most of the major economies of the supercontinent are thinking in terms of a larger Eurasian framework. It is therefore becoming increasingly essential to establish a regular Eurasian dialogue and deepen cooperation between the countries of the region, not only in the fields of economics and finance, but also in technology, science and sustainable development *(Matolcsy, 2020).* In the following, we identify the critical areas (megatrends) of the 21st century that are not only of crucial importance in the processes of the coming decades, but also provide an unparalleled opportunity to strengthen Eurasian cooperation "from Lisbon to Shanghai".

3. The role of 21st century megatrends in shaping the Eurasian power landscape

3.1. Carbon-neutral transition and sustainability

How the economies of the supercontinent can work together to make the carbon-neutral transition is critical to strengthening trans-European networks. The need for a change in the economic model was already high on the agenda before the pandemic, but the post-pandemic recovery has opened up even more space for the thought of change. One of the most significant developments has been China's marked shift towards a green transition. The issue of a sustainable economic model is becoming more and more prominent in China's economic policy and international actions. In 2020, Chinese President Xi Jinping announced the country's carbon neutrality target date (2060) and set 2030 as the peak year for greenhouse gas emissions *(FMPRC, 2020)*. The carbon-neutral transition is currently in line with the phase and medium-term direction of China's economic development: after the efforts of the past decades to eradicate extreme poverty and reach the goal of a "moderately prosperous society" by 2020 (xiaokang

society; *State Council, 2020a*), qualitative factors (innovation, knowledge-based economy, digitalization, development of services) will increasingly play a role alongside the quantitative dimensions of growth (e.g. expansion of mass production capacities). This is reflected in the 14th Five-Year Plan, which entered into force in 2021, focusing on internal economic circulation, higher quality and new, "contactless" types of consumption, as well as strengthening domestic high-tech industries and the services sector *(State Council, 2020b; Xinhua, 2020)*. The green transition fits in well with this ambition. The target of the 14th Five-Year Plan is for China to reduce emissions per unit of GDP by 18% by the end of the 2021-2025 period.

The Chinese green transition could become the engine of economic development in Eurasia in the coming period. It will certainly have an impact on a significant part of the Asian and European economies if the BRI moves towards green investment. And this change has already begun: Before the pandemic, President Xi Jinping announced the Green Belt and Road Initiative. In April 2019, in the framework of the second Belt and Road Forum for International Cooperation, China and its international partners established the BRI International Green Development Coalition, currently involving 25 countries and 9 international organizations (as well as companies and NGOs) (BRI International Green Development Coalition, BRIGC; *BRIGC 2020, 2021*).

In the framework of the Green Belt and Road, China has sought to develop environmental guidelines and organizational frameworks for BRI investments in recent years. *Coenen et al. (2021)* surveyed about two dozen guidelines and policy documents issued by the Chinese government and industry organizations in the context of the BRI environmental and climate principles. They also identified a number of international organizations that have been set up for creating standards, sharing knowledge and dialogue, at the initiative of China, in order to green the BRI (e.g. BRIGC). Out of this complex regulatory and organizational web, the "Guidance

on Promoting a Green Belt and Road" and the "Belt and Road Ecological and Environmental Cooperation Plan" issued by the Ministry of Environment in 2017 stand out. The guidelines show that the Green Silk Road is primarily based on the initiatives of market players, with the role of the states being to provide the framework, create common platforms and share knowledge. Beijing would like to see the following principles applied when Chinese companies invest in the BRI abroad *(Coenen et al., 2021; BRIGC, 2020)*:

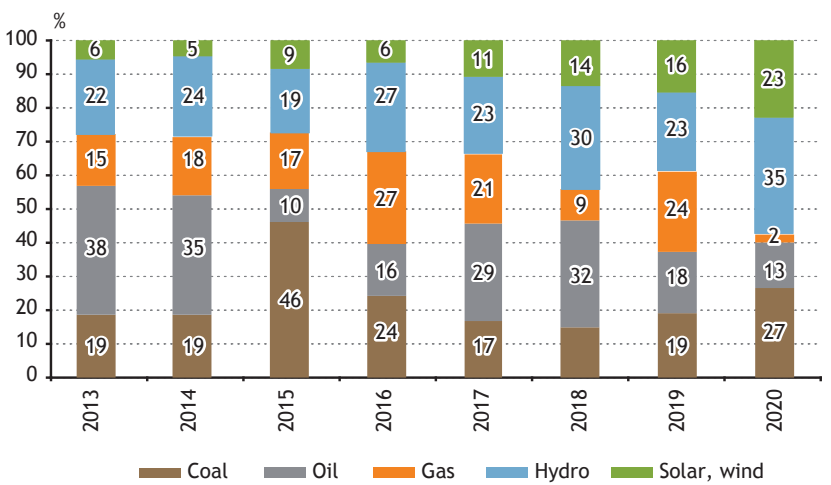
- International and host-country environmental regulations must always be respected.
- An environmental impact assessment is recommended.
- Companies should also develop their own environmental policies and responsibility principles in the spirit of the guidelines (for example, the major Chinese banks and multilateral development banks that have played an important role in financing the BRI have laid down such guidelines, including on the non-reliance on coal-fired investments, see also *Han-Nedopil, 2021; Politi, 2021*).

The guidelines of the Green Silk Road can contribute to a more coherent Eurasian model for sustainable growth. In this respect, it is particularly important to include Asian countries that are still in the early stages of economic development and rely on conventional fossil energy sources in the current phase of extensive growth *(BRIGC, 2020)*. In their case, the Green Silk Road and Chinese capital can contribute to the realization of an alternative to high-carbon traditional industrialization. For example, in February 2021, Bangladesh reached an agreement with Beijing that China would no longer participate in the financing of high-polluting and energy-consuming facilities, in particular coal mines and coal-fired power plants. The parties are changing the use of Chinese loans amounting to USD 3.6 billion within the framework of previous Memoranda of Understanding:

Bangladesh may choose other, smaller investments which have to meet certain sustainability requirements (impact assessment, environmental plan). China is investing USD 500 million to build 450 megawatts of new solar capacity and 50 megawatts of new wind capacity through a Bangladesh-China joint venture, according to an announcement (*Han – Nedopil, 2021*).

The example of the "coal ban" in Bangladesh is particularly forward-looking, considering that China is mainly implementing energy projects under the auspices of the BRI. Around two-thirds of the Belt and Road Initiative investments completed by 2019 (USD 50 billion) were in the energy sector. More than 40% of the capital invested (at least USD 20 billion) was spent on renewable energy capacities, while fossil-based projects accounted for 30% and electricity grid development for 24% *(Eder – Mardell, 2019).* In the field of renewable energies, the focus has been on large-scale hydropower plants, but solar investments are also growing. *Figure 2* shows the distribution of the BRI's energy investments by different renewable and fossil energy sources.

Figure 2: Distribution of Belt and Road Initiative energy investments by energy type



Source: Own compilation, based on Nedopil (2021)

China is the largest producer and exporter of equipment for renewable energy generation, and thus the green transformation of the Eurasian region could be greatly aided by the technology and knowledge shared by Chinese investors *(Coenen et al., 2021)*. In many respects, the Green Silk Road is also linked to the Digital Silk Road *(Chapter 3.2)*, whose digital and satellite solutions can also be used to monitor environmental performance. Foreign investment guidelines and Chinese willingness to change the economic model, if partner countries cooperate, can significantly strengthen Eurasian economic growth and the role of the supercontinent in global processes. A good example of multilateral cooperation is the Peljesac Bridge in Croatia, the first BRI project financed by the European Union and implemented by a Chinese consortium. The bridge is being built in accordance with EU environmental regulations, so the Chinese company is placing great emphasis on noise protection, among other things *(Seenews, 2021*).

At present, the carbon-neutral transition is the most important area where the interests and aspirations of the European Union and China are well aligned, and the greening of economies can be the most crucial area of Eurasian cooperation in the coming years. There is great potential for both the EU and China and other Asian actors to create synergies between green strategies, especially as the EU's new seven-year budget and the Next Generation EU recovery fund put green investments and the circular economy model at the heart of the EU's new seven-year budget. In 2019, the EU launched the European Green Deal to achieve climate neutrality by 2050. A total of EUR 600 billion (around USD 713 billion) of funding is earmarked for investment in the initiative from the Next Generation EU and the seven-year budget *(European Commission, 2021)*. In July, the European Commission published its latest package of proposals to achieve its climate neutrality target: the "Fit for 55" plan aims to reduce the EU's net GHG emissions by 55% by 2030 compared to 1990 levels. To this end, steps such as the gradual renewal of Europe's vehicle fleet

and the inclusion of new sectors (e.g. transport and real estate) in the CO2 quota trading scheme are envisaged. The ambitions and investments of the European Green Deal and the Green Silk Road are well linked: in addition to the infrastructure and renewable energy projects already mentioned, the European and Chinese sides can also partner in the renewal of transport. There are strong ambitions to develop railways and electric cars in both the West and the East. While Chinese manufacturers have so far failed to penetrate the European market for conventional cars, this could change for electric vehicles. NIO, a challenger to the American Tesla, announced in May that it would open sales outlets in Norway, a particularly environmentally conscious market (*Bloomberg, 2021a*). Regarding the development of the European railway networks, China's Fuxing high-speed trains could also attract more attention as the Chinese developer places increasing emphasis on high environmental standards (*State Council, 2021a*).

In addition to China's role, it is worth highlighting two other Asian initiatives that could significantly strengthen multilateral cooperation, especially in East and Southeast Asia, and the solutions involved may also be relevant in Eurasia. One is the Green New Deal, unveiled last year as part of South Korea's comprehensive development plan (Korean New Deal, KND), which earmarks a total of around USD 62 billion in public and private resources for the carbon-neutral transition by 2025, through projects such as environmentally friendly mobility, green industrial complexes and schools. No fewer than 659,000 new jobs will be created by the green transition *(KND, 2020)*. Another prominent initiative is the Singapore government's Green Plan 2030 action plan whose pillars focus on green and sustainable urban living, environmental education, energy management, green industries and environmental resilience *(Government of Singapore, 2021).* Singapore is at the forefront of research into solutions that have the potential to revolutionize carbon neutrality efforts (e.g. CO2 sequestration technologies, hydrogen propulsion, artificial meat) and green finance, making it a knowledge hub for

the green revolution in Eurasia (*see, e.g., Straits Times, 2020; CNBC, 2020; CNA, 2021; MAS, 2021a*).

3.2. The rise of digital technologies

Digitalization and the greater role of technological progress than ever before also create a megatrend that offers opportunities for cooperation. However, developments in recent years have shown that the issues of technological sovereignty and critical infrastructure, economic and national security interests present a particularly complex challenge for both Western and Eastern decision-makers when it comes to implementing cooperation. The issue can also be approached from the changing role of China.

The Western narrative has long been that Asian economies are imitators, but this is far from being the case. Because innovation is not just about inventing new things, but also includes adapting innovations to everyday society. The East is leading this change. A good example is the adoption of mobile payments: while in China, the two largest mobile wallet providers, Alipay and WeChat Pay, had a combined 1.1 billion active users in 2020 (nearly 80% of the population; *Globepay, 2020*), in the euro area, cash is still preferred for 73% of point-of-sale and person-to-person payments (*Cash Essentials, 2020*).

The rapid digitization of China's economy – through popular internet platforms and apps – has contributed significantly to the fact that in 2020, the year of the outbreak of the COVID-19 crisis, China was one of the few major economies to show positive growth (+2.3%; *Xinhua, 2021b*). The foundations for Chinese success were previously laid down by Deng Xiaoping, who initiated pragmatic and technocratic development. Taking Singapore's development as a model, Deng opened up the economy and set China on the path to knowledge accumulation. His strategy was to test the new knowledge, economic policy and technological models in small sample areas, be they cities such as Shanghai, Shenzhen, Chongqing or special economic zones.

As Deng said: "cross the river by feeling the stones". By the 21st century, thanks to a policy of "reform and opening up", scientific and technological innovation has become a key driver of Chinese growth, according to a comprehensive study by the National Development and Reform Commission *(NDRC, 2020).* The special zones and cities are competing with each other to come up with the best economic management solutions and scientific innovations, but they are also working together and sharing knowledge for the common goal of China's global competitiveness and geopolitical expansion. The "Made in China 2025" programme, which aims to increase the knowledge content and added value of Chinese products and services, truly reflects this model. The strategy clearly identifies the need to fuse the internet with traditional industries and to develop domestic capabilities and capacities in the fields of mechanical engineering, robotics, aeronautics and semiconductor manufacturing *(Ito, 2019; Keane–Yu, 2019; Dekker et al., 2020)*. National high-tech industrial development zones (HIDZs), service-focused demonstration zones and various local science parks form the backbone of innovation activity in the country's special zones. China's progress in computing capacity is also noteworthy: in the world's top 500 supercomputers, it held 19.3% of the total in June 2021, the third largest share after the US (30.6%) and Japan (22.7%), and an increase of more than 7 percentage points compared to 10 years earlier *(Top 500 List, 2021)*. In fact, in China, through the activities of the various special zones, a technological and economic competition is taking place, similar to the centuries-old competition between European states, but according to a refined, cooperative Chinese model.

The Chinese innovation model is based on a specific partnership between the state and the private sector (*see, e.g., Ito, 2019; Shi-Kupfer – Ohlberg, 2019)*. In the latest chapter of its "reform and opening up" policy, Internet companies are given a prominent role with international expansion plans that are well in line with the "going out" policy *(Keane–Yu, 2019; Mogni–Goethals, 2020)*. The largest players in the platform economy, Alibaba, Tencent and

Baidu (commonly abbreviated as BAT), have gained significant market share in recent years in various markets in Eurasia, particularly in Southeast Asia, but have also targeted India, Central Asia and even Europe. *Figure 3* shows examples of the most important Chinese and the largest (partly) Chinese-owned online platforms in South and Southeast Asia. Alibaba is already present in the European Union with its AliExpress platform and is one of the top three online marketplaces in 13 EU countries *(Dekker et al., 2020)*. In Spain and Italy, in addition to Asian sellers, local businesses can now also advertise their products on AliExpress *(E-Commerce News, 2019)*. Chinese telecom and hardware companies, such as Huawei and ZTE, have achieved international successes similar to these platforms *(Dekker et al., 2020)*.

Figure 3: Examples of Chinese and (partly) Chinese-owned online platforms in South and Southeast Asia

Source: Own compilation based on information of Bocconi Students Capital Markets. https://www.bscapitalmarkets.com/why-south-east-asia-is-so-important-to-alibaba.html. Date of download: 30 June 2021 Black squares indicate Chinese ownership in foreign companies.

The BRI's digital branch, the Digital Silk Road (DSR), opens up further opportunities for these companies and their partners. The initiative has come to the fore most recently, as the BRI has shifted towards telecoms and digital investments and collaborations, partly as a result of the pandemic *(Dekker et al., 2020; Triolo et al., 2020)*. In addition to the development of physical infrastructure, 5G networks, data centres and platforms, navigation systems (the Chinese BeiDou satellite system) and international R&D activities will be expanded *(Shen, 2018; Keane–Yu, 2019)*. Participating economies can gain access to Chinese technology, resulting in meaningful knowledge transfer *(Kurlantzick, 2020)*. *Eder-Mardell (2019)* estimates that China has invested at least USD 10 billion in DSR projects, while other calculations suggest that the amount spent on related investments may have reached USD 79 billion by the end of 2019 *(Deloitte China, 2019)*.

One of the greatest opportunities of DSR is affordable technology that can enable the developing world to leapfrog and digitally transform its economy. These countries often lack basic infrastructures, but the demand for new digital technologies is increasing exponentially not only in these countries, but also in the Central and Eastern European region *(Shapiro, 2020)*. DSR can help meet this demand and contribute to social inclusion. The example of China's western, more isolated and traditionally less developed regions shows that engaging in the global e-commerce can significantly improve the prospects of any region.

Chinese technologies can reach the countries of the New Silk Road through the BRI – just as old Chinese inventions (paper, gunpowder, compass or printing) arrived in the Eurasian region along the historic Silk Road *(Fung et al., 2018)*. China is thus playing an increasingly important role in shaping international standards. Chinese ambitions in this area have also been strengthened, with Beijing launching the "China Standards 2035" standard-setting strategy and the World Internet Conference also known as the Wuzhen Summit *(Dekker et al., 2020)*.

Setting international standards is also a strategic objective for the European Union, and in the age of digitalization, there is a growing need for a global consensus on the fundamental issues of technology. Standard-setting could thus be another important area of Eurasian cooperation, although the goals, principles and motivations of the different actors in this area differ more than in the carbon-neutral transition (see e.g. data protection, technological sovereignty, cybersecurity and content management issues).

For the Western world and China, the appearance and strengthening of other emerging high-tech powers – notably South Korea, Singapore, India, Israel and the United Arab Emirates (UAE) – also represents an opportunity. In the World Intellectual Property Organization's (WIPO) Global Innovation Index 2020, Western countries (Switzerland, USA, UK, Nordic countries, Netherlands) lead the world ranking, but Singapore is now in 8th place, Korea in 10th, Hong Kong (taken into account separately) in 11th, and China in 14th place (putting China at the top of the list of upper middle-income countries). Israel finished as 13th, Japan as 16th and the UAE as 34th. According to the report, China achieves almost similar innovation performance ("innovation output – knowledge and technology acquired") with lower inputs ("innovation input", e.g. institutions, human capital, infrastructure) than the Netherlands, Germany, the US and the UK at the top of the overall ranking, and is leading in Asia in this respect (*WIPO, 2020*). This is also underpinned by the fact that last year, China filed the highest number of patent applications to the international institution, bringing its share to almost 25%. The second most patent applications were filed from the USA (share: 21.5%), while Japan and Germany were also among the biggest contenders, although their shares (18.3% and 6.8%, respectively) were down on the previous year (*State Council, 2021b*).

According to the latest R&D spending data available in the UNESCO database, calculated at purchasing power parity, South Korea leads the world in R&D spending as a share of GDP, with 4.1% of its GDP devoted to R&D (*UNESCO, 2021*). In the context of the Digital New Deal, Seoul has set itself the goal of moving even further ahead in self-innovation and becoming "from a fast follower to a first mover" (*KND, 2020*). Key digital projects in the context of the USD 49 billion programme include the integration of data, networks and artificial intelligence systems at national level, the digitalization of the education infrastructure (integrated e-learning, full equipment of schools with IT tools and wireless networks), the expansion of the contactless economy, and the creation of smart public services and transport. To support the operation of these systems, Korean satellite navigation capabilities are to be significantly upgraded under the country's space programme (*Bloomberg, 2021b*).

Alongside South Korea, Japan and Singapore can also join Eurasian cooperation as knowledge hubs – the former ranks second in terms of R&D spending as a share of GDP (3.4%), while the latter is also among the leaders with 2.1% (by comparison, China spends 2%, the USA 2.7% and Germany 2.9%). Japan has recently attracted attention for its development of robots and Singapore for its pioneering green economy solutions (membrane technology, hydrogen propulsion, carbon dioxide recovery), in partnership with transnational energy companies with Western background such as Shell. Some of the green economy innovations are digitally based (e.g. carbon offsetting platform), also thanks to Singapore's long-standing digitalization programme (Smart Nation). A similar initiative (Smart Dubai) has been launched in the United Arab Emirates, where the strategic goal is to create smart cities, world-class high-tech hubs. Knowledge sharing is already taking place between the Singapore and Emirates programmes, in the context of the "Abu Dhabi-Singapore Smart Cities Open Innovation Challenge 2021", announced in May, inviting ideas from Singapore companies and research institutes

to address development needs and challenges in Abu Dhabi (*The National News, 2021*).

3.3. Renewal of the monetary system

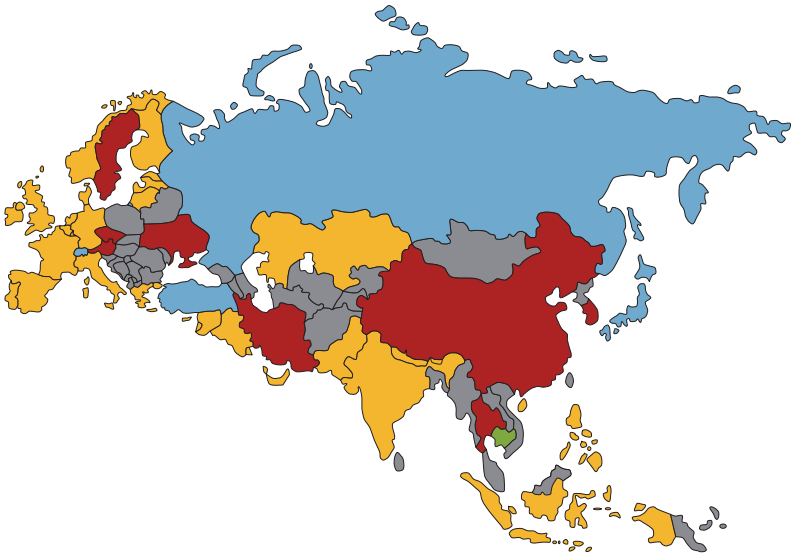
Digitalization naturally implies the spread of electronic payments – a new trend that has emerged in recent years and with the pandemic. New forms of electronic money were born alongside the "conventional" digital money held in commercial bank accounts. The real revolution in this respect is that central banks have recently been at the forefront of the digital transformation of money with the concept of central bank digital currencies (CBDC). Like cash, CBDC is a bank liability issued by the central bank; however, it exists in a digital form and is available to the general public (for more details see *Banai–Nagy, 2021*). There are a number of monetary theory, monetary policy, financial stability and technological issues related to this form of money, among which it is worth highlighting here that CBDC is a response by states to the challenges posed by private economic actors, especially big tech firms and large payment service providers (e.g., Facebook – Libra). When one considers that 83% of payments in China were already made digitally three years ago *(Atlantic Council, 2020)*, and these were predominantly done through the mobile apps of two Internet companies (Alibaba – Alipay, Tencent – WeChat Pay), it becomes clear why China has become one of the pioneers in CBDC development. The People's Bank of China (PBOC) established the Institute of Digital Money in 2017 and launched nationwide testing of the digital renminbi (e-CNY) in actual payments in 2020, with cash benefits and prizes being distributed (the date of implementation is not yet known).

China considers the CBDC to be very relevant to its financial sovereignty, but it could also have implications far beyond its borders, including shaping the Eurasian power space. While the USD is likely to remain the currency of choice for international transactions for a long time to come, introduction of the CBDC

may promote the use of the RMB abroad more effectively than any other measure. According to the official information, the digital renminbi will be suitable for making payments directly and quickly, and it will also work in an offline environment. This potentially represents a huge time and cost advantage over today's US-centric international payment infrastructure (the SWIFT system) *(Birch, 2020)*. Such a solution could be in high demand, for example from the masses of migrant workers from South-East and Central Asia, the Chinese diaspora, and even from the cash flows that will be generated by the financing of the BRI. If other features of the Chinese currency develop favourably (further financial liberalization, lifting of capital restrictions, etc.), there is a good chance that in the longer term, transactions in e-CNY will further strengthen the link between the Eurasian economies. In a sense, the channels for this are already prepared: the expanding Chinese tech giants can later easily offer e-CNY payment options on the popular local payment platforms they own (Lazada, bKash, Akulaku, Paytm) (for more details, see *Boros–Horváth, 2021*).

Digital central bank money can draw Eurasian ties even closer, not only through the use of the digital CNY, but also by linking the various central bank CBDC initiatives. According to the Atlantic Council's collection *(Atlantic Council CBDC Tracker, 2021)*, seven countries in Eurasia have reached the (at least limited) testing phase of digital central bank money (China, South Korea, Thailand, Saudi Arabia, United Arab Emirates, Sweden and Ukraine), and Cambodia launched a payment system, Bakong, similar to CBDC in October 2020. In addition, many central banks have already started researching or technically preparing for digital currencies *(Figure 4).* In July, the European Central Bank announced the launch of the Digital Euro Project, the first year of which will focus on developing of the concept, market impact, necessary legislative changes and consultation with economic operators (*ECB, 2021*).

Figure 4: CBDC projects in Eurasia



- *Pilot - initiated (small-scale) testing in a real environment*
- *Development - Initiated technical build and early testing in controlled environments*
- *Research - Established working groups to explore the use cases, impact and feasibility of CBDC*
- *Launched*

Source: Own compilation based on Atlantic Council CBDC Tracker, 2021 The euro area countries are to be considered together.

Today, the development of digital central bank money has emerged as one of the most promising areas of multilateral cooperation. Among the countries at the forefront of establishing CBDC, China and Hong Kong as well as Thailand and the United Arab Emirates have launched the Multiple CBDC Bridge Project, which is exploring the possibility of a new digital basis for cross-border payments, linking different CBDC developments, in collaboration with the Bank for International Settlements Innovation Hub (BISIH) (*BIS, 2021*). The m-CBDC Bridge is based on an initiative of the Hong Kong Monetary Authority (HKMA) and the Bank of Thailand (BoT) which builds on the

so-called Inthanon Project of the CBDC development in Thailand. The BoT has already tested a prototype wholesale CBDC in the framework of the Inthanon Project and recently extended its development towards the development of a retail CBDC for the real economy (*BoT, 2021*). In June, the Thai central bank hired German technology firm Giesecke+Devrient (G+D) to create the prototype of retail CBDC and allocated THB 10 million (USD 320,000) for the current preparatory phase of the full roll-out of digital CBDC within 3-5 years (*Coindesk, 2021*). But this is not the only example of cooperation between Europe and Asia: in July, the Monetary Authority of Singapore and the Banque de France (BdF) successfully concluded their joint project to test the cross-border wholesale circulation of digital central banknotes by simulating the SGD-EUR currency pair *(MAS, 2021b)*. Also embodying significant cross-border cooperation is the so-called Aber Project, a bilateral CBDC development between Saudi Arabia and the Emirates which has already enabled the testing of a joint-issue pilot digital banknote (*CBUAE – SCB, 2020*).

The increase in international cooperation illustrates what has been evident since (at the earliest) the creation of the gold standard or the Bretton Woods system: the global economy, interconnected by a thousand threads, requires some kind of international consensus on its monetary system, a common or at least a single solution, a framework. Without the ability to process cross-border payments efficiently, the global economy cannot deliver the desired level of prosperity. The legacy of Bretton Woods lives on in the role of the USD as the world's currency, but it is now clear that the global financial system needs to be renewed in the digital payments dimension (among others). One aspect of this is the interconnection of CBDC projects, and another is the interconnection of instant payment schemes (IPS), which has already been implemented in many places. One of the active shapers of this thinking is the Monetary Authority of Singapore which at the end of July proposed a global network of national ISPs in partnership with BISIH called Nexus (*MAS, 2021c*).

The creation of an instant international payment system protocol, similar to Internet protocols, would greatly support the exploitation of the potential of cooperation at Eurasian and global level.

4. Outlook

Looking at the different historical periods, we can see that the poles of power in the world are constantly changing as different regions or countries rise and then decline. Global changes show that only by thinking in terms of a multipolar world order can sustainable progress be achieved and the challenges for all humanity be addressed. The weakening of the Western Atlantic axis, the rapid economic development of China and other Eastern countries and China's commitment to multilateral cooperation point to the strengthening of the Eurasian axis and a broader cooperation in the future. Recognizing the changes of our times, it can be concluded that the Eurasian region, which is constantly moving forward, can only become and remain competitive in the long term, both geopolitically and economically, if cooperation between countries moves forward along megatrends, focusing on the development of technology, knowledge and capital (*Matolcsy, 2021*).

From the perspective of Eurasian cooperation, the megatrends of the 21st century raise above all the question of whether the European Union, China and the other countries in the region can adequately prioritize common interests and aspirations over their natural differences, and whether they can build on each other's strengths to pursue a mutually beneficial path to exploit economic opportunities (transition to carbon-neutrality, digitalization, financial reform). If so, there is a good chance that the megatrends will lead to the further rise of the Eurasian supercontinent and its strengthening as a new geopolitical pole. In this cooperation, the

development of the relationship between China and the European Union will be particularly decisive, as these powers represent the old and new centres of the two "ends" of the Eurasian supercontinent, Europe and Asia. In the long term, the parties may recognize that their common interests are stronger than various other (ideological, partly economic) considerations, and in this recognition, Central and Eastern Europe can play a very important role, not only as a bridge between the two powers, but also as an engine for cooperation through international investment. Overall, therefore, Eurasian cooperation on megatrends is one of the foundations for sustainable development and competitiveness.

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Chapter 1

Geopolitics

Geoeconomic Connectivity Trends in the Area from Lisbon to Vladivostok

Dmitry Erokhin – Elena Rovenskaya – Sergey Tkachuk

The COVID-19 pandemic has escalated two seemingly antagonistic trends. On the one hand, many countries are increasingly taking a national perspective in response to various challenges, ranging from migration to dealing with the new coronavirus. On the other hand, it has become clear that it is impossible to solve major global crises without strong, broad-based international cooperation. Economic integration is one important channel of international cooperation. This article analyses the existing integration processes in the area from Lisbon to Vladivostok, led by the European Union (EU) and the Eurasian Economic Union (EAEU), considers future factors that could significantly affect integration in the region, provides qualitative and quantitative scenarios for the development of relations between the EU and the EAEU, and suggests revising the approach to integration from focusing on eliminating tariffs to facilitating mutually beneficial cooperation agendas in various sectors in a flexible and open manner.

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1. Introduction

The COVID-19 pandemic has escalated two seemingly antagonistic tendencies. On the one hand, many countries are increasingly taking a national perspective in response to various challenges, ranging from migration to dealing with the new coronavirus. On the other hand, it has become clear that it is impossible to solve major global crises without strong, broad-based international cooperation. As crises become more and more systemic, and their impacts are thus far-reaching and cut across all aspects of our lives, it is crucial to reconcile this antagonism and find viable formats and frameworks for international cooperation that make it possible to ensure that countries can maintain their national interests.

Economic integration is one important channel of international cooperation. Economic integration can be an effective way to develop mutual trust and can help facilitate broader cooperation between the parties *(Luo, 2008)*. It is generally accepted that economic integration can lead to higher economic growth rates *(Rivera-Batiz–Romer, 1991)*. Positive effects have been confirmed empirically for different regional integration processes including the European Union *(Głodowska–Pera, 2019; König, 2015; Badinger, 2005)* and major regional economic communities in Africa *(Gammadigbe–Wiegand, 2021; Kamau, 2010)*. Boosting trade by decreasing trade barriers is one way to achieve deeper integration *(Rivera-Batiz–Romer, 1991)*. The technological advances of the 20th and 21st centuries have created enabling conditions for decreasing trade barriers. Creation of the WTO also contributed greatly to this process *(Chang–Lee, 2011)*: Its positive impact on trade was estimated to be about 120% of additional world trade or USD 8 trillion in 2000 alone *(Subramanian–Wei, 2007)*.

The positive effects of globalisation are typically distributed unevenly among countries *(Subramanian–Wei, 2007; Eicher–Henn, 2011)*, which often creates political limits to economic

integration *(Nicolaides–Hornik, 2017; Schneider, 2017)*. Moreover, the simultaneous achievement of the policy goals of national sovereignty, democracy and international economic integration is highly problematic – as stated by the famous trilemma by *Rodrick (2000)*. Hence, it is not surprising that at present there are only a few specific regions which pursue strong political and economic integration, of which Europe and the EU is the most prominent example *(Frunza et al., 2009)*. In the attempt to overcome Rodrick's trilemma, in recent years countries have started to develop and practice a large variety of geoeconomic connectivity formats and projects, many of which have a strong regional focus *(Libman–Vinokurov, 2021)*. This resonates with the empirical findings that point towards the growing importance of regional over global factors as driving forces of business cycles *(Hirata et al., 2013)*, as well as the prevalence of regionalisation over globalisation in affecting regional economic welfare *(Mehanna, 2008)*.

Today, geoeconomics is key in spatially reconfiguring political geography *(Cowen–Smith, 2009)*. Shifts in geoeconomic power determine the influence and power of national governments *(Beeson, 2018)*. In this paper, we briefly overview the existing geoeconomic connectivity processes in the area "from Lisbon to Vladivostok", i.e. those that are led by the European Union (EU) and the Eurasian Economic Union (EAEU), and their activities vis-à-vis overlapping neighbours and strategic partners. We also list several relatively new global trends that are likely to impact geoeconomic connectivity in the area from Lisbon to Vladivostok in the near future and analyse how they may do so. These trends include relocation of production, decarbonisation, digitalisation and the rise of social media. Finally, we discuss the possibility of revising the approach to integration from focusing on eliminating trade tariffs to facilitating mutually beneficial cooperation agendas in various sectors in a flexible and open manner.

The rest of the paper is organised as follows. Section 2 gives a historical overview of integration processes in the region.

Section 3 addresses new forms of convergence models in response to new challenges. Section 4 provides an outlook for the future of EU-EAEU cooperation. Section 5 makes a proposal for the development of the free trade concept in today's world. Finally, Section 6 concludes.

2. Brief historical overview

The EU is the most successful example of the integration processes in the region. The EU can be seen as a working model of what can be called "hard integration" *(Ariyasajjakorn et al., 2020)* as the EU has successfully implemented all four integration levels according to *Balassa (1976)* to the fullest (or almost so): The free movement of goods, services, capital, and labour is complemented by a broad range of other processes uniting member countries that includes agriculture and rural development; climate action; communications networks and technology; education and culture, social affairs and inclusion; energy; environment; health; humanitarian aid and civil protection; informatics, research and innovation; maritime affairs and fisheries; mobility and transport; and taxation, among others. However, the EU is not immune to Rodrick's trilemma. Brexit is a prominent example. According to many analyses, the separation of the UK from the EU was driven mainly by sentiments related to (in)dependence and sovereignty (*Menon–Wager, 2020; Gee et al., 2016*). However, some estimates suggest that after Brexit the UK may lose between 1.7% and 10% of GDP, and the GDP of the EU as a whole may decline by up to 1.5% *(Bisciari, 2019)*. Moreover, Brexit may unleash disintegrative processes within the EU and could inspire other member states to follow the UK *(Rosamond, 2016)*. Moreover, COVID-19 has reignited the fundamental controversy over cross-country solidarity in difficult economic situations *(Ferrera et al., 2021)*. On the other hand, as noted by *Jovanović (2013)*, the EU has come out of different crises as a much stronger union, though it is becoming

more difficult to "weather the storm" and it may end up being "a big and important group, but not a very happy family of nations."

The starting point for the EAEU was the idea of Nursultan Nazarbayev, then-President of Kazakhstan, to create a new association, the Eurasian Union, based on the common history, close economic and cultural ties and similar human aspirations *(Nazarbayev, 1994)*. The Eurasian Economic Community (EAEC or EurAsEC) comprising at different times five to six former Soviet Union republics (Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan) existed between 2001 and 2014 with the aim to promote economic integration among its members. Three states – Belarus, Kazakhstan and Russia – went further and created a Customs Union (BKR CU) in 2010. In 2014, the Treaty on the Eurasian Economic Union was signed by the leaders of Belarus, Kazakhstan and Russia *(Eurasian Economic Commission, 2014)*; the EAEU came into force in 2015. The EAEU was created as an international organisation of regional economic integration with international legal personality and, to a certain extent, its agenda and design are greatly inspired by the EU experience *(Libman, 2019)*. The main declared goals of the Union are the creation of conditions for a stable development of member states' economies in the interests of raising the living standards of their population, the formation of a single market for goods, services, capital and labour, comprehensive modernisation, cooperation and an increase in the competitiveness of national economies. However, being supranational in form, the EAEU remains interstate in the essence of decision-making procedures *(Glazyev, 2020)*. This entails duplication of functions transferred to the EAEU at the level of national governments, which have retained the relevant structural units. In fact, it functions as a superstructure over the EAEU governments, taking only decisions agreed by them on a consensus basis and working according to an agenda approved by them. Expanding the mandate of the EAEU faces a number of difficulties *(Tkachuk, 2020)*. For example, small states may perceive this as a manifestation of Russia's imperial ambitions,

while the Russian leadership is unlikely to allow it to be governed by small states. This again demonstrates the relevance of Rodrick's trilemma.

In parallel, the EU has developed relations with its eastern neighbours, primarily through the Eastern Partnership (EaP) project. The EaP was launched in 2009 as a joint initiative between the EU and six Eastern European and South Caucasus partner countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine *(European Council, 2021)*. The EaP states that its goals include strengthening institutions and good governance, developing market opportunities through economic integration and trade agreements, ensuring energy security, improving interconnection for energy and transport, and enhancing mobility and contacts between people in the target countries.

Before 2014, there were talks about a possible cooperation and even convergence between the EU and the BKR CU. These talks were framed in the traditional economic integration framework focusing on the same dimensions as "hard integration" and implied the same sequence of steps, albeit with a lower expected degree of eventually realised integration. On the EU side, in 2001, with the assistance of the President of the European Commission at the time, Romano Prodi, a group was convened to develop a project for a common European economic space. The work of this group resulted in the adoption of the "Roadmap" for the Common Economic Space in 2005 *(Erokhin, 2019)*. On the Russian side, Russian foreign policy promoted the formation of a common economic and humanitarian space "from the Atlantic to the Pacific" based on the harmonisation and congruence of European and Eurasian integration as a strategic goal in regard to the country's relations with the EU. The Partnership for Modernisation programme jointly launched by the EU and Russia in 2010 gave new impetus to the development of their bilateral ties *(Longdi, 2011)*. High expectations were expressed for this programme to reform and renew political relationships,

increase cooperation on trade, economy and energy security, and support growth and global economic recovery *(Larionova, 2015)*. Notably, the convergence agenda associated with this and other EU-Russian initiatives carried out at that time was naturally quantitatively different from the "hard integration" within the EU, but it did not differ much qualitatively, i.e. it had a rather strong emphasis on trade and barriers to trade.

These talks about a possible cooperation and convergence between the EU and the BKR CU had a solid economic rationale that remains valid at present as well. For example, according to the latest major quantitative assessment conducted by the ifo Institute in 2016 *(Felbermayr–Gröschl, 2017)*, an EU-EAEU FTA would increase EU exports to the EAEU countries by more than 60%, with the Baltic states, Slovakia, Finland and Poland benefitting the most. Russia's exports would increase by 32%, Armenia's by more than 80%, and the exports of Belarus and Kyrgyzstan would both rise by about 100% (all figures relative to 2011). An FTA with a broader geographical scope covering all former Soviet Republics which are not EU members would increase EU exports further, by 74%. The authors also expect the agreements to have positive effects on real income growth in all participating countries in all scenarios.

The political crisis around Ukraine and the subsequent mutual sanctions and allegations between the EU and Russia started in 2014 and froze these processes. As a symptom, the EU does not recognise the EAEU as a legitimate negotiation partner and does not accept Russia's opinion that Russia should be consulted on the integration initiatives of the EU if they concern the countries of the former Soviet Union *(Kofner–Erokhin, 2021; Zagorski, 2011)*.

3. New cooperation formats in response to new challenges

The EU-Russia political crisis constitutes a major obstacle for the classical-format economic integration not only between the EU and the EAEU, but also more broadly in the area between Lisbon and Vladivostok. Besides this crisis, various other political and social factors present in the region make many of the convergence and integration agendas unfeasible. For example, most analysts describe the Commonwealth of Independent States (CIS) as failed regionalism *(Kubicek, 2009)*. Many former Soviet Union republics have not ratified CIS agreements or chose not to participate in CIS structures, the Commonwealth's institutions are weak, and bilateral relations remain important, if not paramount. The same is true for many integration initiatives in Central Asia, which have not managed to create long-lasting formats due to tensions, conflicts and personal hostilities *(Gast, 2017)*. For example, the Central Asian Cooperation Organisation (CAC) failed to start and disappeared after a decade of academic and political discussions *(Qoraboyev, 2010)*.

So far, the EaP of the European Union can be regarded as a partial success only: the weaknesses include, inter alia, an unclear geographical choice behind the EaP, the presumption of shared values and poor incentives offered to the parties *(Kochenov, 2009)*. Moreover, the partnership with the EU was regarded by some member states as a unilateral cooperation and a list of instructions *(Vieira, 2021)*. The EU's attempt to nudge others to the EU standards rather than to make the differences "a shared normal" was also seen as problematic *(Korosteleva, 2017)*.

As a result, new formats of regional cooperation are emerging that – to varying degrees – depart from the classical-format economic integration. A prominent example is the association agreements that include deep and comprehensive free trade areas (DC-FTAs) between the EU and Georgia, Moldova and Ukraine,

which are new legal instruments for gradual integration into the internal market of the European Union without membership *(Sirotkina et al., 2021; Van der Loo, 2016)*. These agreements declare the goals of improving access to goods and services, reducing trade barriers, enabling stable legal environment, and aligning norms and practices. Learning from the experience of the early times of the EaP, the EU moves to the principle of local ownership to focus each bilateral relationship with EaP countries on commonly identified shared interests and to offer a new format of cooperation which reflects equality and mutual respect *(Vieira, 2021; Petrova–Delcour, 2020)*. However, many experts are of the view that the benefits and motivations of these agreements are mostly political rather than economic as they are "aimed at turning neighbours into friends" *(Adarov–Havlik, 2016; Koeth, 2014)*. On the other hand, the same was true for the justification of the EU enlargement itself which was predominantly motivated by moral and not economic arguments *(Piedrafita–Torreblanca, 2005)*, albeit this enlargement eventually brought significant economic benefits *(Głodowska–Pera, 2019*).

Other novel engagement formats that the EU offered to former Soviet Union countries include the Comprehensive and Enhanced Partnership Agreement (EU-Armenia and EU-Kazakhstan), the Generalised Scheme of Preference Plus status (EU-Armenia and EU-Kyrgyzstan) and the Partnership and Cooperation Agreement (EU-Kazakhstan, EU-Kyrgyzstan and EU-Russia) *(Kofner–Erokhin, 2021)*. These agreements were thought to extend the European integration model to encompass the whole of the continent as "a pledge of a future stability and prosperity" *(Hillion, 1998)*, but they did not help overcome "the lowest common denominator attitude towards each other" and left further deepening of economic cooperation between the countries gridlocked by these agreements *(Valko, 2010)*.

The EAEU is carrying out similar kinds of enlargement activities with neighbouring countries. For example, a recently published

study demonstrates the economic benefits of Uzbekistan's potential accession to the Union *(Vinokurov et al., 2021)*. However, as the authors point out, a new approach is needed. It is necessary to move away from the concept of expansion for the sake of expansion, which will only increase the inefficiency of regional integration, and shift to the construction of trade and economic relations between countries on the basis of effective projects competitive in the global market.

The above listed examples underscore that economic integration with trade at its core is turning into the development of the geopolitical connectivity that takes a multitude of legal and informal forms. This growing complexity represents an opportunity as it provides flexibility, but also carries risks as the complexity of rules and regulations leads to additional costs that can hinder development and innovation.

4. Future of the EU-EAEU relations

A number of qualitative scenarios that envisage the future of the relations between the EU and the EAEU are available in the literature. *Van der Togt et al. (2015)* discuss three strategies for the EU cooperation with the EAEU: "full enlargement" based on a new strategic partnership between the EU and the EAEU; "tentative compatibility", which would imply ad-hoc technical relationships, awaiting better times for a closer engagement; and "competing Unions", which would force countries to choose which integration process to join. *Alekseenkova et al. (2014)* present a "shared home" scenario, where – for pragmatic reasons – all Europeans share one home; a "common home", where Europe is home to nations bound together by common values; a "broken home", in which the European home lies in ruins; and a "divided home", in which Europeans live next door, but apart from each other. *Kofner et al. (2018)* document the results of a foresight exercise that involved students and early-career specialists from

various countries. They distinguish three economic scenarios: "TTIP–2 and Greater Eurasia without Europe", where by 2040 the northern hemisphere will be divided into two competing megaregional blocks – the "Transatlantic Economic Union" and the "Greater Eurasian Partnership"; "Limited EU – EAEU cooperation", with the EAEU being a part of China's Belt and Road Initiative, where a prolonged status quo in the West–Russia relations would intensify Moscow–Beijing economic and political cooperation and form the foundations for the creation of the "Greater Eurasian Partnership", however, without the participation of Europe; and "EU – EAEU common economic space as part of Greater Eurasia".

Analysis of these scenarios shows that experts see political factors as major determinants of the future of economic cooperation in the region. However, in the spirit of the complex systems logic, political factors themselves are often functions of other processes. As argued in the seminal paper by *Luttwak (1990)*, geopolitics is superseded by a global economic logic that transcends geopolitical calculation. Regional powers are gaining importance, however, mainly as economic actors through their external economic policies *(Wigell, 2016)*. The feedback loop between geopolitics and geoeconomics is strong in the current realities of the geographical area between Lisbon and Vladivostok. We refer the readers to the multitude of works that analyse political factors for economic integration in this region *(Börzel–Schimmelfennig, 2017; Blichner, 2007)*. As complimentary to these, here we would like to point and briefly discuss a few other relevant major trends.

Relocation of production. The trend of nearshoring and backshoring as a measure to improve resilience started in 2008 *(Wang–Sun, 2021)* and has been accelerated by the Covid-19 pandemic. Between 2014 and 2018, for example, there were 250 reshoring cases in the EU, United Kingdom, Switzerland and Norway *(Eurofound, 2021)*. Most frequently, companies returned from China (76), India (15) and Poland (15) to the UK (44), Italy (40)

and France (36). By way of comparison, in the period 2010-2018 the US reshored 791 companies from China, 108 from Mexico and 62 from Canada, among others, bringing more than 750,000 jobs back to the country *(Reshore Now, 2019)*. As noted by many experts, this can re-shape integration processes *(Pla–Barber et al., 2021; Enderwick–Buckley, 2020)*. The EU is currently working on a supply chain law, which will make it possible to hold European companies accountable for disregarding human rights and environmental impact across their supply chains *(European Parliament, 2021)*. The introduction of this law could make the EAEU a more attractive production site for the EU and lead to a reallocation of manufacturing to its members if the EAEU were able to increase labour productivity, modernise transport routes and construct modern transit hubs.

Decarbonisation. The greening of the economy and the EU commitment to sustainable development will have implications for the regional energy market and the EAEU as a supplier. On the one hand, the Green Deal is a challenge for Russia as a leading exporter of fossil fuels and energy-intensive products to the EU *(Siddi, 2021; Pflüger, 2021)*. On the other hand, it promises huge potential in renewable energy, hydrogen production, energy efficiency, carbon-neutral fuel and nuclear power. Russia and the EU could move towards a more sustainable energy relationship through increased investments and cooperation in these sectors.

Digitalisation. E-commence, digital platforms, cryptocurrency and other products of the Digital Revolution are not strongly affected by national borders and jurisdictions *(Stallkamp–Schotter, 2021; Marthinsen–Gordon, 2019; Ward et al., 2016)*. Blockchain allows any and all governance bureaucracy and inefficiency to be eliminated *(Hickey, 2020)*. Smart products enable precise traceability as well as the application of nuanced and complex trade rules *(Ganne, 2018)*. Digitalisation has the potential not only to change the essence of economic and trade relations, but also to have many spillover effects on other areas, and to play an important role

in regional and global integration processes. Regional digital platforms are already becoming integrations of integrations connecting not only separate countries, but also integration blocs *(Lissovolik et al., 2021)*.

Social media. Despite major advances in economic and political sciences, more often than not policy decisions are based on narratives. Narratives emerge in a complex way where expert views and estimates are only one input. "Stories motivate and connect", "go viral" and spread all over the world making a significant economic impact *(Shiller, 2020)*. As a consequence, major political-economic situations become the results of the popular narratives of their times. Influencers play an increasing role, are viewed as a credible source and have impact on their followers' decision-making *(Nandagiri–Philip, 2018)*. The rise of social media leads to the so-called influencer politics, where worse-off candidates retweeted by influential users can receive higher vote percentages *(Shmargad, 2018)*. Social media actively acquire the censoring function; the blocking of US President Donald Trump by Twitter is a prominent example. Personal influence through social networks may condition the change in citizens' attitudes and political opinions *(Casero–Ripollés, 2020)*. The role of storytelling is highly valued in the European Union to engage domestic publics in EU foreign policy and to re-instate popular support for European integration *(Hedling, 2020)*.

5. Trade tariffs and fair trade

An endless race to the bottom in the area of corporate taxation is recognised to result in corporate tax rates being low, which however neither really enhances the productivity and economic welfare, nor contributes to sustainable living standards *(Gribnau, 2019)*. On the other hand, high tax burdens are compensated by different benefits provided by the host country such as well-developed infrastructure, public services, good investment

climate, higher levels of human capital and consumers with higher purchasing power *(OECD, 2007; Gribnau, 2019)*. As a result, firms can be taxed up to a certain degree without discouraging investment activities.

We want to propose an extension of this argument to trade and suggest that free trade might not necessarily be fair to the importing country. Indeed, the importing country provides enabling conditions such as infrastructure, public services and so on, on which the importer free-rides. The issue of the fairness of trade tariffs has not received much attention in the literature to date; only a few authors have made attempts to discuss it. For example, *Stencel (2008)* speaks about fair trade as trade that protects economic well-being, health, environment, working conditions and labour rights. *Barnett–Duvall (2004)* point that, without fairness considerations, participants of the global economy may question the legitimacy of international institutions and policies, especially when they believe that their interests are not promoted. *James (2012)* suggests that trade barrier removal can only be fair with well-developed social insurance which would compensate those who lose from free trade. A fair price should not only be equal to the cost of production *(Suranovic, 2000)*, but also include the cost of delivery, which is related to the benefits a host country offers to foreign producers. Likewise, when talking about the economic efficiency of free trade maximising the sum of benefits minus costs, host-country externalities are largely ignored.

For example, issues of fair trade arise within the EAEU. A large number of prices for goods, the production of which the EAEU states specialise in, are formed on the exchanges abroad, which forces domestic producers to sell their goods at a discount, incurring significant losses *(Glazyev, 2020)*. In addition, the use of external prices in the domestic EAEU market creates distortions in the economic structure and entails further transaction costs in mutual trade due to the need to constantly recalculate world prices

in national currencies. Another issue is differences in indirect taxes which distort regional markets: When import tariffs are relatively low, country differences in VAT levels for many goods exceed the customs tariff, which significantly distorts the structure of import flows. Differences in excise duties create artificial flows of cross-border trade, damaging the fiscal interests of the parties.

Based on these considerations, we suggest that experts, businesses, policy makers, and citizens could engage in a dialogue around the idea of a fair import tariff rate that would allow the governments of importing countries to get a return on their investment in public goods and to share costs with the direct beneficiaries. Countries and unions of the Lisbon-to-Vladivostok area could pilot this proposal, as in this region free trade has particularly strong political and even emotional context, and hence the issue of fairness is particularly sensitive. Using the revenues from a fair import tariff, governments would then be expected to focus on trade facilitation through reducing non-tariff barriers and infrastructure projects.

6. Conclusions

For many years to come, the lack of international cooperation to combat Covid-19 will support the scepticism regarding the future of global cooperation in general. This can strengthen the trend toward regionalisation and in particular become one of the determinants of integration processes between the EU and the EAEU. Rethinking the format of integration from duty-free trade to mutually beneficial partnership in the areas of digitalisation, sustainable and green development and industrial cooperation, enhancing growth and building trust through people and science diplomacy could serve as drivers of post-pandemic economic growth and bring global trade from a patchwork of regional integration processes to "ethical globalisation" *(Verhofstadt, 2002)* when all regional cooperations can speak at an equal level and

jointly find answers to global questions. Such a flexible approach is necessary given that it becomes increasingly evident that no universal algorithms for the development of any integration formation exist in reality, even if some can be theoretically justified.

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New Waves of Geopolitical Strategy and the Use of Soft Power in Eurasia

David A. Jones

Some new trends can be observed in the geopolitical strategies of various countries or trading groups in the wake of the coronavirus pandemic (COVID-19), especially in Eurasia. They range from modification of China's decade-long "Belt and Road" Initiative and Eurasian Union of the Russian Federation to a more recent Japanese Free and Open Indo-Pacific geopolitical programme coupled with a theoretical US policy of withdrawal from Afghanistan that is yet to be implemented. Each competes to become the more effective. Across Eurasia, competitor countries have developed soft power tools, both traditional and novel, to build new relationship systems across the supercontinent of Eurasia. Of those, which ones – if any – will endure and meet the test of time? This study addresses these issues individually and jointly, drawing on forecasts advanced over the first two decades of the 21st century, post-pandemic assessments, and a triangulation of information available currently.

Journal of Economic Literature (JEL) codes: E5, E6, E7, H3

Keywords: Asia, BRI, C5, China, Eurasia, G7, macroeconomy, India, Russia, Trans-Siberia

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1. Introduction

Countries or trading blocs such as the European Community articulate and then implement strategies intended to advance their geopolitical interests globally, in regions, at "opposite borders" or with next door neighbours (*Boesche, 2003:18*).[1] This becomes and remains true whether nations pursue neoliberal or neo-real strategies, meaning whether they strive for cooperation or prepare for conflict. They may do both, or profess to follow one path (trade, soft power) while actually traversing another (conflict, hegemony). Little doubt exists but that neo-real strategies have replaced neoliberal strategies in the aftermath of the COVID-19 pandemic, both in the context of relations with adversaries and relations with allies or states sought after to become allies, whether or not they will ever be (*Colibasanu, 2020*). This is evident in Eurasia among Eurasian states themselves, between "Great Powers and Eurasian states, and even amongst "Great Powers" themselves, forming what has been termed "the New Great Game in Central Asia" (*Lons et al., 2019; Caruso, 2020*). At once, some players have remained constant when others have changed, sometimes changing only cosmetically. In the 19th century, the original campaign known as the "Great Game" was between the British Empire and Imperial Russia in the period 1856-1907 (*Hopkirk, 1992; Sergeev, 2013; Morrison, 2021*), stoked by Germany in the period 1871-1890 (*Stone 2015*). Currently, in

[1] "Doctrine of Opposite Borders" also is known as the "Mandala Doctrine" included in *The Arthaśāstra*, a Sanskrit treatise from the 3rd century B.C.E. by Chanakya, also known as Kauṭilya or Vishnugupta, an Indian teacher, philosopher, economist, jurist and royal advisor to the Emperor Chandragupta Maurya (r. 321-297 B.C.E.). Boesche, Roger. 2003. "Kautilya's Arthasastra on War and Diplomacy in Ancient India," *The Journal of Military History*, Vol. 67, No. 1, 9-37 at 18. https://muse.jhu.edu/article/40432. The guiding principle of the Doctrine of Opposite Borders is that next-door neighbouring countries are destined to be enemies, whereas countries reposing at the other side of enemy territory can be natural friends, according to a maxim that: an enemy of my enemy is my friend.

the 21st century, the Russian Federation has returned, this time joined by a "Frenemy" in China, its erstwhile friend but long-term rival, plus the European Community (*Colibasanu, 2020*) arguably led by Britain with the United States *visibly* in the background (*James – Faulconbridge, 2021*), with Japan and other states including India and Turkey, leaving Iran and Saudi Arabia *invisibly* in the background. Turkey is eyeing an opportunity to recreate an Islamic Caliphate across the Middle East and Eurasia with itself as ruler spiritually and temporally. Both India and Japan consider China to be a rival power requiring them to delay, and ultimately defeat, China's advances into Eurasia along its "Belt and Road" or "New Silk Road", which is anything but smooth. Russian Federation leaders consider themselves to be the rightful successors to the Soviet Union as well as Imperial Russia, entitling them to preclude any other powers from controlling the Eurasian "supercontinent", including United States (*Sitaraman, 2020*), and China in particular, although the latter goes unstated. United States and the West are searching for ways to compete with China's BRI (*Standish, 2021*). Fundamentally, US interests conflict with those of this cast of countries: America prefers Eurasia to be comprised of autonomous, economically prosperous, sovereign nation states: Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan ("C5"), each to be governed as democratically as possible given their long historical tradition of autocratic rule (*Bureau of South and Central Asian Affairs 2020*).

The rather abrupt US withdrawal from much of South Asia (*McCurdy 2021*), with the Taliban peace talks stalled (*Mehrdad, 2021*), provides a relaxed entry barrier opportunity for China along the China-Pakistan Economic Corridor in the eyes of Pakistani officials, one of whom said:

The US might look at BRI less critically in return for China's and Pakistan's cooperation in helping maintain some stability, through influence on [the] Taliban and China spending more on economic projects," the Indo-Pacific official said. "I am pessimistic about

China's interest and ability to do much constructively inside Afghanistan. However, on behalf of Pakistan, they are prepared to try in order to reduce influence of India (*Gehrke, 2021*).

With China desiring to extend its Belt and Road Initiative (BRI) through Pakistan into Afghanistan, welcomed by Pakistan as a deterrent to its age-old enemy India, the thought is that US officials may consider a Chinese presence in the northern portion of South Asia to be a stabilising, rather than disruptive force in the region, and stop opposing BRI expansion across Eurasia. Such a conciliatory posture appears to be that of the current "Group of 7" or "G7" nations leading the West (*James – Faulconbridge, 2021*). Much seems to depend upon China's behaviour in this region and elsewhere, because Western groupings of geopolitical strategies vary by actor more than by region. Developing nations across the world seem to continue to regard the US as the leading global power (*Silver et al., 2019*). In the case of China's assertion of growing influence, this is true particularly as the West compares China's maritime posture in the region of the "Near Seas" with its posture across Eurasia, one reason being that the West deems the purpose of China's objectives in each location to be similar: to deter the rise of India more than to augment or safeguard East-West cargo transportation (*Garlick, 2018*). In the case of maintaining the China-Pakistan Economic Corridor, it is another example of "Doctrine of Opposite Borders" or "Mandala Doctrine", where China appears to be more concerned with curbing a rising India than with either a rail or highway route between Asia and Europe or buttressing Pakistan economically (*Garlick, 2018, 2019*), and derivatively concerned with "strategic hedging" against political rivalry of regional Middle East competitors such as the Kingdom of Saudi Arabia and the Islamic Republic of Iran (*Garlick – Havlova, 2020*). Thus, with China as it interacts with nations across Eurasia and into the Middle East, soft power interfaces with geopolitical strategy, for better or worse, but amidst some dangers there are many opportunities to unfold. Threats include megarich organisations such as the Taliban (*Sufizada, 2020*). Opportunities

must be harnessed as globalisation struggles go forward in the post-pandemic period (Joshi, 2020; *Colibasanu, 2020*), as articulated by Henry Kissinger (*Döpfne, 2021*).

Amongst the challenges will be the possibility of vacillating Western foreign policies, particularly those of the US in Eurasia and the Middle East, or towards China itself. Some prominent analysts such as Noam Chomsky have opined that US policies under President Joseph R. Biden, Jr. are the same functionally as under former President Donald J. Trump (*Douliery, 2021*), although Biden's secretary of state Anthony J. Blinken recently declared that China has been acting "more aggressively" in 2021 (*Shepardson, 2021*), giving rise to a suspicion that the current US administration may be getting tougher toward China than its predecessor. This will increase risk of danger, possibly accelerate wider and stronger Chinese aggression. Recently, China's President Xi Jinping offered an olive branch, announcing that Chinese global influence must be expanded in a "more loveable way" (*Sulman, 2021*), and some observers have warned that US policy preoccupation with the rise of China (*Bureau of South and Central Asian Affairs 2020*) may have overlooked a "Eurasia power play" (*Su, 2021*), meaning America is ignoring resurgence of an Asian-European "Great Game" that is not salubrious to international stability across Eurasia in the 21st century. At the same time, weaponisation of the BRI by China as has been suggested (*Russell – Berger, 2020*) is not acceptable, either, by China, India, Russia, or the West. If any military "game" emerges, great or small, one game will follow another with risk increasing perilously until conflict erupts by accident, deception or design.

2. China's "Belt and Road Initiative"

Core to China's foreign policy related to Eurasia from South Asia through the Middle East to Europe is its "Belt and Road Initiative" or "BRI" (*Hendler, 2017*), which has also been characterised as

the Chinese "Emperor's New Road" (*Hillman, 2020*), facetiously or otherwise. At least USD 900 billion has been invested (*Bruce-Lockhart, 2017*), probably more. Five different BRI regions have been articulated: Central Asia, Southeast Asia, South Asia, the Middle East, Central and Eastern Europe (*Garlick, 2019:170*). China's focus on regions by means of its BRI forms its multifaceted grand strategy "through the promotion of alternative ideas and norms, and reshaping global governance in a way that reflects China's values, interests and status", advancing "theoretical insights from realism, liberalism, and constructivism to analyse the complex material, ideational, and institutional factors that are being generated by the emerging BRI" (*Zhou – Esteban, 2017:488*)

By contrast, others have accused China of employing its BRI to transform policies of BRI recipient states to achieve Chinese domination by means of three types of actions: fragmentation (dividing instruments of power among numerous officials), decentralisation of authority (by creating a *pseudo* federal system), and internationalisation (rerouting of traditionally domestic procedures such as banking to Chinese institutions) (*Jones – Zeng, 2019:1416-1417*). Indeed, this is a form of "Quixotic" encirclement in foreign economic policy (*Jones, 2015*) that requires robust *dis-encirclement* to optimise and then protect Eurasian nationalism. Chinese BRI contains and reflects both internal Strengths and Weaknesses, external Opportunities and Threats, for all parties involved, China itself included. Inescapably interfacing with the Chinese BRI is a similar but less-visible counterpart advanced as soft power by the Russian Federation in relation to the former Soviet Union's Eastern Partners (*Giles 2016*; *Dimitrova et al., 2017*). This article cannot explore each policy in detail, as that is beyond its purview. It is important to understand, however, that Russia's and China's soft power cannot become confrontational (*Kaczmarski – Rodkiewicz, 2016*) and must be aligned (*Lemkin, 2021*). To be sure, they are competitive strategies with the West and with each other: each involves cargo transportation by highway and railway more East to West than West to East, and both contain

geopolitical strategies. Such is typical of almost any investor state in deploying aid to foreign countries. Russian objectives cannot be taken for granted, as Gussarova (2017) argues. Although China's BRI presents Strengths such as huge infrastructure investment opportunity across Eurasia offering a concomitant prospect for modernisation of production, it presents Weaknesses such as debt both to China itself as well as to participating nations ranging from Pakistan in South Asia (*Garlick, 2019*), Kazakhstan (*Gussarova, 2017*) and Turkmenistan (*Najibullah 2021*) in Eurasia, to Iran and Saudi Arabia in the Middle East (*Jin, 2017; Lons et al., 2019; Garlick – Handlova, 2020*), to the smaller nations of Central Europe such as Crna Gora or Montenegro in English (*Nikolic, 2021*) that this author visited to conduct research in October 2020. On that trip, this author learned directly that Crna Gora is terrified of becoming inundated with Chinese debt that can be unserviceable, even more likely unrepayable.

If China's BRI fails completely, such as by collapsing from unserviceable or unrepayable debt, this may be witnessed as a global threat. Western nations should take no pleasure in failure of a project intended to bring parts of the developing world together. That would relegate developing countries along the BRI into future poverty and instability, resulting in more global threat than opportunity. Competition from Japan and Korea in Asia to the US and Canada in North America, European Union and United Kingdom must join China and Russia with innovative strategies (*Gerstel – Goodman, 2020*) instead of opportunistic opposition. An innovative strategy emerged at the June 2021 G7 meeting at Carbis Bay, England, at which the G7 members proposed "hundreds of billions" of USD to emerging economies "offering an affirmative, alternative vision and approach that they would want to choose" that China retorted is "doomed to failure" (*Shalvey, 2021*). Competition will be the Key Success Factor (KSF), and if somehow China dooms the G7 plan to failure, the real failed product will be its BRI.

An alternative to BRI is viable in the Eurasian region, with the Russian Federation being a visible alternative, utilising the Trans-Siberian Railway and Highway to transport goods made in Asia, particularly Northern Asia, to Eastern and Central Europe. It will not be only the funding, but also the territory and infrastructure within geographical area. Another alternative is India, although the terrain is not as compatible as that of Russia, nor is Indian infrastructure as advanced. If neo-liberal trading paradigms are to be continued, and they have been responsible for preserving peace across this century, competitive Eurasian transportation routes should be welcome, inclusion instead of exclusion should be the watchword, and certainly the G7 should be welcome to participate, both as the Group of 7 and as individual nations. Almost certainly, the US together with the 19th-century "Great Game" participants Britain, Germany, plus Russa (earlier a G8 participant) will do so, probably to be joined by Japan also as these are China's principal competitors. Needless to say, the Russian Federation should be welcomed to rejoin what with it would become the G8 once more, as that body always should have remained.

3. Newfound opportunity to cooperate

Western countries have a newfound opportunity to counter China's gains achieved with its BRI (*Caruso, 2020*), but the West must act quickly and responsibly, not alone but in cooperation with developing recipients of BRI largesse, the C5 countries of Eurasia particularly, South Asian, Middle Eastern and Eastern European nations. What form should this cooperation take? It must be much more than debt, it cannot be mere gifts to be squandered as foreign aid has become in many world regions. Investment is required, whereby Western countries in partnership with China, India, Japan, Korea and the Russian Federation actually invest in new Eurasian infrastructure such

as factories, railways, highways and banking consortia capable of financing industry. Then the task will be to generate a proper return on investment (ROI) by manufacturing products across Eurasia, buying those products for consumption in Asia and Europe, transporting those products *both* East and West to fully utilise railways and highways that form a supplement (not an alternative) to BRI. A substitute monopoly is not desirable, BRI has its place indeed, but among the competition. The task is not to denigrate China's innovative effort, but to add more innovation to the paradigm China has constructed and grow all competitors to capacity. At present, China's BRI as a transportation route carries cargo freight from Asia to Europe much more frequently than from Europe to Asia, return to Asia being empty carriages or low capacity, although goods heading East tend to be of higher economic value than products heading West (*Zhang – Schramm, 2020:733-734*). Newfound opportunities to be harvested by the G7, Russia, Japan or others should achieve directional balance to become and remain competitive, providing opportunity for Eurasian national products to be purchased and consumed in both Asia and Europe (as well as elsewhere). Investment in developing countries should provide an acceptable ROI for the host nations and investors alike, so that each investment becomes and remains sustainable. Currently, the situation within BRI recipient nations is similar to that reported in the US: the bottom 90 percent of the population is borrowing from the top one percent, with savings being "recycled" into household and government debt (*Coy, 2021*), causing inequality to expand, perhaps geometrically. In the BRI recipient nations, savings are also being "recycled" into corporate debt. Newfound opportunities should enlarge Eurasian as well as Russian Federation manufacturing opportunities. Japanese and G7 manufacturing is strong. British, European, Japanese and other Asian transportation must be independent of China's control, much as Eurasian countries should be independent of China's influence and debt.

Countries ready to participate in funding and constructing competitive trade routes between Asia and Europe should be motivated positively instead of negatively. This means the purpose should be to advance rather than to retard recipient states. Burdensome debt repayment should be avoided, with a reasonable ROI generated for the foreign investing nations and recipient states as soon as possible once a project has been completed. Countries participating in China's BRI seem to gain little to nothing from goods passing through their borders en route to Asia or Europe, when those products do not remain in their countries for value to be added or for consumption. If G7 or other investors intend to improve upon the Chinese paradigm, one extremely valuable way will be to ensure that trade routes open economic doors for the participating countries themselves, both investors and recipients of investment. An important component of this would be for recipients to conduct manufacturing or at least perform assembly on some products passing through their territories. If the Chinese model achieved this, excess debt would have been avoided, reasonable debt proportionate to gross domestic product (GDP) would have been serviceable and repayable, but none of this appears to be the case currently.

Eurasian countries, especially the C5 nations, engage in agricultural production, so besides manufacturing opportunities should be apparent in farming: harvesting, milling, forward preparation of fertilisers, weed and pest control chemicals, and drying and then packaging finished food products. Markets exist in Europe and Asia and especially in China for some food products that have become scarce. If – as appears to be the situation – Asian countries prefer to purchase food from the West, an answer is for Western countries to invest in Eurasian production, thereby increasing food supplies as well as diversifying sources thereof as a guard against monopoly and animal diseases. Fundamental to this article is the argument that Eurasian countries can be important contributors to production if they commit to optimum use instead of wasting their assets: rich soil, abundant supplies

of water and energy, temperate climates, inexpensive labour and overall relatively secure environments. Fragmentation, *pseudo* federalisation, and internationalisation should be avoided. Commercial banking including factoring should be undertaken by Eurasian companies in the West instead of in Hong Kong or Shanghai, especially to the extent the investments are to be made from Western sources. Investors should steer clear of domestic politics.

As much so as or more so than other G8 countries, the Russian Federation should be governed by the "Doctrine of Opposite Borders" (Mandala Doctrine) in its relations to China and strive to offer a railway and a highway that is competitive to China's BRI for its national security as much as for trade with the West. From the Pacific Ocean, the fabled Trans-Siberian Railway stretches across Siberia and the Caucasus to Moscow, with branch tracks and parallel highways. Some cooperation exists currently between China and Russia in Eurasia (*Rolland, 2019*). Indian Railway lines are abundant, with more than 9,200 trains daily carrying 1,110 million tonnes of freight annually on 277,987 freight wagons, but the network requires urgent track upgrades as their average speed is 24 km per hour ("15 Facts About Freight Transport of Indian Railways" n.d.). Nevertheless, if China is to invest in Pakistan to stunt the growth of India, the West should strengthen India in cooperation with India itself, Japan, Korea and the Russian Federation. In fact, products shipped from or to Northern Asia such as Japan and Korea easily can be directed across Russia's Trans-Siberia Railway and Highway. Some can go across the China-Pakistan Economic Corridor. Much of this avoids Eurasia, however. An alternative route across India would align well with the southern portion of Eurasia, vigorously increase access to Indian manufacturing centres, so of course that would restore competition to the benefit of all trading partners everywhere.

4. Toward a Eurasian endgame

Change for the sake of change is rarely valuable in the relations of nations and may be harmful. More important is the implementation of an "endgame" meaning improvement of the economy, quality of life, standard of living, corporate citizenship within the world in general, or within a region of focus, in this case, the states of Eurasia, primarily the C5 nations. To the extent China's BRI interacts across Eurasia, it does so mainly on a fleeting basis: it passes through. Products pass from Asia to Europe or in reverse direction, without stopping. An endgame must involve products being manufactured and consumed within the territories they pass in transit. That should be the geopolitical strategy in Eurasia. Concern should be directed toward including Eurasian states in the consumption of Asian including Chinese products as well as those manufactured in Europe. As manufacturing and assembly relocates out of China, part of the process should move to Eurasia. Resources across Eurasia are strong, becoming a temptation for "the new great game" to start (*Mishra 2020*). Instead, what one might term a "Fair Game" for Eurasian countries should happen. This could be one of the outcomes in a post-Pandemic world, going beyond outcomes forecasted already (*Joshi, 2020*), provided supply-chain management becomes resilient as is deemed necessary (*Shih, 2020*).

5. Conclusion

Eurasia is a region of burgeoning importance, strategic to Asia and Europe, to India, Japan and the Russian Federation as much as or even more than to the West, as the gateway from Asia to Europe as well as from Europe to Asia. It is inundated with debt to China, as are many developing countries along China's BRI, and unserviceable or even unrepayable debt can provoke occupation. In June 2021, the G7 Group of Nations agreed to provide

hundreds of billions of USD to provide a viable alternative to China's BRI, although an "alternative" should be viewed more as a "supplement" because BRI should be encouraged to coexist with alternatives funded by the G7, India, Japan and the Russian Federation, separately or collectively. This can only help to strengthen Eurasia, which is currently weakened by BRI, and in strengthening Eurasia, help to improve bi-directional East-West trade volumes to the benefit of both Europe and Asia, strengthen the defences of India, Japan, Russia and the entire region, helping the Eurasian region to move on the road to economic self-sufficiency.

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The EU–China–US Triangle in 21st Century Geopolitics and its Impact on Eurasian Cooperation

Dávid Szabó – Nóra Anna Sándor – Péter István Szabó

The rivalry between China and the US in the 21st century has become a principal paradigm in international relations, which has a profound impact on the dynamics of multilateral cooperation. The struggle between the two great powers also concerns the European Union, which needs to take today's megatrends into account, such as sustainable and green growth and digitalisation, while harmonising the advantages and challenges arising from Asia's increasing global clout on the one hand, and US President Joe Biden's Europe-centric foreign policy approach focusing on restoring the strength of transatlantic relations on the other. It is vital for the European Union to maintain healthy and stable political and economic relations with China due to its own economic interests and its belief in, and vision of, multilateralism and rule-based international order, but it also has to strike a balance in its relations with the US. On account of the dependencies in the global economy, complete independence or 'breaking away' from China is not an option in the turbulent economic times of the 21st century. Instead of confrontation and division, the opportunities for cooperation should be used and enhanced to improve competitiveness.

Journal of Economic Literature (JEL) codes: F3, F5, F6, N7

Keywords: international relations, international economics, European Union, United States, China, Eurasian cooperation, green development, digitalisation

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1. Introduction

In the 21st century, economic and geopolitical relations are dominated by new and unprecedented megatrends, for example sustainable development, digitalisation, the challenges faced by the financial system and recovering sustainably from the coronavirus pandemic. These challenges get an additional perspective due to the rivalry between the US and China, which has become a dominant paradigm of international relations in recent years, and it exerts a powerful impact on the dynamics of multilateral cooperation *(Perthes, 2021)*. The European Union is both the arena and an active player in this rivalry *(Howorth, 2021)*, therefore it will be crucial for the future of the EU to maintain its international relations optimally in alignment with its economic interests, while also preserving its competitiveness. Thanks to stable economic growth and a more active foreign policy stance, especially in the past decade, China has markedly increased its international role and influence. One only needs to think of the Belt and Road megaproject, the Asian Infrastructure Investment Bank, the Regional Comprehensive Economic Partnership, the EU–China investment agreement or the attempts at internationalising the renminbi. Meanwhile, the US is following these economic and geopolitical developments with concern, doing everything in its power to strengthen the Atlantic alliance and isolate China at the same time. Among European states, a clearly distinguishable stance is that instead of building value-based economic ties, they increasingly shape their relations with the Asian giant and Eurasia along interest-based doctrines that promise the greatest economic returns. This paper illustrates the European aspects of the Sino–American rivalry through examples, the leeway and options for the countries in the European Union, the advantages of Eurasian partnership and the development paths in the relations with the two great powers.

Chapter 2 discusses the concept and role of strategic autonomy that have appeared in recent years and refer to the EU's autonomy in foreign policy and foreign trade. The chapter describes China's economic achievements and growing geopolitical role in recent years, and also presents the development and opportunities of the economic ties between the European Union and China, and between the EU and the US, as well as the milestones of Eurasian connectivity. Chapter 3 uses concrete examples to illustrate the development, results and potential economic advantages of the relations between EU countries and China and other Eurasian countries. In addition, the need for balancing owing to the Chinese-US rivalry, which appears in several facets of Sino–European relations, is also highlighted. Chapter 4 takes a closer look at future relations, examining the development of the ties between the European Union and China, and the EU and the US. Two recent megatrends, sustainable development and digital development are also mentioned, because these will be two key pillars in enhancing Eurasian relations in the future.

2. Geopolitical awakening: The EU's position in the multilateral world order

For several decades, the European Union mostly focused on economic integration *(Lehne, 2020)*, but recently it is increasingly seeking to determine its interests and priorities not only in terms of the economy but also in geopolitics *(Perthes, 2021)*. European Commission President Ursula von der Leyen said in 2019 that she was the head of a 'geopolitical Commission', and for 2019–2024 she seeks to create a united Europe, whose operation is dominated by strategic autonomy *(European Parliament, 2020)* and an interest-based geopolitical approach.

2.1. The EU's interest-based geopolitical agenda

In today's strained geopolitical situation, and considering the rivalry between China and the US, the issue of strategic autonomy is becoming even more important for the Community *(European Parliament, 2021)*. In recent years, Germany and France have shown to the EU and its Member States that the interest-based geopolitical approach was justified, particularly when it comes to foreign relations with China.

The essence of Europe's interest-based foreign policy strategy is an independent foreign policy approach based solely on pursuing common interests. Within the European community, its greatest advocate is Germany *(ECFR, 2020).* Besides promoting internal economic integration processes, the European Union has to strive more and more to define independent foreign policy objectives and interests from an international perspective, since this is the only way Europe can become stronger and maintain its position in the face of the challenges posed by the rivalry between global powers *(Carnegie, 2020).* The interest-based foreign policy approach is centred around independent, pragmatic interests free from the influence of other powers *(Romanyshyn, 2021)*. This should not be interpreted as fleeing into isolation or an alternative to globalisation, but rather as one of the conditions for the best way to manage mutual dependencies. In the changing geopolitical landscape of the 21st century and the uncertain global economic environment, all this means that the members of the Atlantic alliance are seeking to become independent from the US in their international relations along economic logic, taking today's new challenges and megatrends into account.

2.2. Changes in geopolitics: China's growing role

With respect to the European Union, the necessity of strategic autonomy and pursuing foreign relations free from ideologies seems to be supported by various factors: according to the Centre for Economics and Business Research (CEBR), China's economy could overtake the US by 2028 (BBC, 2020), and the Asian giant already accounts for around 20% of global GDP *(Cameron, 2021)*. Moreover, recent events, such as the coronavirus, Brexit, the consequences of Donald Trump's protectionist and unilateral measures as well as the steady increase in China's economic and political influence overshadow American hopes that the US can still play a leading role in the global arena while the EU supports it *(Romanyshyn, 2021)*. China has extended its global reach considerably in recent years.

Chinese President Xi Jinping launched the Belt and Road Initiative (BRI) in October 2013, making it the cornerstone of Chinese foreign policy and its foreign trade agenda. It is now considered China's largest economic plan affecting the international community *(Huang, 2016)*. Until January 2021, 171 countries and international organisations had signed 205 cooperation agreements with China under the aegis of the project *(Xinhua, 2021)*, which can thus rightly be referred to as a flagship of Eurasian cooperation. Eighteen of the 171 entities were European Union countries. According to official data, between 2013 and 2020, China invested approximately USD 770 billion in the countries participating in the Belt and Road Initiative *(Green BRI, 2021)*. The Asian Infrastructure Investment Bank (AIIB) based in Beijing was set up in 2016 to fund the Belt and Road Initiative. As of July 2021, it has 103 members, accounting for 65% of global GDP and 79% of the global population *(AIIB, 2021)*. As of July 2021, the AIIB had 19 members from the EU, which also means it now has more members than the Asian Development Bank established in 1966,

because the latter's membership only increased from 31 to 68 in the past 50 years *(ADB, 2021)*.

One should also mention that after 8 years of negotiations, the Regional Comprehensive Economic Partnership (RCEP) was established on 15 November 2020, which allowed China and ASEAN members to send a message to the world, loud and clear *(Chin et al., 2020)*. RCEP members account for 30% of global GDP, and the agreement created a bloc encompassing 2.2 billion people *(ASEAN, 2020)*. By signing the largest trade agreement ever, Asian and Pacific countries demonstrated their commitment to multilateralism, free trade and the rule-based world order. For Asian countries, such as China, Japan and South Korea, the agreement meant not only economic benefits but also a huge geopolitical advantage, because the US is not part of the largest agreement of the 21st century, and it was also left out of the CPTPP. This means that Asian countries, led by China, can make their own rules for regional trade in Asia *(Chin et al., 2020)*. The US squandered its economic influence and attraction in the Asia-Pacific during the Trump era, and China was able to take advantage of this wisely *(Howorth, 2021)*.

Taking these factors into account (among others), the European Union has started on the path of strategic autonomy in recent years, and it has strengthened its bilateral relations along its own interests, de facto going it alone, especially due to the difficulties in cooperating with the Trump administration. The relationship of US President Joe Biden to European countries remains unclear, but it seems that the EU does not want to commit itself to the US for good [in economic issues], and it mainly wishes to shape its Chinese relations based on its own interests *(Demertzis, 2021)*. One of the most striking examples of this search for the right way is the investment agreement between the EU and China, the substance of which was finalised by the parties on 30 December 2020. The Comprehensive Agreement on Investment (CAI) was

hammered out after 7 years of negotiations and 35 rounds of talks *(García-Herrero, 2021)*. For China, the CAI is the most ambitious investment agreement with a third country, and it regulates several areas that are crucial for the parties. First, it prohibits the forced transfer of technologies, and it is the first agreement that also regulates state-owned enterprises (SOEs). It sets comprehensive and transparent rules on subsidies, and the parties have also made commitments for sustainable development, which is another major achievement. One huge advantage of the agreement is that it provides EU investors access to the Chinese market with almost 1.4 billion people, and it facilitates a more level playing field, which is crucial for the future of global competition and EU industrial sectors *(European Commission, 2020a)*. Furthermore, the parties can settle problematic issues and disputes using a formal mechanism *(European Commission, 2020b)*.

The establishment of the CAI was mostly urged by German Chancellor Angela Merkel *(von der Burchard, 2020)*, who wished to increase the EU's clout in the multipolar world order. The agreement and its timing also convey a very important geopolitical message, namely that the EU is a completely independent actor in the international arena, and it does not need the 'consent' of the US during its negotiations with China *(Kuo, 2021)*. Since 2005, Chancellor Merkel's goal has always been to strengthen the economic ties to China and maintain an active political dialogue *(Perthes, 2021)*. Although the European Parliament voted to suspend the ratification process of the CAI on 20 May 2021, Merkel has stuck to her position that the investment agreement should be maintained, stressing that it was an important milestone in bilateral relations, even if there may be hiccups during the ratification process. She also argued that without China the EU will not be able to tackle global challenges, such as the questions related to the reform of the WTO, climate change or sustainability issues *(IISD, 2021)*.

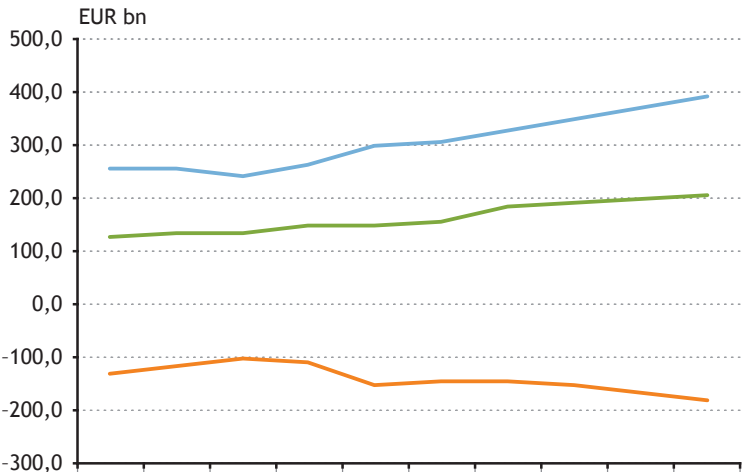
2.3. The EU's economic and trade relations with China and the US

The European Union is currently trying to find its way as regards establishing and maintaining its economic and political ties. European countries need to harmonise the advantages and challenges arising from Asia's increasing global clout on the one hand, and US President Joe Biden's Europe-centric foreign policy approach focusing on restoring the strength of transatlantic relations on the other *(Howorth, 2021)*.

In the relationship between China and the European Union, the parties have mainly focused on economic cooperation: the EU became China's number one trading partner in 2014, while China became the EU's in 2020. Therefore, the EU is forced to perform a balancing act while developing its economic ties. China has become a key player in the global economy, and it strives to forge extremely close trade and economic relations with the European countries participating in the Belt and Road Initiative as well as with large European economic powers, such as Germany and France. This is clearly reflected in the steadily growing trade volume figures from the past ten years: while total trade in goods between China and Europe amounted to EUR 382.4 billion in 2011, it was worth EUR 586.6 billion in 2020 *(EC, 2021)*. For China, the main aim is to strengthen international trade relations with the countries of the European Union, and the Eurasian transcontinental railway, which has recently been considerably enhanced, provides a great opportunity for this. The railway network currently links 160 cities from 22 European countries to over 60 Chinese cities. The crucial nature of the Eurasian transcontinental railway network is attested by the fact that in the first six months of 2021 the number of train trips was up by 56%,

and in 2020 the number of freight trains hit a record *(Xinhuanet, 2021)*. To put this into perspective, the total value of the trade between the US and the European Union was EUR 377.5 billion in 2011 and EUR 556.1 billion in 2020, which means that the growth rate of bilateral trade with the US matches that of Chinese trade relations *(EC, 2021)*.

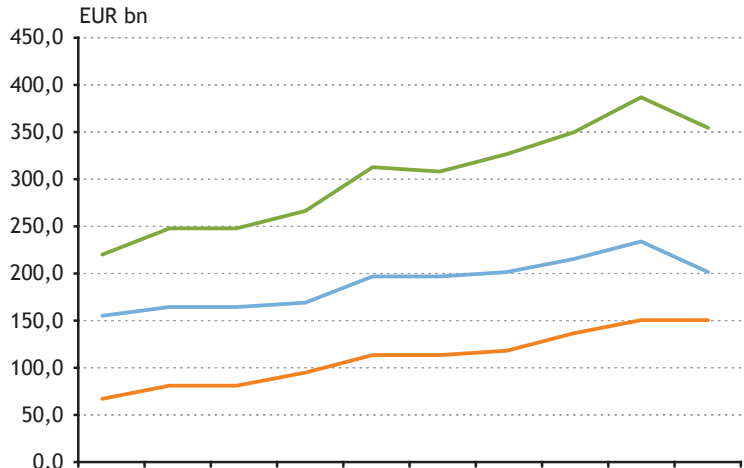
Chart 1: Trade in goods between the EU-27 and China, 2011–2020



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Export	126,5	132,2	134,7	145,1	145,5	153,4	178,7	187,9	198,4	202,8
Import	255,9	250,1	238,9	256,5	295,9	298,9	322,7	342,6	363,4	383,8
Trade balance	-129,4	-117,9	-104,2	-111,4	-150,4	-145,5	-144	-154,7	-165	-181

Source: Own compilation based on Eurostat data

Chart 2: Trade in goods between the EU-27 and the US, 2011–2020

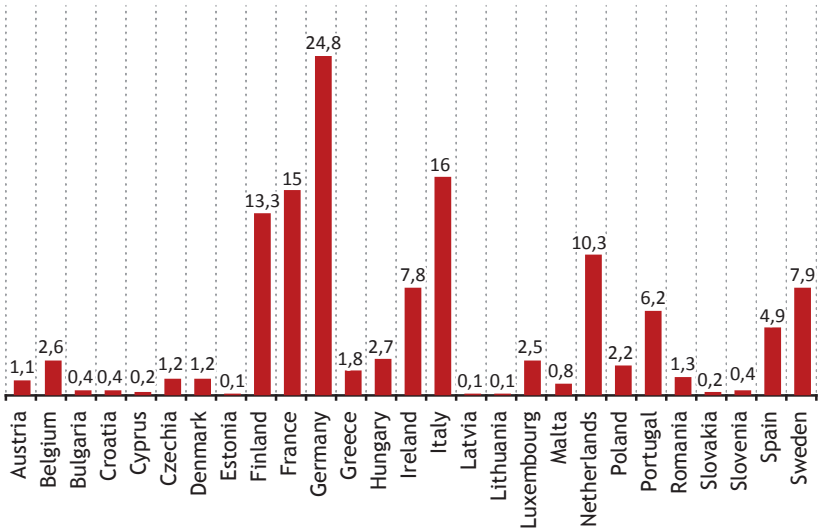


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Export	222,5	248,2	245,9	265,9	310,8	308,8	324,1	351,2	384,6	353,3
Import	155	167	164,7	168,8	197,3	195,2	203,4	214,6	234,9	202,8
Trade balance	67,5	81,1	81,2	97	113,5	113,6	120,7	136,6	149,7	150,5

Source: Own compilation based on Eurostat data

In the aftermath of the 2008–2009 financial crisis, Chinese foreign direct investment (FDI) also increased: while in 2010 it amounted to EUR 2 billion, in 2016 it was worth EUR 44.2 billion *(Kratz et al., 2021).* In 2019, the stock of capital investments from China and Hong Kong to the European Union was EUR 255 billion. For comparison, total FDI from the US amounted to EUR 2 trillion in the same year *(Eurostat, 2021)*, although the difference can also be attributed to the long-standing US–EU relationship.

Chart 3: Chinese FDI in the EU-27 and the UK, 2000–2020, breakdown by country (EUR billion)



Source: Own compilation based on Rhodium Group and MERICS data. https://merics.org/en/report/chinese-fdi-europe-2020-update

It is therefore vital for the European Union to maintain healthy and stable political and economic relations with China, not only with the US, due to its own economic interests and its belief in, and vision of, multilateralism and the rule-based international order. Complete independence or 'decoupling' from China is out of the question for the EU and countries in the Asia-Pacific region, but reducing unilateral dependencies *(Perthes, 2021)* and increasing cooperation in strategic areas are on their agenda. Although points of contention arise in EU–China relations from time to time, it is very important to recognise that the parties have reached countless milestones in their bilateral relations in recent years, especially in terms of connectivity *(Anthony et al., 2021)*. Just like in the case of railway links, the pandemic did not interrupt the development of aerial connectivity: according to the Civil Aviation of Administration of China (CAAC), by the

end of 2020 there were 1068 cargo flights a week between China and the BRI countries. The CAAC estimates that China provided medical supplies as part of the fight against the coronavirus to 47 countries via the Air Silk Road. Within Europe, the airport of the Belgian city of Liège was pivotal, as Chinese protective gear was transferred from there to 15 European countries, including Italy and France *(Xinhuanet, 2020)*.

As regards finance, the strengthening of the cooperation between Europe and China is also reflected in the internationalisation of the renminbi, as the Chinese currency is increasingly popular in Europe. Trading in Chinese securities is now possible at European stock exchanges, and RMB clearing banks operate in France, Germany, Switzerland, Luxembourg, Hungary and the UK. Financial cooperation is facilitated by initiatives such as the China Europe International Exchange trading platform operated by Germany's Deutsche Börse or the London-Shanghai Stock Connect launched in June 2019. Thanks to these, Europe was second behind Hong Kong in cross-border renminbi transactions in 2019 *(Kärnfelt, 2020)*. Recent financial developments worth mentioning also include the swap arrangement between the European Central Bank and the People's Bank of China extended in 2019, which will be in effect until 8 October 2022 with an allocated amount of EUR 45 billion *(European Central Bank, 2019)*. Besides the ECB, the Magyar Nemzeti Bank for instance also extended its arrangement with the PBoC that was in effect since 2013, raising the allocated amount from RMB 10 billion to RMB 20 billion *(MNB, 2020)*.

Although it does not see eye to eye with China in certain issues, the EU has always been pragmatic about their relations, and it will not abandon this approach, especially because it considers China a major partner in areas such as the fight against climate change or even the post-pandemic economic recovery *(Anthony et al., 2021)*. Another meaningful fact as regards the development of relations is that the Chinese administration's objective has shifted from

manufacturing products with low value added to those with high value added and thus an innovation-driven economy in recent years. In China, just like in South Korea and Japan, innovation is seen as a cornerstone of economic development and welfare *(Haour, 2016)*. According to the 2020 Global Innovation Index of the World Intellectual Property Organization, China tops the group of middle-income countries, and it is the ranked as the 14th largest innovator in the world *(WIPO, 2020)*. Therefore, it would be unwise to stay away, on an ideological basis, from the cooperation potential offered by the digital and green transition.

3. Interest- vs value-based foreign relations: examples of great-power balancing acts along economic interests

It is very important to distinguish between the concepts of economic and political alliances when examining external economic relations. While European countries strive to maintain partnerships with countries that hold the same values as Europeans in their political alliances, in economic relations it is economic and business interests that dominate *(Smith, 2014).* China has become Europe's main trading partner by 2021, even though the overwhelming majority of the European community condemns the domestic developments in China. This shows that the Member States of the European Union have learnt to separate the ideology of political, value-based alliances from economic interests.

The success of the Biden administration's foreign policy approach, which seeks to isolate China globally through the Atlantic alliance, mainly on a multilateral basis, depends largely on the independent economic partnerships operated by China and the European countries in the Atlantic alliance *(Chen, 2016)*. For the European Union, America's foreign policy influence is limited by

independent economic interests. If in top European economies such as Germany the advantages arising from the close economic partnerships with China outweigh those from the alliance with the United States *(Rosnerova–Hraskova, 2019)*, China could have a competitive edge against American foreign policy. The first signs of this could already be seen at the G7 meeting in June 2021, where large European powers maintaining active economic partnerships with China argued for the importance of China's economic presence in Europe *(Politico, 2021)*.

The external economic relations of European Union Member States and the changes in the global economy show that the purely unipolar economic world order has started to crumble in the global arena. Europe is striving to take advantage of the trade and economic cooperation by diversifying its economic resources *(Goulard, 2020)*, which is necessary in light of the changing trends in the global economy *(Matolcsy, 2021)* if the European Union wants to maintain its competitiveness. Nevertheless, the declared intention of American diplomacy is currently to reduce China's European ties and economic influence, but it remains to be seen to what extent the United States can unilaterally determine partner countries' foreign relations while the Atlantic alliance remains in its present state *(Howorth, 2021)*.

When it uses its competitive edge in specific sectors of the economy, for example in technological and green developments, China can get ahead of the US in Europe, but this also requires that it put much greater emphasis on its presence on the continent, by multiplying the number of partnerships *(Christiansen–Maher, 2017)*. Currently, the Asian giant maintains the most important trade and economic relations with European countries (Germany, France) that are not even part of the Belt and Road Initiative *(Eurostat, 2021)*. China can establish a stable European alliance network if it can provide the benefits arising from this mutual cooperation to most European Union Member States.

In order to make this happen and to make these countries interested in strengthening Chinese partnerships, China's main model for future cooperation should be mainly based on economic interests, just like in the case of Germany and France. These two countries are clearly part of the Western sphere of influence, and they have close ties to the US. Yet China can still create and channel economic opportunities that make it a priority even for European economic giants to enhance their Asian relations *(Nurgozhayeva, 2020)*. Actually, it is probably in the European community's best interest to harmonise the interests of Western and Eastern orientation, and this calls for balancing policies to be pursued in the long run. In other words, the European Union, as a community of countries striving for independent external economic relations, has a vested interest in taking advantage of both American and Chinese economic and trade partnerships.

Below, a few examples will illustrate the cornerstones of the relations between China and the European countries, the related dilemmas due to the rivalry between the US and China as well as the need for balancing.

3.1. The Franco-German axis

China's primary and main trading partners in the European Union are Germany and France *(Eurostat, 2021)*. The potential differences do not lead to confrontation in Chinese economic relations, as statistics clearly show that bilateral trade is developing and steadily expanding between Germany, France and China *(Reuters, 2021)*. For Germany, China has been the largest international trading partner for five years, with the annual volume of bilateral trade amounting to USD 258 billion in 2020 *(Global Times, 2021).* For France, China was its second most important import partner behind Germany in 2020, with an overall bilateral trading volume of USD 57.3 billion *(Tradingeconomics, 2021)*.

China has created a cooperation model for European economic giants based on independent and shared economic interests *(Chen, 2016)*. The cooperation between German, French and Chinese economic actors is characterised by the establishment of joint ventures and technological and research projects. The openness of the European economic giants to cooperation with China is shown by the German car industry's output to China, which exhibited substantial annual growth even amidst the international global crisis in 2020: sales of BMW and Daimler for example rose by 7.4% and 11.7%, respectively, year-on-year. For the European economies with manufacturing that includes substantial value added, today's Chinese market is an extremely important source of revenue, and the increasingly Westernised Chinese consumer culture provides the perfect breeding ground for this *(Global Times, 2021)*. China also appears as an increasingly large investor in the strongest European economies, as exemplified by the USD 2.4 billion invested in France's environmentally friendly vehicle technology developments in 2021 *(Bloomberg, 2021)*. There is also significant cooperation between Germany and China in R&D investments. For example, the German chemical industry heavyweight BASF will build a chemical complex in Beijing from USD 10 billion *(SCMP, 2018)*. Thanks in part to these advantages, Germany and France did not budge under pressure from the US regarding the current use of Chinese 5G technology, which illustrates China's success in developing its European partnerships.

To enhance Eurasian cooperation, China has to endeavour to adapt the tried and tested German–Chinese and Franco–Chinese economic model to other countries, as that could put it at a competitive advantage against the United States and may further bolster its European presence *(Dadush et al., 2019)*. Germany and France are forced to pursue a so-called shuttlecock policy between the American and Chinese spheres of influence. Just like in the Trump era, Biden's openly anti-Chinese foreign policy approach has not been able to meaningfully disrupt the development of

the two European great powers' Eastern ties *(Politico, 2021)*. This underscores the independence of external relations in Europe and the possibility of strengthening the strategic Europe approach.

Germany and France can serve as examples to the European Union and other Belt and Road Initiative countries regarding the balancing act between China and the United States. Chinese economic ties can serve as the actual basis for a new, Asia-based alliance in Eurasia if they can provide the necessary independence from the American alliance of interests, creating a new and efficient perspective for European Union members, but this also requires openness from European countries. 'China cannot change the course of European history alone without the strong cooperation of Europeans in the coming decades' *(Matolcsy, 2019)*. Currently, some signs of this process can be seen, primarily owing to China's competitive advantage in technology and the green economy, but the strengthening of the European Union's independent foreign policy strategy could expedite it *(Xie et al., 2014)*.

For China, one of the most important tasks is to further increase economic confidence in European Union Member States and other European members of the One Belt, One Road Initiative. Forging allies and creating an alternative to the American alliance require that European societies see the advantages of entering into a partnership with China, which thus would create social support for China. Therefore, China needs to step up its presence and engagement, and the active foreign trade approach developed along the German–French axis may provide a solid basis for that *(Chen, 2016)*. A strengthening Eurasian partnership may also give a boost to the European Union, as the enhancement of transcontinental ties may engender new trade channels, opportunities for energy partnerships and investment partnerships and developments *(Kowalski, 2020)*.

3.2. Cooperation between the European Union and Eurasian countries at the level of individual nations

Several examples prove the importance of Sino–European economic relations and the successful adaptation of the Franco–German model. China lent a helping hand to many European countries, for instance during the financial crisis more than ten years ago, and the success of the cooperation can also be seen in the volume of port development projects and the investments in the past 20 years.

3.2.1. Hungary

Hungary was the first to join the Chinese project in 2015 as part of the opening up to the East policy, striving to enhance Sino–Hungarian relations and, in a broader sense, take advantage of the cooperation with the Eurasian region. Hungarian Minister of Foreign Affairs and Trade Péter Szijjártó called on European countries in 2015 to take part in the project and strengthen their ties to the East using the BRI *(Szijjártó, 2015)*. At the 2020 Budapest Eurasia Forum, established by the Magyar Nemzeti Bank to promote awareness of, and foster action in, Eurasian cooperation, the minister said that Hungary had a vested interest in a strong European Union, as strengthening the Eurasian cooperation also strengthens the EU *(Szijjártó, 2020)*. Hungary has excellent relations with China and other Eastern countries in trade, too. In the past ten years, Hungary's eastern exports have increased by 22%, and its trade volume to Eastern countries has gone up by 25% *(Szijjártó, 2020)*.

Chart 3 shows that among the V4 countries, Hungary attracted the most Chinese capital in the past 20 years, amounting to EUR 2.7 billion *(Kratz et al., 2021)*. According to the Hungarian Investment Promotion Agency, it contributed to the implementation of 907 projects in 2020, leading to investments of EUR 4 billion. Out of these projects, 97 involved FDI worth EUR 2.5 billion, which created over 10,000 new jobs. In these projects, the share of the countries affected by the opening

up to the East stands out: Asian investors are implementing 30 investments to the tune of EUR 1.1 billion (representing 30.9% of all projects), with China leading the way with 27.1% and EUR 664 million *(HIPA, 2021)*.

3.2.2. Greece

Under the aegis of the BRI, perhaps the best example for the partnerships aimed at establishing Sino–European connectivity is the Port of Piraeus. Greece granted a concession for some parts of the port to the China Ocean Shipping Company (COSCO) in 2008. Since the southern European country was devastated by the 2008–2009 economic meltdown and it found it difficult to borrow from EU and international markets, the Chinese presence was a lifesaver *(Kleimann et al, 2020)*. Over the centuries, the port has always been key to Greece's economic prosperity, and after the Chinese acquired a 51% stake in it in 2016 *(Khushnam, 2020)*, it became the largest container-handling port in the Mediterranean in 2020 *(Seatrade, 2021)*. In 2020, Kleimann et al. showed that traffic at the port increased by 50% by 2019 compared to the year when the Chinese obtained their majority stake *(Kleimann et al, 2020)*. Both parties claim that the cooperation is a huge success: the Greeks are satisfied with the work of the COSCO and the impact of the developments on employment, and the Chinese view this investment as the Mediterranean hub for their BRI-based (geo) strategy *(Khushnam, 2020)*.

A paper by the Foundation for Economic and Industrial Research has found that by 2025, Greek GDP could increase by 0.8% thanks to the Port of Piraeus. Also, between 2016 and 2025, there could be 31,000 new jobs. Out of this, 3000 direct jobs and 10,000 indirect jobs have already been created *(Qianqian–Davarinou, 2019)*. Chinese President Xi Jinping considers the Port of Piraeus a flagship project of the Belt and Road Initiative *(Anthony et al., 2021)*. The other flagship of the project is the construction of the 350-kilometre-long Budapest–Belgrade railway, which also has relevance for Hungary. It would not only connect the capitals of

Hungary and Serbia, but ultimately also considerably boost the transport of goods between Piraeus and Budapest *(Brînză, 2020)*. It has to be noted, though, that China already accounts for 15–20% of (port) traffic in Europe, and it is present in major hubs such as Antwerp, Piraeus, Rotterdam, Nantes and Malta *(Magistad, 2020)*.

For Greeks, the importance of the ties to the Asian giant is shown by the fact that they joined the BRI (Obor Europe, 2018), and also that in 2019 they became part of an initiative between Central and Eastern Europe and China, which had been called 16+1 and is thus now referred to as 17+1 *(Ciurtin, 2019)*. Greece is also a crucial partner and ally for the US though. The Mediterranean country is loyal to NATO, committed to multilateralism and maintains constructive dialogue with the EU, therefore it will be essential for the Biden administration to remain on good terms with the Greeks regarding the revival of Atlantic efforts. Thanks to its geographical location, Greece has strategic significance when it comes to the stability of the eastern Mediterranean *(Pagoulatos–Sokou, 2021)*. The balancing between the two great powers can also be seen in the case of Greece, in particular in technology development: although the Greeks have not taken a position on the issue publicly, the contract for the development of the 5G network was awarded to Swedish telecoms firm Ericsson *(Sacks, 2021)*. At the same time, in early June 2021, Greece's permanent representative to NATO, Spiros Lambridis, said that although the BRI project raised certain concerns in other European countries, Greece considers it a specific objective and will not abandon it, and the country does not intend to break its economic ties to China *(Amaro, 2021)*.

3.2.3. Italy

It is no coincidence that Italy has become a theatre for the China–US rivalry in the past few years. The rapprochement to China is mainly based on economic rationale, as the Italian economy was already in recession before the pandemic, and the Chinese BRI promised enormous investments and infrastructure

developments, which was exploited by the Italian government. In March 2019, Italy was the first among the G7 to sign a memorandum of understanding with China about the New Silk Road to enhance trade and investment relations *(Magistad, 2020)*, causing great consternation among European Union members *(van der Eijk–Gunavardana, 2019)*. The 29 agreements signed under the BRI amounted to USD 2.8 billion. The signing of the agreement promised huge advantages for both parties: Italy sought to use the economic benefits, while China wanted to capitalise on the European country's advantageous geographical location *(Giovannini, 2020)*. The agreement mentions two Italian ports by name, Genoa and Trieste *(Magistad, 2020)*. The Asian giant invested EUR 16 billion in Italy in the past 20 years. Only the UK (EUR 51.9 billion) and Germany (EUR 24.8 billion) attracted more Chinese capital *(Kratz et al., 2021)*. In 2020, Italy's two main export partners were Germany and France, but among its import partners Germany was followed by China, with EUR 32.1 billion *(Eurostat, 2021c)*.

Even though strengthening the Atlantic alliance is currently high on the agenda in Italian foreign policy, Rome granted permission to Vodafone in early June 2021 to use Huawei technology for 5G development, on the condition that extremely high security rules are observed *(CGTN, 2021)*. Mask diplomacy was also a success story in Italy: as a 2020 survey showed, 52% of Italians considered the Asian country 'friendly', while only 17% believed the same regarding the US. However, the least popular countries included Germany (45%) and France (38%) *(Bechis, 2020)*.

3.2.4. Portugal

Portugal is also a beneficiary of Chinese relations, although it maintains close links to both the US and China, so it is forced to perform a balancing act in various respects in its ties to the two great powers. The country is a founding member of NATO, and the US has always considered it an ally, but it has also been China's strategic partner since 2003 *(European Commission, 2012)*.

Portugal's aim, namely to establish friendly relations with both great powers, is part of Portuguese foreign policy thinking, inspired by a universalistic approach and the need to maintain multilateralism. As Minister of Foreign Affairs Augusto Santos Silva put it: 'we are friends and partners of China, but we are not allies'. In November 2018, Portugal signed a memorandum of understanding with China about the BRI, which, according to the Portuguese, tallies with the EU's Eurasia strategy as well as the EU–China Connectivity Platform *(Rodrigues–Tavares da Silva, 2020)*. It should be noted that China is actively present on the Portuguese energy market, which could be a stellar example for the cooperation of electric car manufacturing. Portugal's most important investments are directed at the energy sector: since the country produces 50% of its energy use from renewable sources and China is increasingly turning towards renewable energy production to foster sustainability, this area is ripe for further cooperation *(Belt and Road News, 2021)*.

From a geopolitical and geostrategic perspective, one of the most interesting aspects of the Portugal–US–China triangle is the issue of the Sines port. Sines is Portugal's largest man-made port, which could function as a southern alternative to the port of Rotterdam in the future. Having recognised this, the Portuguese government announced a call for tenders to build a new terminal in 2019, foreseeing a significant capacity development. However, the tendering process of the project, worth EUR 600 million, was postponed by the Portuguese government until April 2021 due to the coronavirus pandemic, and no headway has been made to date [when this manuscript was finalised] on account of the pandemic *(Reuters, 2021)*. The declared objective of the Portuguese government is to bring the project under the umbrella of the BRI, as Chinese enterprises (e.g. the COSCO and the Shanghai International Port Group) are expected to bid for the concession *(Clbrief, 2020)*. The port development project is being watched closely by the US, as the American administration believes that it holds huge potential, since this port is closest to the US and

it serves as a major European hub *(US Embassy & Consulate in Portugal, 2020).* Due to the development of the 5G network, the southern European country even had an altercation with the US in 2020: George E. Glass, US ambassador to Portugal, pointed out to the country on 26 September 2020 that it had to choose between its allies and China. Portugal responded that only the government had the right to decide in such matters *(Reuters, 2020)*.

3.2.5. Spain

In Spain, China bought around 12% of the country's debt during the 2008–2009 economic and financial crisis *(Ortega, 2019).* In the past few years, China has been Spain's most important Asian partner, with Spanish exports to China steadily rising, reaching EUR 8.1 billion in 2020 *(ICEX, 2020).* China is also a major investment partner for Spain: in 2018 Chinese capital worth approximately EUR 1 billion was pumped into Spain, and while there was a lull in 2019 with merely EUR 72.5 million of Chinese investment *(El Economista, 2020)*, in 2020 Chinese capital of USD 370 million flowed into the southern European country, despite the pandemic *(The Corner, 2021)*. Nevertheless, the Spanish stance on the Chinese New Silk Road project launched in 2013 is illustrated by the fact that the Spanish government has not signed a single BRI deal with China (*Esteban–Otero-Iglesias, 2020)*. Although Spain is not formally part of the BRI, Spanish Prime Minister Pedro Sánchez has repeatedly said that he definitely wishes to strengthen Sino–Spanish relations, and he believes Spain will have a constructive role to play in the development of Sino–European relations as well *(El Mundo, 2021)*.

3.2.6. Poland

Chinese–Polish relations were bolstered as the Belt and Road Initiative was created, and Poland is part of the BRI as well as the 17+1 platform. Poland signed a strategic partnership with the Asian giant in 2011, which was then upgraded to a comprehensive strategic partnership in 2016. Poland can mostly benefit from this Chinese partnership in infrastructure development, as the Chinese have successfully bid for the construction of railways

and motorways in the past few years. In August 2019, the Chinese firm Stecol won a tender worth PLN 724 million (USD 185 million) for constructing a road section near the Łódź Special Economic Zone, and in December 2020 it also won a tender to construct the Mińsk Mazowiecki–Siedlce motorway. As noted above, rail freight transport between China and Europe hit record highs in 2020, with 12,400 trains transporting goods to Europe. The Małaszewicze terminal, located near the border with Belarus, was pivotal in this *(Paszak, 2020)*. In April 2021, 379 pairs of trains travelled on that section, while the authorities recorded a similarly high number in March, 377 trains, which means that 27,266 railway cars operated in the third month of the year *(Cargotor, 2021)*.

Just like many other EU countries, Poland considers its trade partnership with China a priority: last year the Asian giant was the country's second most important import partner behind Germany, with goods imported amounting to EUR 23.2 billion, surpassing even the Netherlands and Italy *(Eurostat, 2021d)*. Despite the pandemic, 2020 was also a bumper year for investments, because Poland attracted a large amount of Chinese capital, with investments worth EUR 815 million *(Kratz et al., 2021)*. This was only outstripped by investments to Germany and France *(Kucharczyk, 2021)*. However, no cooperation is anticipated between Poland and China in 5G development, as on 2 September 2019 Poland and the US signed a cooperation agreement about 5G technology development *(Paszak, 2021)*. In early May this year, Korean firm Samsung announced that it would develop the 5G network in cooperation with Polish mobile operator Play *(Samsung, 2021)*.

The above examples show that the countries that are committed to the Eurasian partnership are mostly those that actually benefit from its advantages. They take their economic interests into account, and have greater support for a foreign policy approach aimed at independence from the US. This means that if China manages to expand the group of European countries that benefit

from the Eurasian partnership, the collaboration between the EU and Asia could also strengthen down the road.

4. Opportunities and challenges: shifts in the European Union's foreign policy

4.1. The EU's future relations with China and the US

As the European Union tries to find the right way in its foreign policy, the prevailing stances on international alliances may be reshaped, and the current, mostly Western-oriented alliances could also change *(Gabriel–Schmelcher, 2018)*. It is crucial for European Union members to utilise the opportunities offered by the global economy as fully as possible, so that the alliance of interests can function productively, and the achievements of Western and Eastern development are expected to provide a basis for this at the same time *(Smith, 2014).*

In the case of the European Union's top economies, it can clearly be seen that shared economic interests entail close partnerships with China too. In the transition from a growth-oriented economic structure to a development-oriented one, the future Europe should be a central element, as economic sustainability and the challenges posed by climate change are crucial for the future of Eurasia (Rosnerova – Hraskova, 2019). In new technological and climate-neutral industrial developments, Asia, and in particular China, hold increasingly essential potential *(Xie – Zhang – Laia, 2014).* The balancing policy of European countries has to strive for a balanced and parallel harnessing of the potential in Eastern and Western relations, as this is the only way for the European Union's community to adapt appropriately to the globalising world economy.

The policy of balancing between the US and China will be significantly influenced by how the foreign policy approach of

the two great powers will change, or perhaps even converge, in the coming years. For China, one potential path for establishing relations with the European Union is for the Chinese Communist Party and the Chinese government to pursue a political approach increasingly aligned with Western conditions. One sign of this from the Chinese government could be that there are measures taken to settle human rights issues: the Chinese State Council adopted a white paper on enforcing human rights within China *(Xinhuanet, 2021).* The Chinese policy of economic opening and reform is mostly based on this 'Westernisation' trend, allowing Chinese political and economic actors to adapt to changing political expectations if their interests so dictate[2] *(Zheng – Xiang, 2011).* With its sustainability and green turnaround, which is currently one of the most important elements of the 14th Five-Year Plan (2021–2025), China is increasingly aligned with European and Western views on sustainable development. On the other hand, the European Union has to accept Eastern values, be free from ideologies and refrain from intervening in other countries' domestic matters. That is the only way to create a win-win cooperation. This means that the EU needs to become independent from US expectations in its foreign policy.

In Europe, the strength of the United States is its economic, political and military presence. If China wishes to provide an alternative to the countries of the European community, it has to increase the number of Belt and Road Initiative projects in Europe significantly, as the establishment of an alliance requires the

[2] The groundwork for China's economic growth was laid by the reform period under Deng Xiaoping (1978–1997). It rested on establishing an economic structure modelled on the West, encouraging investment by Western firms in China and creating independent Chinese technological innovations. During the reform policy period, Chinese leaders went on several major foreign trips to study other countries, and many world-known economists were invited to China, including the Hungarian professor János Kornai. Gewirtz (2018): A hajóút, ami megváltoztatta Kínát (The cruise that changed China) In KÖZ-GAZDASÁG 2018/1. http://unipub.lib.uni-corvinus.hu/3319/1/KG_2018_1_Julian_Baird_Gewirtz.pdf

support of both the political community and societies, and for that the existing benefits of Chinese partnership need to be tangible for society too. A good example of this is the active expansion of cultural, educational and exchange relations, thereby filtering down the opportunities offered by the cooperation with China to the lower levels of society and also familiarising the European communities with Eastern culture. If European countries only wish to reap the economic benefits of the Western sphere of influence, perhaps under pressure from the United States, they will only be able to use a portion of the opportunities in the global economy in the years to come, as they will cut themselves off from the technological and infrastructure opportunities of the Chinese economy. It is therefore in the EU's best interest to utilise the benefits of both the Atlantic and the Eurasian partnership based on its strategic autonomy.

With respect to Europe's future independent and strategic foreign policy approach, Central and Eastern European countries could serve as the bridge between the East and the West. For the CEE region, the Eastern partnership can play a major role in logistics and as a hub in international trade since the region can serve as a gateway for the prospering Eurasian transcontinental railway network and the north–south Mediterranean trade channel. The countries in the CEE region can simultaneously reap huge benefits of the economic opportunities offered by the East and the West, since the developments in the globalising world economy, regardless of the direction they come from, can have a profound impact on the open economies of these countries *(Béres et al., 2017)*.

4.2. Cooperation opportunities with Eurasia in the age of the technological and green revolution

The digital revolution in the 21st century fundamentally changes the structure of economies, creating new opportunities but also new challenges. It is vital to strengthen the digital dialogue between the European Union and China to promote the recovery

from the Covid-19 crisis *(Mogni–Goethals, 2020)*. The EU's R&D spending falls short of that in China and the US *(Grevi, 2020)*, with 2.19% of the EU's GDP dedicated to this purpose in 2019 according to Eurostat data. Relative to GDP, Sweden fares the best with 3.39%, followed by Austria's 3.19% and Germany's 3.17% (Eurostat, 2020). Therefore, the European Union should place more emphasis on increasing private R&D investments, fostering the appropriate legal environment necessary for that, and on promoting key sectors such as quantum computing and semiconductors *(Grevi, 2020)*. This is all the more desirable because cutting-edge technologies like artificial intelligence and robotics are still coming from China and the US. In today's digital age, these technologies will not only be one of the cornerstones of the power dynamics but also crucial parts in social welfare *(Lehne, 2020)*. The European Commission's EU Recovery Plan 2021–2025 worth EUR 750 billion and aimed at the post-Covid-19 recovery, job creation and the enhancement of Europe's resilience through green and digital investments can be the perfect basis for the digital cooperation between the EU and China *(Mogni–Goethals, 2020)*.

The promotion of the other great megatrend of our time, sustainable development, could be another mainstay for the cooperation between China and Eurasian countries. In its 'Made in China 2025' strategy, China strives to lead the way in the development of green technologies. The Asian giant already produces three quarters of the world's solar panels, two-thirds of the world's wind turbine production capacity is associated with it, and it is a world leader in the manufacturing of electric batteries. And these sectors are vital in fostering sustainable development. Besides the cooperation affecting renewable energies, future collaboration holds enormous potential in green finance and green investments too *(Kefferpütz, 2021)*. In 2020, Chinese greenfield investments to the EU were at levels not seen since 2016, even despite the crisis, with Chinese investors accounting for EUR 1.3 billion, or 20%, of total FDI, in contrast to the average

of 6.5% a decade earlier. The largest greenfield investors include technology companies such as Huawei and Lenovo *(Kratz et al., 2021)*.

Both the European Union and China are committed to fostering sustainable development, reducing the harmful impact of climate change, ensuring energy efficiency and cutting CO_2 emissions. China strives to be carbon-neutral by 2060, and the EU by 2050. However, there are differences in the laws and various standards, and resolving these will require further cooperation *(Anthony et al., 2021)*. A prime example of this is the cooperation between the People's Bank of China (PBoC) and the European Union regarding the harmonisation of taxonomies of green finance and green investments. The EU and China want to create a mutually recognised investment framework by the end of 2021 that could further encourage green investments *(Li–Yu, 2021)*.

Besides the recovery from the Covid-19 crisis and the economic partnerships, strengthening the dialogue with Eurasian countries is also vital for addressing new challenges such as innovation and sustainable development. The fight against climate change is only possible through harmonised international cooperation and standardised rules.

5. Conclusion

The partnerships in the globalising international arena suggest that the 20th-century Cold War paradigms no longer apply to the challenges of the 21st century. In the US–China rivalry, the EU has to be an autonomous actor, diversifying its economic and political ties. The challenges of the 21st century (environmental and economic sustainability) can only be tackled through cooperation and partnership, and Europe can only preserve its competitiveness by learning from some Eastern examples and innovations. There have been some promising steps towards

a Eurasian partnership, but the EU needs to press ahead, and that requires opening up ideologically and politically to China. On the other hand, China has to continue opening up its economy to the West, and it has to adapt to Western social and political expectations, so that large parts of Europe can see tangible results of the cooperation. Central and Eastern European countries could play a key role in mediating between the two sides, i.e. the East and the West. Hungary's Eastern Opening policy fits in well with the developments determining Europe's future, as in the long run only the cooperation between the East and the West can lead to sustainable economic and social developments. For Europe, the simultaneous development and preservation of both American and Chinese relations is key, thanks to the changes in power relations in the global economy. China will increasingly become a crucial player in technological and green developments in the coming decades, while the United States is expected to try to maintain its global economic influence. For the countries in the European Union, the real development potential is held by utilising the arising opportunities at the same time, and this calls for strengthening the value-based, pragmatic and independent foreign policy approach. From the perspective of great powers, global economic development and the convergence of third-world countries should rest on the partnership of great powers rather than on their confrontation *(Matolcsy, 2021).* Instead of rivalry, the world now needs mutual understanding and the utilisation of cooperation opportunities.

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Chapter 2

Multilateral Cooperation

Geofusion – Digital Connectivity and Digital Silk Road

Norbert Csizmadia

The Belt and Road Initiative launched by China in 2013 comprises railway lines, the development of sea and land ports, the construction of motorways, digital developments, and the establishment and development of logistics centres, in other words, networks operating through economic corridors connecting Europe and Asia, which will form a new and interconnected Eurasia. The Belt and Road Initiative is about shifting the axis of the world economy back to land from the oceans, and restoring and rebuilding the former economic, political and cultural role of Eurasia. The Belt and Road Initiative can be described as a complex network that can be expanded flexibly in both time and space. The Silk Road consists not only of infrastructure networks but also of knowledge sharing, people-to-people connections, and cultural and financial cooperation. The Belt and Road Initiative (New Silk Road) connects the actors that constitute the new phase of globalisation: this represents around 40% of global GDP and 70% of the Earth's population. The main hubs of the infrastructure networks built as part of the New Silk Road will reorganise the regions in terms of their significance too, with new centres cropping up. We can identify these new centres with the help of geofusion.

Journal of Economic Literature (JEL) codes: F5, F6, O2, O5, R4

Keywords: connectivity, sustainability, Belt and Road Initiative, Eurasia, geofusion, geopolitics, geography

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1. Introduction

1.1. Megatrends and visions

The global financial and economic crisis that started in 2008 reshaped our world. While globalisation was the determining factor between 1980 and 2010, as a result of the 2008 economic crisis new cooperations, new actors, new ways of thinking, new solutions and new systems of values emerged. Globalisation entered a new era, the era of technology and knowledge, and a Eurasian era based on long-term sustainable growth *(Cséfalvay, 2017; Csizmadia, 2019; Matolcsy, 2019)*.

The 21st century breaks with traditional geographical maps, which thus need to be redrawn *(Csizmadia, 2016)*. We need a new approach, and increasingly novel solutions have become necessary. This requires a new, associative perspective, comprehensive knowledge, unique ideas, and creativity. In order to create novel knowledge, we first have to understand the world around us, the nodes in the networks and integrated knowledge through associative maps that mobilise creativity and help us focus on what is important.

Thanks to a 24/7 global economy based on new technologies, talent finds a way of emerging by bridging distances. However, it is not just the mobility of individuals — economic and otherwise — that has increased with the advent of the Internet, modern public transport and new industries, but also that of nations, communities and countries. Just as nowadays a Chinese economist, an American geographer and a Hungarian engineer can easily start a business together, countries thousands of kilometres apart can be linked by shared interests, economic and political cooperation. Meanwhile, climate change (or more precisely, keeping it within +2°C), environmental damage threatening the lives of humans, adapting to the consequences of these issues, widening economic and social inequalities, economic

crises, international conflicts, and migration collectively all pose unprecedented challenges to humanity *(Csizmadia, 2016a).*

The former unipolar world order is also becoming multipolar, while global strategies are being replaced by regional cooperation (*Bernek, 2018*). In this new era, geography and economic geography are on the rise, with geopolitical developments being replaced by geoeconomic ones; competition is for markets rather than territory *(Luttwak, 1990)*. We live in an age of networks and fusions. In this interconnected world, a complex approach becomes paramount *(Castells, 2005)*. The centre of gravity of the world economy is shifting towards the East again, marking the end of a 500-year Atlantic period. While the 19th century was the age of the British Empire, and the 20th century was that of the USA (*Khanna, 2019*), the 21st will be the century of Eurasia. Europe and Asia connecting to form Eurasia, where China will play a leading role.

The most important megatrends for the decades ahead can be summarised as follows: humanity will become stronger and stronger, but at the same time, it will gradually age: due to technology, more and more diseases will be successfully cured, but more and more will be spent on healthcare, medicines and health tourism. Everyone will be connected ever more closely to everyone else in the world. Meanwhile, localisation is gaining momentum, tribal feelings are developing in the new city-states, and 'local' trumps 'global'. We will experience the 'rise' of the machines, and out of the marriage of genetics, robotics, the internet and nanotechnology, GRIN technology will be born. The 20 years between 2010 and 2030 will be the period of life sciences, and within that, biotechnology, medicine and the pharmaceutical industry will exhibit the most dynamic growth. Singularity is a future period in which technological change will be so rapid and far-reaching, that human life will irreversibly change as a result. Due to singularity, human and machine intelligence will merge, and machines will become capable of independent development, yet in some sense they will be human, with their

intelligence becoming similar to that of humans *(Kurzweil, 2013)*. Pollution, global warming, and the lack of raw materials and energy sources will cause ever graver problems: countries will become submerged, while the fiercest fights will break out over fresh water. In the aftermath of the 2008 financial crisis, new systems of values are developing, in which maximising short-term profits will be of secondary importance behind long-term value creation and preservation. In parallel with the transformation of responsibilities, new industries are reshaping the markets *(Watson, 2010)*.

This paints a picture of a new world order where the possession of power will be at least as important as profits, and this will be coupled with the increasing economic engagement of the state; economic warfare will undermine economic integration, multilateral systems will regress to the regional level instead of becoming global, oil prices will be low and fickle, so competition will not be for resources but for markets. The lines between commercial and strategic objectives are increasingly blurred in the case of sectors such as technology and finance. In the age of geoeconomics, countries no longer seek to promote the free market. On the contrary, they use market tools to increase their own strength, i.e. the economy is seen as an instrument of great-power politics.

1.2. The rise of geography and the importance of geopolitics in the 21st century

Today, the processes of globalisation have radically transformed human society and with it the functioning of the economy. The integration and rise of networks within the global economy is unfolding at an accelerating pace from one decade to the next. The dismantling of barriers within the economy, the global unification of standards, and the global homogenisation of consumption habits have given rise to a global economy that is increasingly becoming a unified whole and behaving like a single unit. This

unification is well illustrated by the fact that major financial institutions from Hong Kong to New York, and from London to Buenos Aires, maintain branches in every global hub of the world economy, allowing capital to flow freely between the different regions of the world. Therefore, it is no surprise that the role of geographic space has also been radically transformed in this new economic and social structure. In the wake of falling transportation costs and technologies spanning physical space, distances are shortening, but at the same time, space is becoming 'denser' *(Csizmadia et al., 2016).*

The main consequences of globalisation regarding the spatial aspect of the economy can be summarised as follows: the main processes of globalisation (the spread of information and communication technologies, and growing deregulation) have created a dual spatial process: the geographic spread of economic activities coupled with stronger local trends. To put it differently, spatial concentration has gained economic significance, while long-term relationships between distant business partners may also be strengthened. The firms of global industries plan their product markets and sales in terms of country groups, but with respect to input markets and production, they think in terms of subnational regions, generally cities and their catchment areas. Firms competing globally have recognised that the roots of their competitive advantages are concentrated in space, so they need to take action locally to strengthen these advantages *(Krugman, 2009).*

In today's technological era, we are prone to forgetting the importance of geographical factors, but at the same time, we are witnessing quite the opposite in a certain sense: geographical factors are becoming increasingly decisive in international relations and political debate.

Robert D. Kaplan (2018) believes that geography holds the key to understanding the drivers of the world, in particular geopolitical and foreign policy conflicts. He shows why it is wrong to view

the impact of geographical factors on human societies and the course of history as outdated, to underestimate it, and to fail to use it to understand and resolve conflicts. Although we may forget about the power of geographical factors, they do exist, he argues. Not even technological progress can eliminate them, though many people believed it could. In fact, not only has technological progress failed to result in the 'end of geography', it has lent greater significance to territorial aspects.

2. At the dawn of a new world order — the Eurasian future

A new world order is dawning in the 21st century, a changed, multipolar world order that also offers opportunities. The economic, social, natural and environmental balance of our world has been transformed, triggering a shift in the geopolitical 'world order', too. In this new, fast-moving world order, the importance of geography is increasing again:

- International relations in the 21st century have become even more complex and intricate, and geography has an important role to play in understanding this.
- Understanding the geopolitical developments in the 21st century requires new types of maps and representations, explanatory infographics.
- To understand the geopolitical developments at the beginning of the 21st century, several disciplines need to be coordinated, such as history, economics, physics, biology, geography, sociology, cultural anthropology, engineering (technology and materials science), etc. It is, therefore, a kind of fusion, i.e. the harmonisation and combination of various disciplines, that can lead to the assertions that form the basis of hypotheses.

We live in an age of networks and fusions. In this interconnected world, a complex approach becomes paramount. The centre of gravity of the world economy is shifting towards the East *(Quah, 2011)*, marking the end of a 500-year Atlantic period, and while the 19th century was the age of the British Empire, and the 20th century was that of the USA, the 21st can be the century of Eurasia. Europe and Asia connecting to form a new Eurasia, where China will play a leading role. In relation to this, the Central and Eastern European region may become a gateway to the Eurasian continent.

The age of globalisation was followed by the age of technology, and one of the most pressing questions is what role will be played by location in this technology-driven era. This is the geography of knowledge and fusions, or 'geofusion' — the fusion of places — in the age of networks. Technological progress may once again enhance the importance of geography *(Csizmadia, 2016b)*.

2.1. Age of networks and connectivity

Modern life is impossible without networks. They are increasingly significant today, as more and more advanced networks emerge and spread. While the networks in nature have developed organically, and they operate almost imperceptibly, on their own, man-made networks need to be planned and made operational by us. The better we understand networks, the better we can make efficient structures facilitating the achievement of our goals. After all, networks consist of a set of nodes that are linked to each other in some way. The nodes — and the links between them — may vary widely, and thus networks are also extremely diverse. Through networks, one can understand the mechanisms that are responsible for several aspects of the world around us. This highlights the significance of the nodes (or hubs) and their connections in a network.

One of the most interesting and important features of networks is that in every network, there are special nodes that have many

links. These nodes emerge in space and can also be seen on our maps; for example, in the air traffic network or in knowledge networks, where central nodes and patterns are shown in the context of university collaborations.

Maps of air traffic and knowledge networks

Source: Geofusion 2.0, Scimap

Along with geographical places, spatial flows are increasingly important. Manuel Castells argues that instead of the historically developed geographical approach ('place in space' or 'space of place'), actual developments call for a 'flows in space' or 'space of flows' approach. At the same time, the global change in the international economy is uneven, i.e. geographical differentiation

is much greater than ever before. A complex spatial structure is on the rise; the global economy is much more of a multipolar system.

Especially in the first decades of the 21st century, network science related to international space garnered more attention than before. The essence of the preferential attachment theory developed by Zeev Maoz (2012) is that the growth of trade and alliance networks that are prone to being scale-free reflects the development model by Albert László Barabási (2016). The significance of the nodes follows from the density (cohesive communities or cohesive geographical nodes).

As Parag Khanna (2016) puts it, competitive connectivity is the most important geopolitical driver of our era. In terms of the morphology of space, connectivity has become a new world paradigm, and our existing maps can now be supplemented with indications of power lines, motorways, railway networks, internet cables and air routes; in other words, the symbols of the global network society. Khanna believes that the changing nature of geopolitical competition is complemented and transformed in the struggles for the interconnectivity of supply systems.

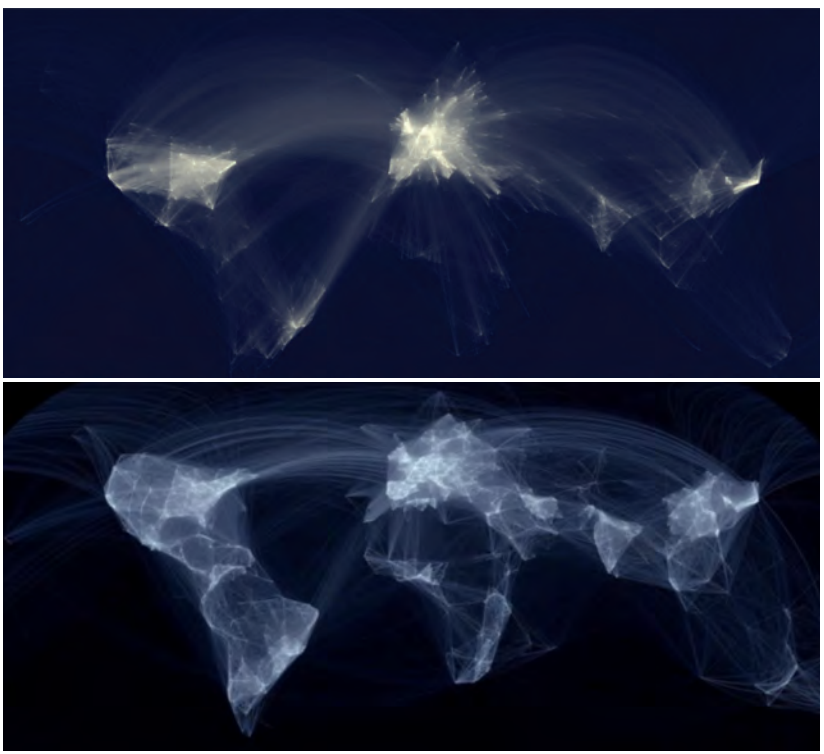
2.2. Geofusion – connectivity, fusions and networks in space

The network and fusion of geographical places, i.e. 'geofusion' is both the synthesis of geography and the creation of something new in geography with the simultaneous application of economic policy, economics, technology, design and visualisation. By linking a wide range of areas, geofusion maps offer new perspectives through maps, explaining geopolitical and geoeconomic correlations. Connectivity factors appear; infrastructure and knowledge networks in geographic nodes, i.e. HUBs, based on geopolitical structures, define global nodes, a new way of interpretation.

Geofusion world map of the 21st century — based on connectivity and geographical networks

Source: Geofusion 2.0, 2021.

Network of scientific cooperation in 2005–2009 and 2010–2016



Source: Sciene-Metrix, Scimago Lab, Inc, Oliver H. Beauchesne; Data: scopus - Elsevier

The fusion of places, i.e. 'geofusion' (*Csizmadia, 2016b*), is both the synthesis of geography and the creation of something new in geography with the simultaneous application of economic policy, economics, technology, design and visualisation. Geofusion maps are new maps that offer new perspectives of a wide range of areas through maps, explaining geopolitical and geoeconomic correlations. Connectivity factors also appear in complex geofusion map representations; infrastructure and knowledge networks in geographic nodes, i.e. HUBs, based on geopolitical structures, define global nodes, a new way of interpretation *(Csizmadia, 2019).*

Fabó and Petroccia (2018) in their study The century of metaconvergent geofusions' argue that the explosive development of information technology changes human, social, geographical, economic, political and cultural relations considerably, as it significantly facilitates access to knowledge about the world, the use of data, the comparison, analysis, regrouping and enrichment of knowledge.

Information technology can bridge continents, regions, cities and communities across long distances, providing immediate presence and opportunity for action for all actors. This highlights the fact that the emergence of geofusions and clusters unfolding along scientific and geopolitical force lines is heavily influenced by the characteristics of geographical places. The recent interdisciplinary nature of sciences and the emergence of new disciplines are attributable to both fusions and complex networks of relationships. Therefore, a new phenomenon of network science also becomes more important, since it outlines the centres, connections and access points in such a way that the more general findings lead to specific realisations and solutions *(Fabó–Petroccia, 2018).*

Fusions and networks are maintained by a complex system of relationships, on the basis of which a complexity index can be calculated for the economic development of the different areas. All in all, economic development based on knowledge and

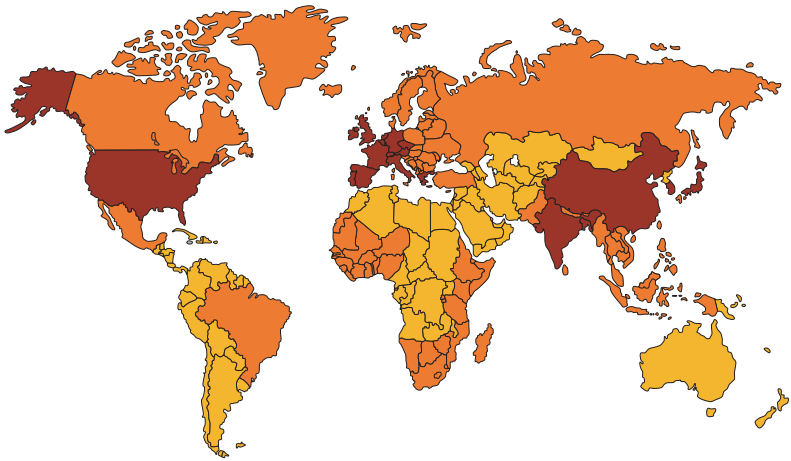
technological innovation focusses on areas and nodes (global cities, HUBs, megaregions, geographical regions) with high-quality higher education and knowledge transfer institutions, and with favourable climatic conditions *(Fabó–Petroccia, 2018; Csizmadia, 2016b)*.

Today's societies live in a special geomoment, when and where — i.e. in space and time — knowledge, innovation, creativity and skilled labour are the most important values. Geography helps us recognise the direction of changes and adapt to them. The drivers of economic growth, in particular talent, innovation and creativity, are not evenly distributed around the world, but are spatially concentrated *(Papp-Váry, 2018)*.

3. Geofusion world — the geopolitical spatial structure of the 21st century

With the rise of geography, by using new types of geofusion map we can identify geopolitical structures from the geographic factors and thus designate the main power centres of a new, multipolar world economy. Through the study of geopolitical and civilisation theories, and the use of connectography and geofusion maps, the most important power centres, areas and connections in the multipolar world order of the 21st century can be outlined.

Connectivity factors and geofusion



Legend: red: very high density; orange: high density; light orange: medium and low density; yellow: very low density
Source: Author's work, 2019.

Four regions stand out in terms of connectivity: North America; Europe (Western Europe); China and Southeast Asia; and the Indian subcontinent. The analysis proves the significance of global urban hubs within regions and countries. Cooperation links and connections between regions are especially important, and this is the most obvious in the case of air traffic links, but it can also be seen in overland traffic (motorways and railway networks). While ties are stronger on the Eurasian continent and in North America, power centres appear only in nodes in both Latin America and Africa, and on the continent of Australia (Rio de Janeiro, São Paulo, Buenos Aires, Cape Town, Sydney). Geographical fragmentation is also crucial. While there are vast expanses of land north of the Eurasian mountains, the southern areas are divided by peninsulas and islands (Arabian Peninsula, Hindustan Peninsula, Southeast Asia), which are mainly connected by sea and air links.

If, based on connectivity factors, we use the geofusion method to analyse the density of geopolitical regions, the countries as nation-state levels, as well as global cities and hubs (i.e. we place the global urban hubs, the significance of nation-states and the economic force fields generated through connectivity factors on top of each other), we can then use this to determine the geopolitical and geoeconomic force fields of the present period as well as the key geopolitical players and actors, just like the various types of geopolitical regions. This is my own research defined by using my own geofusion methodology described above. It is important to emphasise that in today's world, hierarchical spatial systems (global cities, nation-states, geopolitical regions) built on each other need to be examined together to determine the force fields, and this is where geofusion methodology (i.e. the simultaneous analysis of connectivity factors, the nation-state level and hubs) can help.

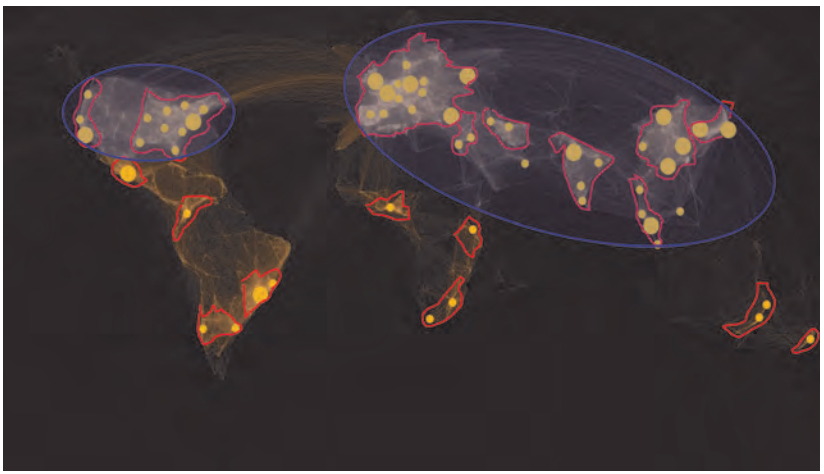
In relation to the classification based on nation-states or countries, power is defined by Max Weber as the ability to force others to do what they would not necessarily do themselves. Power is 'any chance within a social relation to impose one's will also against the resistance of others, independently of what gives rise to this chance' *(Weber, 1987:77)*. Accordingly, power in international relations and geopolitics means the ability of a state to change the behaviour of another state. The term 'superpower' is used to describe states that can promote their interests all over the world through their economic, military and soft power, thereby exerting considerable influence on global events. The term 'regional great power' is used to describe states that have the economic, military and soft (cultural) power to promote their interests in their geographical region and to exert considerable influence on the life of the region.

Based on the maps generated by the analysis and the previous geopolitical structure layout within 36 regional spatial units:

- I name 2 (large) global geopolitical force fields; these are America and Eurasia, within which the 2 main great-power geopolitical leaders are China and the United States of America (these are also the G2 countries)
- During the analysis, I identified 16 regional powers, namely: Russia, India, Japan, South Korea, Australia, Iran, Saudi Arabia, Turkey, Israel, Germany, France, the United Kingdom, Italy, Scandinavia, Brazil, Republic of South Africa.
- Among geopolitical regions (as regional force fields — especially due to transport and trade), the role of gateway regions is of paramount importance for the future. In my analysis, I identify 6 major gateways, namely: Southeast Asia — ASEAN countries, Central Asian countries, Persian Gulf countries, Southern Europe, Central and Eastern Europe (the countries that joined the 17+1 Initiative) and Central America.
- I have identified 64 global urban power centres located in the territory of a given nation-state, which are important parts or hubs of the geopolitical force fields. Out of the 64 global urban hubs, 5 belong to Latin America, 3 to Africa and 3 to Australia. 12 belong to the North American territories and 41 to the Eurasian continent (out of which 20 are in Asia and 21 in Europe).

The results obtained with the geofusion method show that in the multipolar world order, not only countries have geopolitical and geoeconomic significance (playing a prominent role), but also the regions arising from regional cooperation, and the economic and geostrategic power centres, global hubs and global cities, which take on new meaning through interconnectedness. The map below summarises the unified, hierarchical geofusion synthesis of global cities and hubs, geopolitical regions, networks and geopolitical force fields.

Geoeconomic force fields by region



Source: Author's work

4. Future is long-term, sustainable and Eurasian

In the 21st century, a cohesive Eurasia will play a key role in the new world order. Eurasia is a term originally used in physical geography and geology, referring to the continent comprising Europe and Asia. Regarding its geological history, it has to be noted that Eurasia became a separate continent about 400 million years ago. It covers approximately 55 million km^2, which is 36.2% of the Earth's surface. It is home to just over two-thirds of the world's population, more than 5 billion people. In plate-tectonic terms, Eurasia not only means the land areas of Europe and Asia, but also the Eurasian Plate, one of the 7 major crustal plates that make up the Earth's lithosphere; it is located under the eastern half of the North Atlantic Ocean, but also beneath the Arctic Ocean and the Sea of Japan, among others. The Eurasian crustal plate is the largest contiguous landmass on Earth. In the Cenozoic

Era, when smaller plates from the south (the Arabian and Indian plates) joined Eurasia, the longest east–west mountain system was created, stretching from the Pyrenees to the Himalayas, also called the Eurasian Mountain System.

4.1. Eurasia — a 9,000-km-long contiguous unit of physical geography

On the current geographical map that emerged after the last ice age, if we take a look at the contiguous band between 40 and 50 degrees north latitude, from the Carpathian Basin all the way to the Pacific Ocean, we can see that a so-called steppe belt extends for over 9,000 kilometres. From a geological and physical geography perspective, there is a homogeneous area here spread out over 20–24 million km^2. This was, therefore, traversable, and became the most important transport route, the so-called 'Steppe Route' (*Grandpierre, 2019*), which is a vast expanse with fertile soil and interstream areas, lying in the temperate and subtropical climate zones. For thousands of years, this represented a link to the steady stream of east–west traffic on the ancient Silk Road.

The ancient Silk Road's 'main route' ran through the steppe between China and the Carpathian Basin. According to Attila Grandpierre's research (2019), the main thoroughfare of the ancient Silk Road had one pole in the Carpathian Basin, and the other in China. This ancient Silk Road was the scene of the most important innovations and technologies of those eras, with advanced agriculture, irrigated farming, metalworking and pottery. It was also the highway of contemporary philosophy. An ancient, natural world-view prevailed from the Carpathian Basin to the Pacific Ocean. On the basis of historical aspects, we can speak of 4 major Silk Road eras in time, which Attila Grandpierre writes about in his book "Az ősi Magyarország. A Kárpát-medence és a Selyemút népeinek felemelkedése" (Ancient Hungary. The Carpathian Basin and the rise of the peoples of the Silk Road): A Palaeolithic Silk Road 40,000 years ago, a Prehistoric Silk Road

7,000 years ago, an Ancient and Middle Age Silk Road that existed between the 2 BC and the 17th century, and the New Silk Road in the 21st century *(Grandpierre, 2019:332).*

Since 2007, China has been building an 'ecological' civilisation, a 21st-century continuation of organic thinking, ancient Chinese philosophy and ancient Eurasian culture. The development of the New Silk Road would bring even greater benefits to the peoples living in the Silk Road area. 'This could lead to the rise of Eurasia. The ecological civilisation could become more efficient than modern civilisation if it establishes its scientific foundations, built on local features and creating a unique culture. Just as during the Renaissance, Europe's primacy in the world was enabled by the revival of ancient Greek knowledge, for ancient Eurasia the most important key could be the return to an even higher-quality body of knowledge and morals', which could mean a new geocivilisation. The ancient world-view, ancient knowledge, philosophy, philosophical system, religion, folk music, folk tales and common traditions of the peoples of the Silk Road reflect an ecological system of values, and a deeper understanding of the ancient high culture may promote the cultural and social revitalisation of the peoples in the region, the advent of a new renaissance.

4.2. The changing centre of gravity of the global economy – a shift to the East

In his article 'The global economy's shifting centre of gravity' published in 2011, Danny Quah, professor at the London School of Economics and Political Science and dean of Lee Kuan Yew School of Public Policy, National University of Singapore, models the change in the world's economic centre of gravity by depicting it on Earth's surface, based on the averages of locations of economic activity. For his calculations, he identified and used the total value of GDP produced on Earth, the world's urban agglomerations of over one million people and rural centres. According to these

calculations, in 1980, the world's economic centre of gravity was located at a point in the middle of the Atlantic Ocean, at the same longitude as Izmir and Minsk. This change clearly reflects the economic growth of East Asia and China, the main reason behind the shift. Having estimated the economic output of the almost 700 locations studied, the author concluded that the centre of gravity would be in China by 2020. Observed from the Earth's surface, the magnitude of change would represent a shift of 9,300 kilometres compared to 1980. Hence the need for the developed and wealthy countries in the past century to open up to the East on issues related to the world economy and global governance. Moreover, many existing global issues will probably remain dominant in the 21st century, such as ensuring the continued growth of the global economy; however, change is expected on other issues, whether regarding political influence or military intervention *(Quah, 2011)*.

In the 19th century, the world was Europeanised, in the 20th century, it was Americanised, and now, in the 21st century, it is being irreversibly Asianised *(Khanna, 2019)*. This is actually a multicivilisational order connecting five billion people through trade, finance and infrastructure networks, which together account for 40% of global GDP. China will not be the sole leader in this system, as Asia will return to the stable multipolar order that existed well before the European colonialisation and American dominance; and accordingly, India and Southeast Asia will also become major economic and strategic centres. Asia's growing muscle will reshape business and cultural life in North America, Europe, South America and Africa. However, if we add that the two most important watchwords in this new, multipolar world order are connectivity and complexity, and the two strongest global trade areas are Europe and Asia, then we can say that in terms of connectivity, we can talk not only about a century of Asia but of a century of Eurasia.

In her book 'The future of humanity' published in 2018, Zhouying Jin, director of the Centre for Technology Innovation and Strategy

Studies at the Chinese Academy of Social Sciences, explains that the so-called hard and soft technologies complement each other, just as yin and yang do in Chinese philosophy and thinking. The most important objective of global civilisation is the transition to sustainable development and growth by using green technologies, artificial intelligence and manufacturing technologies. This can bring forth the civilisation of greatness based on the Chinese mindset of ecological civilisation.

4.3. Belt and Road – the most important Eurasian programme

From an economic, geostrategic and geopolitical point of view, the most important factor in the creation of the 21st-century Eurasia is China's long-term development plan, the Belt and Road Initiative (BRI), also known as the New Silk Road Programme, which was announced by Chinese President Xi Jinping in September 2013 in Kazakhstan, at the Nazarbayev University in Astana. The main objective of the Belt and Road Initiative is to shift the axis of the world economy back to land from the oceans, and to restore and rebuild the former economic, political and cultural role of Eurasia. The long-term programme is actually a complex network that can be expanded flexibly in both time and space. It is an alliance of state-owned and economic institutions and cities, a peaceful rise based on cooperation and a network of win-win relationships. The New Silk Road connects the actors that constitute the new phase of globalisation: this represents around 40% of global GDP and 70% of the Earth's population. The Belt and Road Initiative also heralds infrastructure interconnection, political coordination, the removal of trade barriers, financial integration and human development. Upon its announcement, the Belt and Road Initiative was joined by 64 countries, and by the spring of 2019, 125 countries and 29 international institutions from around the world had signed and started implementing a total of 170 agreements worth USD 1000 billion.

The Belt and Road Programme can be summarised in 6 points as follows: One concept and initiative. Two wings: the land and sea routes, namely the Silk Road Economic Belt and the 21st-Century Maritime Silk Road. The 'three principles': built in the interest of everyone, by everyone, for everyone. Four keywords: at macro level: connectivity, strategic synergy, capacity-building; at cooperation level: joint development of markets; at operational level: business management, market operations, government service and international standards. Five directions, which are the five main goals of connectivity: linking together policy, infrastructure, trade, finance and people-to-people connections, all implemented through six economic corridors.

The Belt and Road Initiative is both the most important geostrategic programme of the 21st century and the largest investment in world history. It is a coherent network of maritime routes and land-based economic corridors. Among the latter, the most important one is the New Eurasia Land Bridge Economic Corridor, connecting 108 cities. 14,000 trains run between the main cities of China and Europe each year, transporting over 1.1 million tonnes of goods in containers. So far, more than 600 projects have been realised since the announcement of the plan, including 41 pipelines, 203 bridge and motorway developments and 199 power plants; new railway lines are being constructed, and in early 2019, 12 new port development projects were launched in Europe. The Belt and Road Initiative is joined by 6 major development zones on land (3 major routes) and sea (3 major routes).

From a geopolitical point of view, there is the potential for a new Eurasian force field to emerge along the Belt and Road. In fact, for the countries along the route, this creates unique, unprecedented infrastructure development opportunities. The funds for this enormous infrastructure development are provided by Asia mainly through the Asian Infrastructure Investment Bank (AIIB), which was established at China's initiative and started its actual

operations in January 2016. It has now 77 members; Hungary became a member of the AIIB on 26 June 2017 *(Bernek, 2018)*.

In relation to the Belt and Road Initiative, there are a lot of – inconsistent – figures, both in terms of the number and scale of investment projects. At any rate, the BRI has so far been characterised by investments amounting to over USD 1,000 billion, more than 250,000 new jobs created, almost 600 infrastructure investment projects and a multitude of energy centres, power plants, railway lines, roads and pipelines.

The past decade also saw major investments. China's deliberate planning and thinking, and the new, 21st-century global map of the Silk Road that surpasses even the original one, has been an integral part of the entire world since the early 2000s.

4.4. The future of the Belt and Road Programme – digitalisation and sustainability

With the development of the BRI, China's global project has further expanded in recent years. The Digital, Green, Golden and Polar Silk Roads now form an integral part of the BRI. Due to its extension to Latin American countries and Africa, the initiative is increasingly a driver of megaregional integration. The international community frequently voices concerns regarding the Belt and Road Initiative's sustainability, environmental awareness, transparency and openness. Therefore, at the 2019 Belt and Road Forum in Beijing, Chinese President Xi Jinping announced the development of a high-quality, open, green, clean, transparent and inclusive BRI. China assigns great importance to innovation development, artificial intelligence (AI), science and technology development (R&D), industry optimisation and modernisation as well as productivity improvement. Also, the financial sector needs to be developed to high standards, with a special focus on enhancing financial services and preventing financial risks.

In 2017, at the Belt and Road Forum for International Cooperation, China initiated the establishment of an international coalition for the green development of the BRI (Green Silk Road). Green development needs to take into account cyclical and sustainable development and low carbon dioxide emissions. President Xi also proposed to launch a reporting platform concentrating on ecology and environmental protection *(Xi, 2017)*. Infrastructure and transportation cooperation facilitates an uptick in trade among the BRI countries, which is a boon not only to economic relations but also to consumers. Thanks to the new or upgraded trade routes, consumers have access to a wider range of products and services as well as an increasing number of jobs on account of the improving connectivity.

Cooperation also provides several benefits in medicine for the population of the BRI countries. China has already signed agreements on cooperation in the health sector with 56 BRI countries. Education is also an important segment of BRI cooperation: due to the scholarships established by China, young generations have more and more opportunities to gain first-hand experience in the country, and Chinese students have an increasingly active presence abroad, including Hungary. China has already signed agreements on the mutual recognition of higher education diplomas with 24 countries. One outstanding example of the strengthening of cultural ties is the growing number of Confucius Institutes around the globe. Through scientific and technological cooperation, the BRI countries can benefit from the advantages offered by innovative solutions, including, in particular, the FinTech sector *(Horváth, 2018)*.

5. Digital Silk Road

The BRI is not only about the revival of former trade routes, but also about the development of railways, motorways, oil and gas pipelines, power grids, smart grids, and maritime and other infrastructure links.

The Digital Silk Road is not being built only on land and under the sea. China's independently constructed and operated satellite system is the BeiDou Navigation Satellite System (BDS), which serves the development of the BRI, with an eye on China's national security, economic and social development. In addition to navigation, the satellite system is also applied in such fields as transportation, fishery, agriculture, forestry and public security.

Today, China is the world's largest e-commerce market, accounting for around 40% of global transactions. Currently, intercontinental digital connectivity is implemented with submarine fibre-optic cables, which carry 98% of telecommunications and data traffic. By the end of 2017, four international cable landing stations — Qingdao, Shanghai Nanhui, Shanghai Chongming and Shantou — had been established in China's territory. The country has built 10 submarine cables landing in mainland China.

Companies that have started from the e-commerce sector and expanded their scope of activities with FinTech services are the greatest winners of the Digital Silk Road. The Digital Silk Road holds several potential opportunities for large companies such as Alibaba, JD and Tencent. Government measures also contribute to the success of e-commerce platforms; international e-commerce pilot zones have already been announced in 35 Chinese cities, where companies can increase their market portfolios under favourable market conditions, benefiting from preferential tax policies.

The BRI is the new engine of globalisation. The growing penetration of the digital economy provides new drives for

economic development. China supports the building of the Digital Silk Road both politically and economically, which will enable the implementation of digital infrastructure developments promoting the development of the digitally least developed BRI countries and the levelling-up of the digital economies of technologically more developed countries; at the same time, it creates the digital interconnectivity of the BRI countries, through which information, one of the most important resources of the 21st century, can flow freely and effectively.

On 4 July 2015, the Chinese State Council released a document entitled 'Guiding Opinions on Actively Promoting the "Internet Plus" Action Plan', the aim of which is rapid and quality development; it seeks to integrate other achievements of information technology (such as mobile internet, cloud computing services and big data) with traditional industries through connecting the internet and the real economy, thus fuelling economic growth. The plan focuses on 11 points such as entrepreneurship and innovation; new-generation manufacturing industry; modern agriculture; smart energy; new-generation financial solutions; public services; efficient logistics; e-commerce; green ecology; convenient transportation; and artificial intelligence.

The 13th Five-Year Plan on Economic and Social Development (2016–2020), adopted in March 2016, refers to the construction of the Digital Silk Road too, which also emphasises the construction of the Digital Silk Road, in addition to the establishment of smart cities. In the summer of 2018, China started establishing a 'BRI spatial information corridor', the main components of which are communication, navigation and remote-sensing satellites.

5.1. Infrastructure implications of the Digital Silk Road

Currently, intercontinental digital connectivity is implemented with submarine fibre-optic cables. China has 14 neighbouring countries in total, and consequently, it has a unique geopolitical

advantage in constructing a terrestrial and undersea cable system. With the help of cross-border terrestrial cables China has developed such a cable network that not only creates links with neighbouring countries, it also reaches Europe. China currently has 17 international land-based cable border stations, and with the exception of Bhutan and Afghanistan, has developed cable links with all neighbouring countries. China's further large-scale projects include the construction of a submarine fibre-optic cable link between the Asian country and Chile.

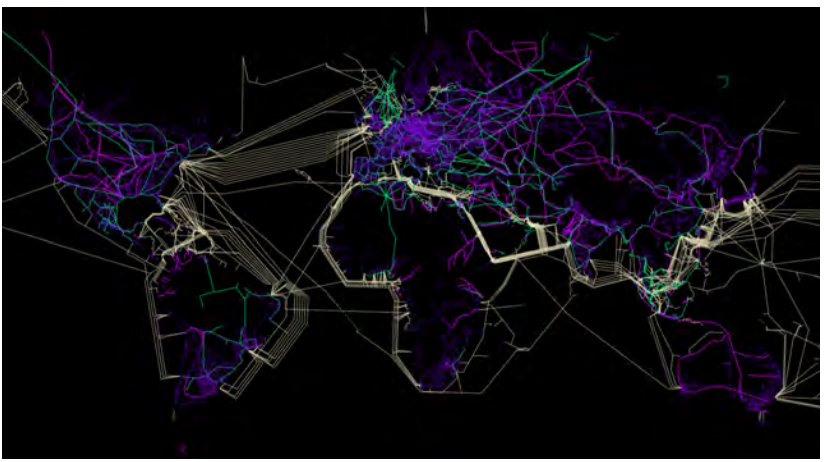
The warming of the Arctic may offer the opportunity to build a 10,000-km-long telecommunications cable link between China and Finland. China's Ministry of Industry and Information Technology, and state-owned China Telecom are taking part in negotiations on the construction of the over 10,000-km-long cable. The participants of the project include Finland, Norway, Japan and Russia. If laid down, the cable could provide the fastest-ever data link between China and Europe by 2020.

5.2. Digital Silk Road: a 21st-century form of connectivity

Complementing the infrastructure network of the BRI countries, the Digital Silk Road aims to provide information and communication connectivity by creating a free and efficient flow of data, the most important resource of the 21st century. Its two most tangible segments focus on the laying of cross-border fibre-optic cables — and thus the development of internet backbone networks, i.e. high-speed primary hardware and data transmission lines — and the expansion of BeiDou, China's own navigation satellite system. The establishment of the global operation of a satellite system that provides technological independence as a key feature of great-power status potentially strengthens China's presence and reliance on Chinese technology in all areas requiring location services. Thus, the system, which offers an alternative to the US GPS networks, and some of whose products are already used by more than 120 countries *(Xinhua, 2019)*, serves not only

Chinese national security and military considerations, but also serves to gain control over strategic assets and curb US influence. The Digital Silk Road, which contributes to the active shaping of cyberspace, also includes cooperation in areas such as quantum computing, nanotechnology, artificial intelligence, big data, blockchain technology, next-generation mobile networks, smart city projects, research and data centres as well as e-commerce and mobile payment services *(Xi, 2017)*.

Connectivity and submarine internet cables



Source: FututreAtlas

The new driving force of economic development is the increasing penetration of the digital economy; the Digital Silk Road can be seen as one of the most significant projects of the 21st-century form of connectivity, fitting well into the concept of geoeconomics. Last year, in 2020, the scale of China's digital economy reached RMB 39.2 trillion (USD 6 trillion), accounting for 38.6% of GDP *(Xinhua, 2021)*. Digital innovation offers considerable economic potential; for example, the Internet of Things could contribute USD 1.8 trillion to China's cumulative GDP growth by 2030 (*Shi-Kupfer–Ohlberg, 2019*), and the country's e-commerce market could grow to USD 3 trillion by 2024, accounting for half of global

transactions *(GlobalData, 2021)*. The country is working hard to become a scientific and technological superpower. Technological self-sufficiency has become a key issue. China aims to raise R&D spending by at least 7% each year over the next five years, and it will increase expenditure on basic research, which is the main source of innovation, by 10.6% *(Reuters, 2021)*.

National initiatives are not only designed to accelerate technological development and the digitalisation of the economy, but also seek to help domestic companies advance in untapped foreign markets. For this, there is hardly a better recipe than establishing China-centric digital interconnectivity among the BRI countries, especially when it is combined with the pursuit of making Chinese technology interoperable and compatible with the host country, creating a Chinese-dominated dependency. The expansion of technology companies is also much needed because, as China's digital economy matures, actors are not only facing stiffer competition, but also witnessing a saturation of the internal market (*Kelkar, 2018*). Companies seeking access to foreign markets thus have a strong interest in the Digital Silk Road, for which China has signed cooperation agreements with at least 29 countries *(Triolo et al., 2020:3)*. In reality, however, as some estimates suggest, far more countries — about one-third of the 138 BRI member states — can cooperate on the Digital Silk Road projects *(Kurlantzick, 2020)*.

5.3. Dimension of the Digital Silk Road strategy

Intercontinental digital connectivity is implemented with submarine fibre-optic cables, which are estimated to carry 98% of international telecommunications and data traffic. However, the location of the cables is geographically concentrated. China, which now accounts for more than 60% of global fibre-optic cable production, has started to build new connectivity networks to avoid congested hubs such as the Strait of Malacca, and to increase its strategic advantage by gaining control of the infrastructure

behind the information corridors (*Kelkar, 2018*). One of the most striking manifestations of this is the 12,000-km-long Pakistan and East Africa Connecting Europe (PEACE) submarine network linking the BRI countries to Europe, which will be completed with the construction of a fibre-optic cable between Pakistan's Rawalpindi and the port cities of Karachi and Gwadar, which began this year *(RT, 2021).*

In Africa, Chinese ICT infrastructure financing surpassed the funds from African governments, multilateral agencies and G7 nations *(Arcesati, 2020)*. ZTE is setting up East Africa's first 5G SA network in Uganda, and Huawei, which has built 70% of the continent's 4G network, is currently developing a smart city and data centre in Kenya from a concessionary Chinese loan. The tech giant is also expanding in Southeast Asia and Europe; it has set up a cloud and AI innovation laboratory in Singapore, a 5G ecosystem innovation centre in Thailand and 91 5G network deployment agreements worldwide, including 47 with operators in Europe, 24 in Asia and 17 in other regions. This puts Huawei in the lead ahead of Sweden's Ericsson and Finland's Nokia *(Ma, 2020)*. In addition to physical infrastructure, Chinese companies are expanding, for example, with e-government-related, smart educational and AI-based healthcare projects, and by exporting e-commerce and FinTech platforms, promoting the Digital Silk Road as a development concept in its own right, and thus China's leading role in the digital economy. Besides ensuring supply chains, increased digital presence is also an area worth keeping an eye on. The Digital Silk Road serves as a channel for China to actively participate in shaping international standards and legal norms by disseminating digital systems that are closer to the Chinese concept of internet governance and cyberspace sovereignty.

In the future, cyberspace will become dominant, especially if the coronavirus pandemic increases the demand from countries for Chinese digital infrastructure.

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The BRI: Transcending Classical Geopolitics

Zhimin Chen – Xiaotong Zhang

Classical geopolitical theories, as represented by Halford Mackinder's "Heartland Theory" and Nicholas Spykman's "Rimland Theory", put an excessive emphasis on power, and competition between sea power and land power. With the classical geopolitical theories, the BRI is often interpreted as a geopolitical vehicle. However, this contribution argues that the BRI – guided by the principle of extensive consultation, joint contribution and shared benefits – goes beyond classical geopolitics. The goal of the BRI is to connect land and sea via a highly complex transportation network, and this connectivity, which is represented by highways, railways, oil and gas pipelines, power grids and sea lanes, aims at constructing a free and open functional zone that connects land and sea. Moreover, it is mainly business laws and the logic of the market, rather than power and wars, that maintain this functional zone. As more countries and regions increase their efforts to develop infrastructure in the context of COVID-19, the competing infrastructure projects do not necessarily give rise to geopolitical tensions. Instead, they may lead to "maximal connectivity", by which countries and regions compete to increase connectivity and finally contribute to overall welfare and economic benefits on a global scale.

Journal of Economic Literature (JEL) codes: F00, F01, F02, F10

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While the world political pattern has witnessed significant changes since the end of the 19th century, the classical school of geopolitics developed by Halford Mackinder and Spykman is still a powerful source of today's Western geopolitical thought, and a guiding ideology of geostrategic makers in the West. The dualistic thoughts of the opposition between land power and sea power, and the persistent focus on the great powers' conflicts in the "heartland" and "rimland" still dominate the West's viewpoint of the world and China's "Belt and Road Initiative (BRI)". This contribution examines this tradition of geopolitical thinking and how it may lose sight of the important aspects of the BRI and lead to missing opportunities in a world that demands greater global cooperation.

1. Eurasia from the perspective of Western geopolitical thinking after the Cold War

In his famous article "The Geographical Pivot of History" published in 1904, British geopolitician Halford Mackinder suggested that, in essence, world history was the history of repeated conflicts between land nations and sea nations *(Mackinder, 2004)*. He summed up his theory of geopolitics in three sentences:

"Whoever controlled Eastern Europe would control the heartland; whoever controlled the heartland would control the World Island; whoever controlled the World Island would control the world" *(Mackinder, 1919:194).*

At the end of WWII, American scholar Nicholas Spykman believed that the key area fought over by the great powers in Eurasia was not the so-called "heartland" but the "rimland" *(Spykman, 1944).* The "rimland" was the strip of coastal land around the

Eurasian continent, which was caught in the middle of sea power and land power and was also an area rich in resources. Like Halford Mackinder, Nicholas Spykman also inherited Mahan's dichotomy of the opposition between land power and sea power and considered "the rimland" as "debatable zones", i.e. areas contested by land power and sea power.

The end of the Cold War and the disintegration of the bipolar system opened up a new round of competition on the "Eurasian Continent". During the Cold War, the conflict between sea power and land power focused on the rimland to prevent the Soviet Union from dominating Eurasia. Mackinder's theory was borrowed and quoted in the Reagan Administration's 1988 "National Security Strategy," which stated, "It is the conviction that the most basic national security interests of the US would be endangered if a hostile state or group of states were to dominate the Eurasian landmass – that area of the globe often referred to as the world's heartland. We fought two world wars to prevent this from occurring. And, since 1945, we have sought to prevent the Soviet Union from capitalising on its geostrategic advantage to dominate its neighbours in Western Europe, Asia, and the Middle East, and thereby fundamentally alter the global balance of power to our disadvantage" *(Reagan, 1988:2).*

In the post-Cold War era, the competition area for great powers has moved close to the "heartland". The new geopolitical condition changes the traditional mindset of the Cold War, when it was not necessary for sea power to enter the hinterland of Eurasia so as to curb land power. In the post-Soviet era, the Atlantic camp was able to enter the deep hinterland (especially Central Asia and the Caucasus region) to expand its influences in these regions and control important transit routes that connect these areas. The importance of the heartland has increased as the significance of energy resources in Central Asia has become more obvious. As Russia lost its long-term monopoly in Eurasia, it was more likely for the Atlantic camp to seize the opportunity to enter the region

and implement some control over this vast inland area. The US and the European Union encouraged Central Asian countries to construct their own transport lines and gas pipelines westwards, bypassing Russia and Iran. Thus, it can be said that Western geopolitical practices are still guided by classical geopolitical theories. Moreover, the policy proposals of American and British scholars of geopolitics are highly consistent with each other, i.e. it is unacceptable that any single land power gains a dominant position and poses a mortal threat to sea power.

In his book *The Grand Chessboard*, former US national security advisor Zbigniew Brzezinski further complemented Nicholas Spykman's view. He argued that in the post-Cold War era, the US must establish a pluralistic state of geopolitics in Eurasia and prevent the formation of a strategic alliance between China and Russia, or among Russia, China and India *(Brzezinski, 1997)*. Brzezinski pointed out that the unification of Europe and NATO's eastward expansion allowed the US to complete the strategic task of securing the west side of the "rimland." However, the US still needs to focus on the security of the east side of the "rimland" in Eurasia, and there are two rapidly rising regional powers – China and India – on the east side. Brzezinski worried that Russia, China and India might establish a strategic partnership that was contrary to American interests. Therefore, the US should strive to encourage China to participate in geoeconomic development in the middle section of the rimland (including the Middle East and Central Asia) and invite China to join "transcontinental security arrangements," namely "an expanded NATO linked by cooperative security agreements with Russia, China and Japan" *(Brzezinski, 1997)*, so as to establish a trans-Atlantic and trans-Pacific strategic security framework and ensure the security of the east and west part of the "rimland."

Western advancement towards the "heartland", in the forms of eastern enlargement of NATO and the European Union, has created and expanded a zone of peace among these organisations'

old and new members, but also increased the geopolitical competition and conflicts between the West and Russia. From the Baltic Sea through Central and Eastern Europe to the Black Sea and the Western Balkans, "shatter belts" *(Cohen, 1963:83-86)* seem to be remerging. The potential enlargement of NATO and the EU to Ukraine, Belarus, Georgia and Azerbaijan and other eastern partner countries has triggered a fierce competitive relationship with Russia. All of this would create a series of geopolitical flashpoints in the heart of Eurasia.

At the same time, with the rapid rise of China, the US has been gradually seeing China as the potential geopolitical rival. Instead of penetrating deep into the Eurasian landmass, the Trump Administration advanced the Indo-Pacific Strategy, which aims at working together with allies, partners and regional institutions to preserve a free and open regional order (*US State Dept., 2019:4)* .The US Indo-Pacific Strategy has been seeking support from Japan, India and the ASEAN countries, which are what Nicholas Spykman labelled "rimland countries". The classic Nicholas Spykman strategy is to prevent the rimland countries from being controlled by America's geostrategic rival. In Nicholas Spykman's belief, he who controls the rimland rules Eurasia, and he who rules Eurasia controls the destinies of the world *(Spykman, 1944)*.

To a large extent, the Biden Administration has inherited the Indo-Pacific Strategy of the Trump era. Moreover, the Biden Administration is reinforcing this strategy by working more closely with its traditional allies. As Biden sees "stiff competition" with China *(Salama–Lubold, 2021)*, his Indo-Pacific Strategy relies more on allies and partners to compete against China and China's model of governance, including its European allies to join the chorus of the Indo-Pacific, represented by the Indo-Pacific strategies of Germany, France, the Netherlands and the EU institutions *(EU Council, 2021)*.

As the Biden Administration devotes more resources to the Eurasian rimlands, the US must withdraw an equal amount of

resources from the hinterland of Eurasia, such as Afghanistan and Syria *(Mogelson, 2020)*, and start efforts to control its competition with other Eurasian great powers, such as Russia *(AFP, 2021)* to avoid strategic overstretch.

2. The "Belt and Road Initiative" in Western geopolitical imagination

Since 2014, Western political elites have shown mounting concerns about China's "Belt and Road Initiative". The US-China Economic and Security Review Commission created by the US Congress held six hearings in 2015, two of which were directly related to the "Belt and Road Initiative" *(USCC, 2015)*. There are more and more articles analysing the "Belt and Road Initiative" in American journals such as *Foreign Affairs* and *Foreign Policy*. For example, the journal *Foreign Policy* published two articles written by American scholar Tom Zollner in 2014, "High-speed Empire" and "Red Train Rising" *(Zollner 2014)*, highlighting the concerns of the diplomatic community in the US regarding China's "high-speed train diplomacy," an important part of China's "Belt and Road Initiative". Overall, more than a few Western geopolitical elites consistently use the Western geopolitical imagination to analyse the "Belt and Road Initiative", either intentionally or unconsciously. They consider the "Belt and Road Initiative" as China's geopolitical and military strategy and the "Maritime Silk Road" as China's move to pursue global leadership, as this analysis echoes with ideas and theories advocated in Mahan's theory of sea power, as well as the US historical practice of projecting power beyond its region and into the globe in the late 19th century. They also treat the "Silk Road Economic Belt" as China's strategic initiative to mobilise resources and strength in the "heartland", and they even associate China's "Belt and Road Initiative" with Germany's challenge to the British Empire before WWI and the East-West confrontation during the Cold War. Thus,

it can be said that the geopolitical reality after the Cold War is full of realist competition between countries in the interpretation of Western geopolitical imagination. This means that China's efforts to promote infrastructure construction and expand trade and economic cooperation that aims at mutual benefits and win-win results are very likely to be misunderstood by some Western geopolitical elites, and can be wrongly interpreted as strategic initiatives that have geopolitical and military motives and aim at breaking the current balance of land power and sea power and gaining dominance in the continent, and thereby triggering geopolitical conflicts.

Following this "historical mimicking" approach, Western geopolitical elites view the "Belt and Road Initiative" from the long historical evolution, comparing China with great powers in history, and thereby offering negative interpretations of the "Belt and Road Initiative". There are three comparative subjects. First, they compare China with Germany in the late 19th century. Edward Luttwak, a US government consultant and geo-economist, compares today's China with Germany in the late 19th century in his book *The Rise of China vs. the Logic of Strategy*, arguing that China will be like Germany and transform its rapidly growing economic strength into a military build-up *(Luttwak, 2012:56-67)*. Second, they compare China's "Belt and Road Initiative" with the "Great Game" of controlling Central Asia between the British Empire and Tsarist Russia from the mid-19th century to the early 20th century. An article in the UK's *Financial Times* states that the "Belt and Road Initiative" will help China establish regional leadership in Asia from economic, diplomatic and military aspects and reflect the wishes of Beijing regarding establishing spheres of influences, which can be called the modern version of the "great game" of controlling Central Asia between the UK and Russia in the 19th century *(Clover–Hornby, 2015)*. Especially with the withdrawal of US troops from Afghanistan, the decline of Russia's economic strength and China's increasing influence in some former Soviet regions, it is likely that Central Asia will

become the new arena of the "great game" among China, Russia, Iran, Turkey and some Western countries *(Farchy, 2015)*. The *Financial Times* quotes an analyst's comment, which argues that Russia hopes for a division of labour between Moscow and Beijing so that China can promote economic development in Central Asia, while Russia provides military security *(Farchy, 2015)*. Third, Western geopolitical elites believe that China's "Belt and Road Initiative" is similar to its ancient tributary system, worrying that China's contemporary Silk Road initiative is part of China's efforts to restore the ancient China-centred "world system." James Holmes, from the US Naval War College, points out that China's "Belt and Road Initiative" is meant to be an economic boon for its neighbouring countries, and that this approach is rooted in Chinese tradition. In other words, historical dynasties in China usually used a variety of ways to provide gifts and other material benefits for neighbouring countries in exchange for the latter's political obedience to China *(Minnick, 2015)*.

In comparing China with traditional great powers, this "historical mimicking" approach also implies that China will imitate traditional great powers, establish spheres of influences, engage in military expansion and pursue world hegemony. For example, a representative figure of offensive realism in the US, John Mearsheimer, views the rise of China from the experience of the US itself. In the theory of offensive realism, one crucial geopolitical concept is that "great powers will seek global hegemony." Great powers seek regional hegemony in the beginning and then become a global hegemon step by step. The key to realising hegemony is preventing the emergence of other regional hegemons. On this basis, Mearsheimer believes that China will follow the US practice of obtaining hegemony in the Western Hemisphere at first, namely competing for regional hegemony in Asia and implementing the Asian version of the "Monroe Doctrine" at first, and rejecting the US outside Asia thereafter. In response, the US will strengthen its alliance system with other Asia-Pacific countries and curb the rise of China. Consequentially, the possibility of the outbreak of

military conflict between China and the US will increase greatly. In this regard, Mearsheimer believes that China's rise cannot be peaceful (*Mearsheimer, 2014:360-411*).

3. The BRI: Transcending classical geopolitics

The interpretation of geopolitical practices through the lens of Western classical geopolitical theories may very likely lead to a "self-fulfilling prophecy" and have a negative impact on inter-state relations in the future. From a Chinese perspective, this trap of the "Western geopolitical imagination" serves no good for either side. The world is not necessarily bound to see confrontation between East and West, conflict between land power and sea power, or the clash of different civilisations *(Huntington, 1997)* or different continents.

Specifically, Western geopolitical imagination has problems in three aspects. Firstly, the analytical framework of classical geopolitical theories places excessive emphasis on power and competition *(Hu–Lu, 2015)*. Similar to the theory of realism, classical geopolitical theories focus on power and control. Mahan's "sea power theory," Mackinder's "heartland theory" and Spykman's "rimland theory" all claim to use military forces to implement effective control of a strategic location and thus result in a shift in power among nations. A perspective that emphasises power has two drawbacks. First, the excessive pursuit of power itself is bound to lead to a "security dilemma" and increase the risk of confrontation and conflicts; second, excessive attention to the subject of power will lead to nationalism and great power centralism. A country which endorses this mindset centred on confrontation and conflicts tends to view other participants in international affairs as its competitors or potential enemies, and only allows itself to occupy the dominant position and control

strategic areas so as to safeguard national security and interests. Even so, safety is only temporary; in order to obtain more long-term security, the country also needs to curb its potential enemies to maintain its absolute advantages. Moreover, classical Western geopolitical theories use great powers, especially advanced Western capitalist powers, as their starting point, openly discuss how to obtain strategic advantages through occupation and control, and ignore the interest demands of small states. The zero-sum mindset and hegemonism have a distorted view of the struggle of realistic politics *(Ye, 1998:88),* which in fact intentionally or unconsciously reflects Eurocentrism. However, this over-simplistic logic of confrontation clearly does not reflect the new trends and new changes in the contemporary global situation.

By contrast, the "Belt and Road Initiative" tries to go beyond the "power perspective" of Western geopolitics, seeking to enhance understanding and trust and to strengthen all-round exchanges *(Xinhua News Agency, 2015),* while "extensive consultation, joint contribution and shared benefits" are the principle of the BRI *(Xi, 2019)*. In Halford Mackinder's theory, infrastructure projects are considered as tools mobilised by a country to fight against another country. In China's interpretation of its "Belt and Road Initiative", the promotion of connectivity and free trade will benefit countries along the route and result in win-win cooperation. China stresses that the BRI does not intend to seek dominance, but aims at establishing a corridor of friendship, prosperity and exchange and creating a road that benefits all countries along the route *(Wang, 2015)*. Many countries involved in the BRI have been left behind in the globalisation in the previous decades, and the pursuit of economic development and a better life is the common goal of countries and peoples in the region. China is keenly aware of the great economic development potential and the development needs in the region and it proposes its "Belt and Road Initiative" based on the common interests of countries in the region *(Huang, 2015)* , fully considering the interests of the countries along the

route as well. As President Xi Jinping points out, China "stands ready to connect more closely its development with that of its neighbouring countries and welcomes its neighbours to take the 'high-speed train' and 'free-ride train' of China's development and live an abundant life together." It is still early to judge the performance of the "Belt and Road Initiative" at this moment. Nonetheless, from the Chinese side, the "Belt and Road Initiative" is meant to go beyond the narrow perspective of nationalism and great power centralism.

Secondly, Western geopolitical imagination presumes the perpetual central role of core Western countries, which are developed, civilised and powerful, while the "Belt and Road Initiative" embraces the participation of multiple subjects and is an association and transformation of "multiple centres." The participants in the "Belt and Road Initiative" are diverse and they play their distinctive roles at the same time. These participants include the countries along the route, international institutions, regional corporation organisations (such as the Association of Southeast Asian Nations (ASEAN), the Shanghai Cooperation Organisation, the Eurasian Economic Union and the AIIB), international companies, regional governments and business organisations, which interact with each other and create the field of the "Belt and Road" together. In this sense, the innovative part of the "Belt and Road Initiative" is that it fully mobilises the enthusiasm of various participants and market subjects, lets them jointly discuss, build and share the "One Belt One Road," and goes beyond the narrow perspective of a single dominant country or the interests of one party. Zeng Xianghong proposes a new concept, which categorises the "Belt and Road Initiative" as "a Tai Chi geopolitical imagination." Like the two "centres" in the Tai Chi symbol (namely "Yang in Yin" and "Yin in Yang"), the centre of the "Belt and Road" is not merely China. The centre can also be Europe, Central Asia, or other nations and regions. Similar to the changing nature of the centre of Yin and Yang, the centre of the "One Belt One Road" also changes as time goes on. Different

from the Western geopolitical imagination which divides the geopolitical space of the world into core and periphery, the "Belt and Road Initiative" endorses a spatial thinking that different countries, regions, cultures or civilisations become centres and periphery interchangeably *(Zeng, 2016)*.

Thirdly, classical geopolitical theories emphasise the antithesis of sea power and land power, while the "Belt and Road Initiative" stresses the integration of land and sea. We know that Halford Mackinder's "heartland" theory was once widely accepted and used to support Anglo-American geopolitical strategies. But his theoretical model is static and emphasises the relative geostrategic advantages of Eurasia due to its physical location on the earth. By contrast, the "Belt and Road Initiative" tries to go beyond the perspective of the "land and sea dichotomy" in traditional Western geopolitics. Connectivity and the construction of transportation hubs proposed by the "Belt and Road Initiative" show how places, nations and regions gradually change their roles against the backdrop of dramatic historical changes, and this shift in roles will reconstruct the meaning of geopolitics. The goal of the "Belt and Road Initiative" is to connect land and sea via a highly complex transportation network, and this connectivity – represented by highways, railways, oil and gas pipelines, power grids and sea lanes – aims at constructing a free and open functional zone that connects land and sea. Moreover, it is mainly business laws and the logic of the market, rather than power and wars, that maintain this functional zone.

4. The BRI and global revitalisation in the context of the COVID-19 pandemic

The pandemic has caused economic recessions in many countries and has an impact on the BRI, as well as Eurasian connectivity. However, evidence shows that China's trade and investment with

the BRI countries has been increasing. The import and export volume between China and countries joining the BRI increased by 21.4% in 2021 Q1, contributing 29.5% to China's total foreign trade. The two-way investments have also witnessed sound growth. During the pandemic, the China-Europe Railway Express rose against the trend. In 2020 Q1, the China-Europe Railway Express operated 1,941 trains, recording year-on-year growth of 15%, and transported 174,000 TEUs of goods. This shows the advantages of promoting connectivity on the Eurasian continent.

As the BRI advances, we are seeing more efforts to develop infrastructure on a global scale, including by developed economies. The EU has made efforts to promote infrastructure investments and connectivity. The flagship project is the EU's Recovery Plan *(European Commission, 2020)* and its Asia Connectivity Strategy, promoting the European way of connectivity – sustainable, comprehensive, rules-based connectivity *(EEAS, 2018)*. Compared with the US, the EU's attitude towards the BRI is more nuanced. The EU and China established a joint connectivity platform in 2015 to explore opportunities for further cooperation in the area of transport with a view to enhancing synergies between the EU's approach to connectivity, including the Trans-European Transport Network (TEN-T), and China's Belt and Road Initiative *(European Commission, 2020)*. Some EU member states such as Hungary, Italy, Portugal and Greece signed MOUs on the BRI with China. That said, there remain significant divergences between China and the EU in terms of governance. In the EU's recent strategic outlook towards EU-China relations, China is labelled as partner to work with, but also a systemic rival promoting alternative models of governance *(European Commission, 2020).*

On 12 June 2021, President Biden and G7 leaders launched a new global infrastructure initiative called "Build Back Better World Partnership" (B3). According to the White House press release, the B3 Partnership is a values-driven, high-standard and transparent infrastructure partnership led by major democracies to help

narrow the USD 40+ trillion infrastructure needs in the developing world, which has been exacerbated by the COVID-19 pandemic *(The White House, 2021)*. However, the B3 Partnership is proposed by American political elites as a way to deal with China's strategic competition *(The White House, 2021)*. George W. Meeks, chairman of the House Foreign Affairs Committee of the US Congress claims that "The Build Back Better World Partnership could finally break the Belt and Road" *(Meeks, 2021)*.

Certainly, China would be concerned that some of the Western connectivity initiatives are motivated by explicit geopolitical considerations. However, this contribution argues that the proliferation of such connectivity initiatives is already a proof that China's BRI represents true common interests in the global society and has now triggered global competition to provide more connectivity, which will benefit the world in the long run. According to this logic, complementary and even competing connectivity efforts should be welcomed and encouraged, as long as they increase overall welfare, efficiency and productivity for countries, in particular developing countries. An ideal scenario is that these complementary connectivity efforts would lead to something we call "maximal connectivity". Maximal connectivity is a recognition that global connectivity cannot be achieved by any country single-handedly. It is a collective cause, which requires political solidarity, mutual assistance and economic collaboration. Maximal connectivity is a worldview, believing that global connectivity is benign and mutually beneficial rather than a zero-sum game. China could play a role as a facilitative leader. The key features of facilitative leadership are collective rather than hegemonic leadership, attractive rather than coercive leadership, win–win rather than solipsistic leadership and empowering rather than patronal leadership *(Chen et al., 2018)*.

At the same time, as China embraces high-quality development of the BRI, even some sort of synergy could be found in the competing connectivity initiatives. At the Roundtable of the

Second BRI Forum for International Cooperation, President Xi Jinping proposed the "high-quality development of Belt and Road cooperation". Xi highlighted that, "the BRI must be open, green and clean, and follow a high-standard, people-centred and sustainable approach. We should make our support for the UN 2030 Agenda for Sustainable Development an integral part of Belt and Road cooperation, align our cooperation with universally accepted rules, standards and best practices, and pursue economic growth, social progress and environmental protection in a balanced way. The BRI should be beneficial to all and deliver common development" (*Xi, 2019*).

China will vigorously promote the green, health and digital Silk Roads in the post-COVID-19 era. First, environmental protection is vital in the BRI area. Promoting the concept of "green water and green mountains", encouraging enterprises to protect the environment and to fulfil their social responsibilities will be crucial in building the green Silk Road. China is committed to peaking CO2 emissions before 2030 and achieving carbon neutrality by 2060. Second, to promote global public health governance and build a health and hygiene community of mankind means jointly building the health Silk Road. China has provided more than 450 million doses of COVID-19 vaccines to nearly 100 countries since the outbreak of COVID-19, which is solid proof that China has been working with the rest of the world in building such a community of public health. Third, to advance the "Digital Silk Road" together with partner countries and regions in building smart cities, 5G networks and developing artificial intelligence. Despite the serious damages to the world economy, the pandemic has ushered in new digital economy opportunities. Many economies have introduced new measures to promote the transformation of the digital economy, covering the digital infrastructure construction, digital industry, the transition from traditional industries to digital technologies, digital governance and international digital cooperation. These are exactly the areas where China and Europe could work together in the context of

COVID-19 via multiple channels such as high-level China-EU dialogue in the digital area.

In the context of changes unseen in a century, in order to realise the integration of China's new global governance concept with the global governance system, we first need to strengthen the multilateral nature of the BRI and align with the development strategies and plans, including the United Nations 2030 Agenda for Sustainable Development. Second, the implementation of internationally accepted economic and trade rules along the BRI should be emphasised. Thirdly, public health governance and public health infrastructure construction will become an important part of the BRI. The countries along the BRI are mainly developing countries, and their pandemic prevention efficiency and medical resource capacities are relatively low, so there is a huge gap in diagnosis and treatment, as well as prevention and control capabilities. Therefore, public health governance and infrastructure construction will provide important guarantees for the sustainable development of the BRI.

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The Role and Future of Regional Cooperation in Eurasia

Márton Ugrósdy

Regional cooperation is on the rise in Eurasia, but the rivalry of the two formative powers of the 21st century, the United States and China, is limiting the opportunities for Eurasian nations to pursue an alternative foreign policy. China, which acts as a Heartland power, is trying to build its own cooperation formats, most notably the Belt and Road Initiative, while the Rimland power and its allies are experimenting with other concepts (such as the Free and Open Indo-Pacific) and multilateral formats (the Quad). What role remains for organisations outside these binary options, such as ASEAN or the Turkic Council, is yet to be seen, but due to the imperfect and non-exclusive nature of national interests there will be room for smaller, mostly regional formats to flourish in the shadows of great power rivalry, should these smaller formats address the real and tangible needs of their members.

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1. Introduction – a wider conceptual framework

The 1990s did not bring the end of history, and with the end of the American unipolar moment one might get the strange feeling that old great power geopolitics is back on stage. Looking

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at government documents, think tank reports and different interviews and articles of international relations theorists, it seems that traditional geopolitics is the main shaper of the emerging world order, where a hegemon, which controls (or tries to control) the Rimland, is managing its own gradual decline, whereas the rising great power is building different institutions and cooperation formats to unite the Heartland countries to successfully challenge that status quo.

Both the Heartland *(Mackinder, 1904)* and Rimland *(Spykman, 1942)* theories have a role to play in understanding the current power balance of Eurasia. While the continental powers, most notably China and Russia, are trying to unite the heart of the Eurasian landmass with different institutional formats (e.g. the Shanghai Cooperation Organisation, the Eurasian Economic Union, the Collective Security Treaty Organisation, or on a different level of ambition and institutionalisation the Belt and Road Initiative) and they are likely sympathisers of the Heartland theory, the US as a major naval power and the current hegemon is operating along the principles of the Rimland theory, by encircling the Heartland powers, and building formal and informal alliances with the littoral nations of Eurasia. The powerful and deep strategic partnership between the US and Japan, the longstanding security cooperation of the Republic of Korea with the US, as well as recent American overtures towards India and the Southeast Asian countries are evidence of the American efforts to apply the old and tested Cold War approach to isolate the major land power, which is threatening the dominant position of the US in the world order.

This paper will not be based on these two theories though, as both function rather as theoretical compasses to highlight the current geopolitical challenges of Eurasia. Furthermore, as power dynamics cannot be understood only through access to natural resources as in the time of Mackinder and Spykman, but rather through access to the ownership of intangible goods (e.g. intellectual property rights) and services (digital central bank

currencies), the geographical element of geopolitics is losing its importance somewhat, compared to the early-mid 20th century.

Experiencing its relative decline globally, the United States has decided to focus its efforts on containing the rise of China, which it sees as a strategic competitor and the main threat to US interests around the world *(The White House, 2021)*. Since US President Barack Obama's 'Pivot to Asia', President Donald Trump increased the pressure on China especially by economic means, and President Joe Biden seems to be maintaining the pressure and add the 'value-based' ideological dimension as well. The US assessment that China is the great power most capable of challenging American dominance is well-founded and, taking into consideration the economic and military performance of China, the challenge will only grow in the future. It is for this very reason that the United States is trying to make its allies hold the line against China in all theatres *(Heath, 2021)*: political, economic and other cooperation with the Asian power is unacceptable to the US. Whether in the economic or political realm, the US is trying to force its partners to take either-or choices and deny its allies the opportunity of engaging positively with China. US pressure to drop Huawei as a hardware supplier for 5G cell phone networks, forbidding or at least monitoring Chinese acquisitions of strategic companies and infrastructure, as well as coming up with alternative projects to counter the BRI (such as the Three Seas Initiative in Central Europe, or the Blue Dot Network to promote global infrastructure development) are clear signals that the US feels that its dominance is threatened and will act quickly and decisively against those who would like to see these parallel initiatives as being complementary, rather than mutually exclusive.

Inadvertently, the rise of China is playing into the hands of the United States, as the smaller neighbours of Beijing are feeling threatened and intimidated by their ambitious large neighbour. At times, traditional hard security concerns are impeding closer economic cooperation between China and the adjacent countries.

The Chinese argument about the peaceful rise of China and its integration into the existing institutional system are well-known, but the actions of the People's Liberation Army Navy on the South China Sea, the Senkaku/Diaoyu Islands dispute, as well as the possible spillover effects of China's efforts to control its Western provinces make the ring of smaller neighbours uneasy. Thus, the growing presence and national potential of the Heartland powers are pushing the Rimland countries towards the hegemon, which the Heartland powers want to challenge.

It is against this backdrop that smaller regional formats can exist and flourish in Eurasia. In those areas, where great power competition is not omnipresent, it is possible to establish new formats based on (mostly economic) common interests. Regional groupings which do not cross the interests of great powers can and will be relevant in this setup, and formats leading to more efficiency and increased cooperation can benefit the whole of Eurasia in the long run. The integration of these smaller projects into one large network is questionable though: overlapping memberships in the various formats can augment the foreign policy interests of many countries, but core national security concerns will likely remain the main driver of participation in these organisations.

2. US – China (Russia) rivalry in Eurasia

The United States will remain a major player on the Eurasian continent, as its major rivals (China and Russia) are located here, and the shifting economic centre of gravity also calls for significant US involvement in the region. So far, the US wanted to control the littoral waters of Eurasia, and with its naval presence at key shipping chokepoints (most notably in Japan, Korea, but also in the Indian Ocean and the Malacca Strait) the superiority of the US Navy was unquestionable in recent decades. With the ambitious naval developments of the PLA Navy, and the growing militarisation of the South China Sea and the East China Sea, the

current US leverage over China is about to diminish. Overland, the US never had physical access to the inland heart of Eurasia, with the sole exception of the Northern Distribution Network and the respective US-operated airbases in Kyrgyzstan and Uzbekistan. Apart from these, Afghanistan-related ventures, the US never had physical access to either Central Asia or the Western provinces of China, and has not had any influence over the landlocked states of Asia for a prolonged period since the collapse of the Soviet Union.

The US is trying to play a similar game in Asia as it plays in Europe with NATO: by cooperating more closely with the littoral states (especially those who have disagreements with China), it wants to control Chinese access to the high seas. The China-Pakistan Economic Corridor, which would enable China to gain deep-water port access on the Indian Ocean goes against the American interest. The US wants to use its own power as well as its alliances to keep Chinese maritime ambitions at bay, while controlling the export of dual-use technology to prevent the PLA from rapid modernisation, which will challenge the US military presence in East Asia. Furthermore, even though China is not aiming at exporting its political system, the US regards China as a major ideological opponent as well, and Washington will keep exporting its own values to Asian nations, even if these countries are not ready to accept American values and principles on progressive, and sometimes woke issues, which are completely out of touch with the social reality of most Asian nations.

To establish control over the ambitions of the two major land powers, the US is playing the classic balancing game in Asia that it has played in Europe since the end of World War II. The US is primarily working with the Rimland countries to encircle China and secure the major maritime routes which travel from the Indian Ocean to the Far Eastern ports and the industrial centres of China, and conducts regular Freedom of Navigation exercises in the Taiwan Strait and the South and East China Seas, challenging the PLA Navy close to Chinese shores. Most of the bilateral defence

agreements (US-Japan, KORUS, US-Vietnam, US-Australia, etc.) and regional groupings such as the Quadrilateral Security Dialogue (Quad) are aimed at countering the rising influence of China *(Wilkins, 2021).* Even larger geopolitical constructs such as the Free and Open Indo-Pacific or the Blue Dot Network can be regarded as (somewhat) mirrored reactions to the Chinese initiatives, of which the centrepiece is clearly the BRI. The economic dimension of the coordinated US-led approach further underlines that security and economic interests are interrelated, and this further complicates the role regional formats can play in Eurasia (*Yamamoto, 2020*). Economic decoupling is far from easy though, despite repeated calls from the US side to decrease the level of economic cooperation between Japan and China for instance *(Watanabe, 2021)*.

On the other hand, the US requires binary choices from its allies, whether they are in Asia or Europe. These smaller countries cannot have it both ways: according to the American interpretation, they must take sides between democracy (the US) and autocracy (China) (*The White House, 2021*), regardless of the historical and trade relations that these other countries might have with China. This dogmatic approach puts a serious strain on countries which are wary of China, but have deep trade and investment relations with it (most notably Japan and ROK) *(Goreczky, 2018)*, or want to enhance trade with China, such as the EU Member States, most of which depend on the US for hard security assistance and assurances.

For Asian nations such as Korea, India or Japan, managing the rise of China is an existential question, and at this time the leaders of these countries believe the only guarantee they can get against a more assertive Chinese foreign policy is the backing of the United States. Even India, which has a long history in the non-aligned movement, has decided to seek closer cooperation with Washington and put more emphasis on the Quad, despite the initial hesitation to throw the full weight of the country behind the

initiative *(Raj, 2021).* The 2020 Galwan Valley skirmishes further underscored India's desire to seek like-minded partners in Asia to enhance its own security.

Russia on the other hand is not a major concern for the US in Asia, but rather a minor issue in Europe, especially due to the protracted conflicts in Ukraine, Georgia and Moldova. Russia is not regarded as an existential, systemic threat by the US, despite Moscow's ambitions to be a spoiler in international relations. Central Asia, especially after the US withdrawal from Afghanistan, is not high on US foreign policy planners' agenda, while the Eastern perimeter of NATO is stable, to the worse luck of the buffer states (most notably Ukraine and Georgia, who will not be admitted to either NATO or the EU anytime soon). Russia's naval ambitions lack the cutting edge due to the lack of funds and mostly outdated technology, and despite Russian dominance of their own territorial waters, neither of the Russian fleets nor the air and space forces have the capability to conduct major power projection operations against a traditional, state-like adversary. Therefore, building an alliance against Russia besides NATO is not a US priority, which gives some leeway for the current US administration to try to drive a wedge between Russia and China to weaken Eurasian unity and promote US interests in the wider region.

3. A look at different regional formats

Looking at Eurasia, we can find different cooperation formats, some of which have a long and distinguished history such as the Association of South-East Asian Nations (ASEAN) to platforms like the SCO and the recently (re-) established Quad.

3.1. ASEAN

ASEAN was established in 1967 as an economic cooperation between five countries and was gradually expanded to ten

members and two observers. The focus ever since has been on economic cooperation, despite the need for further political coordination, especially as China grew larger and maritime issues started to emerge between some ASEAN member states and China. The main question about the future of this format is that whether it can be taken to a deeper level of coordination, and how it will relate to outside actors and other regional groupings.

ASEAN's greatest organisational advantage is its limited geographical focus, clear principles of cooperation, as well as the limited ambitions when it comes to a closer political union. As long as the current format serves the interest of the members, it will be hard to bring the integration to the next level. One might assume that an outside threat or a major change in the regional balance of power might push ASEAN towards more coordination, but we rather see a very diversified approach of China among the member states.

Looking at individual member states, one can find a few countries which are looking forward to deepening their cooperation with China, but most of the ASEAN members are somewhat or very critical towards the more assertive Chinese foreign policy and posturing in the SCS region. Singapore and Vietnam are the countries which are the most closely connected to the US but cannot disregard China's growing presence as well , while other countries are trying to hedge between the need for economic cooperation and (possible) territorial disputes, as they clearly cannot disregard China, but are aware of the risks that a closer relationship might entail *(Chatterji, 2021)*.

On the institutional level, ASEAN and China have a structured cooperation which reaches back more than thirty years and now is on the level of strategic partnership *(Zhang–Wang, 2017)*. ASEAN combined is China's second largest trading partner *(Salát, 2021)*. Chinese priorities are changing though: as long as China was a relatively weaker player in Southeast Asia, existing

institutional setups allowed Beijing to manage its peaceful rise by slowly modifying the status quo up until a certain point. As Lyu underlines though, this incremental approach towards the reform of the international system paid off, and China integrated more successfully into the regional economic cooperation formats than the politico-military ones *(Lyu, 2019)*. China's relationship with ASEAN serves as a vivid example of this approach.

In the long run, if ASEAN wants to retain its *raison d'être*, it has to be very careful about entering other formats and larger structures. The resilience of ASEAN since its founding has been outstanding and, despite the increasing great power competition in Southeast Asia, it wants to retain its central role in the region in the future as well. In order to achieve that, however, ASEAN as an organisation will have to accommodate the diverging China-policies of its members, which will only be possible if there is no further political integration down the road.

3.2. Shanghai Cooperation Organisation

The SCO was established as a Russian – Chinese initiative 20 years ago *(Sun, 2021)*, but the main objective for Moscow was always to keep Chinese intentions in Central Asia, Russia's 'soft underbelly' at bay. Back then, the balance of power was different and less tilted in China's favour than it is now. Having said that, the stability of Central Asia, especially when it comes to radical extremism, terrorism and religious movements, is in the common interest of not only Russia and China, but of India as well, which joined the cooperation at a later stage in 2017. Cooperation is mostly limited to security and defence, but apart from some major Russo-Chinese military drills with occasional participation by other SCO members, a full-fledged cooperation encompassing more policy fields is yet to be seen.

With its membership consisting of all major land powers in Asia, especially after the 2017 enlargement round which brought both

India and Pakistan on board, it is very hard to assume that the SCO – with such a divergent set of national interests and security concerns – can be the foundation or even part of a larger Eurasian integration. It is noteworthy that the 2020 Galwan Valley incident took place between two members of the SCO, and the existing institutional frameworks did not prevent the low-intensity military conflict from happening. Furthermore, the two major founding powers – Russia and China – have a long history of military cooperation under the SCO banner, while it is not easy to foresee India and Pakistan, or for that instance India and China conducting similar military exercises. Sending military observers is of course important for building trust and transparency, but the ambition level of the non-core SCO-members is most probably focused on keeping an eye on Moscow and Beijing, rather than turning the SCO into the bulwark of Eurasia against the sea power coming from the Rimland.

Curiously enough, the Central Asian members of the SCO (for whom the most likely outside players which might meddle in the region are the two guaranteeing powers of the SCO) have started to grow new contacts with other regional formats as well. Apart from the EAEU and CSTO, most of them became members of the Turkic Council, while Uzbekistan started a significant internal reform process and a multivectoral foreign policy. With the gradual power shifts in the region, Central Asian countries are becoming even more interested in preserving their foreign policy room for manoeuvre in the shadow of their two giant neighbours. Because of all these questions listed above, the SCO should soon calibrate its ambitions if it wants to be relevant and useful for its members in the future.

3.3. Russian-led integration formats in the post-Soviet space

Once labelled as the EU of Eurasia, the EAEU has failed to unleash its potential and remains dominated by Russia. Looking at the two Russia-led organisations mainly aimed at Central Asia,

one might get the feeling that in order to preserve and protect Russian interests in the near abroad, Moscow wanted to enhance its organisational ties with the former Soviet republics. While the CSTO serves as the main vehicle of military cooperation, the EAEU was meant to be the guarantor of Russian economic influence in the region *(Šćepanović, 2021)*.

The EAEU is a small market: with a population of 184.5 million people in 2020 and a combined nominal GDP of USD 1.7 trillion in 2020, its economy is roughly the same size as that of Canada. With the Soviet legacy, namely that most of the manufacturing and high value-added industry are located in Russia, the EAEU is more about guaranteeing Russian market access to the other members rather than providing a level playing field for all enterprises located in any of the members states and inviting investment to underdeveloped regions. Modelled after the EU to some extent, the EAEU is more about serving Russian economic and political interests and to maintain economic control over the post-Soviet space.

Combined with the CSTO, which is a more practical military organisation, Russia has the institutional edge in Central Asia. But the multi-layered Russian approach to the heart of Eurasia also sheds light on the challenges Moscow is facing: it has to retain its economic and military influence over its former subjects, but at the same time Russia has to treat the smaller countries as equals too (to underscore the Russian narrative that all states in the world are equal and therefore the US does not have any privilege in the international order), while trying to keep China out of its own backyard, which is becoming more and more complicated each year, especially as the Belt and Road Initiative is offering long-awaited infrastructural developments for Central Asian countries that Russia never wanted or could never afford to build in the last three hundred years.

Russia's current challenges can be seen in all these international organisations. In the SCO, Moscow is becoming the junior partner

despite being one of the founding members. In the CSTO and EAEU, Moscow can only remain the shaper of things because its relative weight *vis-á-vis* its former subjects, which are willing to accept this special relationship with Moscow for now. But neither the SCO nor the two other Russia-centred formats can be true influencers of the future of Eurasia like China and India, which do or will possess the necessary economic and manpower to redefine the power relations of Eurasia in the 21st century.

The Greater Eurasia concept, which was first formulated by Russian President Vladimir Putin in 2016, is a clear symptom of these ambiguities. The three main objectives, namely developing the Far Eastern regions of Russia, reinventing the relationship with Central Asian countries and building a closer relationship with China *(Bordachev, 2019)* are indeed the main issues Russian elites have to address, but implementation will be an uphill struggle. Reviving the Russian Far East would be of pivotal importance to Moscow as these regions have generous reserves of natural resources, albeit with a relatively low population. The Russian Far East is close to the new economic centre of gravity of the world, but infrastructure remains scarce (apart from Russian domestic flights and the Trans-Siberian Railway), the cost of transportation is enormous, and the high value-added products are usually manufactured in European Russia, leading to higher transportation costs, unreliable delivery times and hence lower competitiveness.

Both the CSTO and the EAEU have been attempts to revive Russia's relations with the Central Asian countries, but the sheer fact that the Greater Eurasia concept wants to address these questions shows the inadequacy of the two existing formats *(Kapoor, 2020)*. The third pillar – a closer relationship with China – is indeed a success story for now, but it remains to be seen how Moscow can manage its relationship with Beijing from a position of relative weakness, which is not something that President Putin is used to *(Krikovic–Pellicari, 2021).*

3.4. Turkic Council

Among the attempts of the great powers of Asia to establish their own solar system of cooperation, we can find some smaller, albeit very active and interesting formats as well. One of them is the Turkic Council, established in 2009 by the Nakhichevan Agreement, comprising of mainly Turkic countries of Central Asia, the Caucasus and Turkey itself. Tellingly, Hungary has joined as the only extra-regional country as an observer, as the "Westernmost Eastern nation" to revive its relations with the countries of Central Asia.

The Turkic Council is an indigenous initiative by a middle power, Turkey, to use its cultural and linguistic roots to connect to the heart of Eurasia, and gain access to the polities and the economies across the Caspian basin. The main novelty of this format is that it provides a third alternative to the two main powers of Central Asia, and as the leaders of Kazakhstan, Uzbekistan and Kyrgyzstan are trying to balance between Moscow and Beijing, Ankara might appear to be a viable and attractive option to augment the newfound multivectoral foreign policies of Central Asian nations. The composition of the format is also a source of the most important challenge of the Turkic Council: most probably it may remain effective as long as it does not stand in the way of great power interests. But until then, or with a sufficiently low level of political ambitions, it can serve as a useful platform to encourage trade, travel, investment, people-to-people contacts and other forms of cooperation between the member states.

Although it has a permanent secretariat in Istanbul, the Turkic Council is still in an early phase of institutionalisation, in spite of the efforts to fill the already existing structure with content. The Turkic Council also provides an umbrella for other formats such as the Parliamentary Assembly of the Turkic Speaking Countries, the International Organisation of Turkic Culture, the International Turkic Academy, the Turkic Cultural Heritage Fund, the Center

for Nomadic Civilisations and the Turkic Business Council. The list of these para-organisations further underscore that the TC is mostly focused on cooperation in the fields of education and culture, and is not really stating any kind of declared strategic/geopolitical ambition for the moment.

3.5. The Free and Open Indo-Pacific and the Quadrilateral Security Dialogue

'To every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal and directed to contrary parts' – reads Newton's third law, so when the concept of One Belt, One Road was unveiled by Chinese President Xi Jinping in 2013, everyone knew it was only a matter of time until another rival concept would be announced by the Rimland powers. Unveiled in 2016 by Japanese Prime Minister Abe Shinzo, the idea of the Free and Open Indo-Pacific (FOIP) incorporates ASEAN and aims to connect two oceans (the Pacific and the Indian Oceans), and two continents, Asia and Africa. The strategy, which has been adopted by the Japanese government, rests on three pillars: 1) the promotion and establishment of rule of law, freedom of navigation and free trade; 2) pursuit of economic prosperity; and 3) commitment to peace and stability *(Szechenyi–Hosoya, 2019)*.

Despite the numerous attempts to prove that the FOIP is not a countermeasure to the BRI, it is obvious that certain keywords (freedom of navigation as a reference to the militarisation of the South China Sea by China; free trade as a reference to alleged Chinese dumping and the restrictions on foreign companies operating in China; focus on a rules-based international order as opposed to alleged shady bilateral deals of China with third countries, etc.) and the increased level of cooperation between Japan and other like-minded countries which are aware of the rising Chinese ambitions leave no doubt that the FOIP is indeed the fruit of Newtonian logic. More recent developments, such

as Japanese references to the term Quality Infrastructure or the increasing role of the Quad, further confirm the initial impression that the FOIP might be the counter-concept to the BRI.

The FOIP has, however, led to revitalisation of the Quad, which had its first iteration in 2008 and 2009. Proposed by Prime Minister Abe, it envisaged enlarging the already existing Trilateral Security Dialogue, composed of the United States, Australia and Japan, to include India, as a potential partner interested in countering the growing Chinese posture in Asia. Relaunched in 2017 once again on a Japanese initiative and with the strong support of US President Donald Trump, the Quad once again tried to contain expanding Chinese interest in the Indo-Pacific and coordinate the efforts of the four members. India, which was an outlier in the Quad for some time now put its full weight behind the cooperation and participated in the 2020 naval exercises as well. Increasing tensions between India and China might push Delhi into further cooperation with Tokyo, Canberra and Washington in the future, but how the Quad might be able to increase its weight and cooperate with other like-minded nations (such as those ASEAN members which are wary of China) is yet to be seen. Economic decoupling from China is out of the questions for now, but some Quad members, especially Japan and Australia, are experimenting with a China +1 strategy, trying to reduce their economic dependence on China *(Goreczky, 2021).*

From the US perspective, the Quad is a very useful format. As Wess Mitchell outlined, one major concern for the US is the cost of re-entry into regions which are in the US orbit, but where the US cannot afford a troop presence which serves as an effective deterrent for the adversaries *(Grygiel – Mitchell, 2016)*. Mitchell claims, that it is cheaper and easier for the US to maintain a close network of allies, which may also serve as bridgeheads when US troops have to be brought in on short notice to repel an outside attack on the allies compared to cost of a forced re-entry once the enemy has occupied the territory of the ally. Following the

Rimland logic, Mitchell strongly argues for the importance of formats like the Quad, which are on the direct frontline with the US rivals and are often in need of US financial and military assistance.

4. Completing the puzzle

The future of regional cooperation in Eurasia remains a function of the great power rivalry on the supercontinent, and most of that rivalry is and will be between the upcoming land power, China, and the declining but still potent sea power, the United States of America. The future of the regional formats will depend on whether they can protect their independence (ASEAN and the Turkic Council might be on this track now) or whether they will become an instrument of great power competition (SCO, EAEU, Quad) in the very near future.

Despite the Western claims, China recognises that it cannot evict the United States from Eurasia, and that not only applies to the Western end of the continent. China's national potential is rising each year, and many neighbouring countries are starting to get more anxious looking at the growing strength of the PLA. China's growing posture inadvertently pushes its neighbours closer to the United States as these countries are seeking security guarantees. Other projects and initiatives, like BRI tend to become more securitized as a result, providing fresh opportunities for alternatives like FOIP.

Looking at the future of Eurasia, the key to regional and continental cooperation will be in Beijing's hands: Russia is not in a position to take the initiative, and this is visible in the relative uselessness of the SCO, as well as the not-so-successful existence of the EAEU and CSTO. The latter's credibility suffered a serious blow in September-October 2020, when during the Second Karabakh War, Armenia, which is a CSTO member, did

not receive any military assistance either from Russia or any other member even though it was attacked by a non-CSTO member. Of course, Russia had other considerations in mind, but the CSTO's inactivity questions the very reason for this organisation to exist and sends a powerful message to other, non-Russian members of the alliance.

As the geopolitical centre of gravity is shifting towards the East and Southeast Asia, littoral countries and their relationship with China will shape the future of Eurasia, as well as limit or enable the presence of the US on the continent. The United States, which is now concentrating all its resources to limit the rise of China is investing considerable effort on alienating Southeast Asian nations from China

Looking at the different multilateral formats of Asia, some of which were examined in this paper as well one must take note of the overlapping memberships in these organisations. First, this is an asset as it promotes dialogue and cooperation between Eurasian nations, but the very diverse set of views, compared with the suspicion of members *vis-á-vis* each other, limits the political and practical ambitions of these formats. The SCO for instance, which had a clear set of goals at its inauguration is now in a much different position with the accession of Pakistan and India, and due to this development, the number of institutional gridlocks might grow in the future.

Traditional alliances are hard to build and costly to maintain, but in a few situations, when there is a direct and tangible threat from a third country, they might emerge. Asia is currently facing one of these moments of history. This creates momentum for the United States and its allies to institutionalise their cooperation, and return to the policy of containment, which was employed against the Soviet Union half a century ago. Even though China can make inroads with infrastructure projects, preferential loans and the like, China has already become far too powerful for its

own neighbours, many of which are now turning to the United States and its allies for security assurances.

Revisiting the theoretical framework of this paper, I would recommend the reader to re-read Mackinder and Spykman. Their theories might seem outdated, but with some modification and slight modernisation both the Heartland and Rimland theories might explain the current shift in the power balance of Asia and underscore the potential as well as the limitations of the currently existing or yet-to-be established international organisations, forums, clubs and leagues in Eurasia. If these organisations can fit into the competing frameworks of the great powers, they might survive and be instrumentalised, but taking the high road, remaining independent from the great power interests and to keep relevance, organisations like ASEAN and the Turkic Council will have to go through a major transformation to stay alive.

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Chapter 3

Economy

The Role of Monetary Policy in Climate Change Mitigation

Barnabás Virág

The paper reviews the impact of climate change on central bank activities, including monetary policy and the monetary policy toolbox. As regards the role of monetary policy, there are different views on the extent to which green considerations need to be taken into account, but there is a consensus that central banks cannot ignore such completely. As a result, central bank mandates have recently been extended to include sustainability aspects, while central banks are increasingly seeking to mainstream green considerations in more and more areas. The Magyar Nemzeti Bank was given an environmental sustainability mandate in 2021. A number of programmes of the Hungarian central bank take green considerations into account and the central bank is also developing its monetary policy toolbox in line with its green toolkit strategy.

Journal of Economic Literature (JEL) codes: Q5, E5

Keywords: central bank mandates, monetary policy, green finance

1. Introduction

One of the major challenges of the 21st century is to establish sustainable growth. Sustainable growth has traditionally been understood as realistic, problem-free growth in economies which is sustainable over the long term. Today, the concept has evolved and broadened: it refers to the rate of growth in an economy that

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can be sustained in the long run without causing unbearable environmental pollution or the overuse of resources.

Rapid economic growth often comes with compromise. If the economy grows too fast nowadays, the process can deplete resources and create environmental problems for the next or subsequent generations. Examples of environmental problems include global warming, the depletion of oil reserves or declining fish stocks. In economies, growth periods are usually triggered by increases in aggregate demand, such as consumer spending and investment. During these periods, the productive capacity in the economy also needs to be increased, which allows the process to be sustained over the longer term without the emergence of imbalances.

Sustainability is thus primarily about achieving macroeconomic and ecological balance. To achieve this, we need to stimulate digitalisation and innovation, as well as green solutions that are gaining attention in the face of climate change. In addition to these factors, social sustainability must also be increasingly emphasised, for example to avoid social gaps and extreme inequalities.

Achieving the goal of sustainability requires the involvement of all economic actors. With the coordination of individual steps and measures, the right response can be given to the challenges of environmental and social changes linked to the establishment of sustainable growth.

As important actors in economic policy, central banks play a key role in this process by shaping their monetary policy-making, and some central banks, including the Magyar Nemzeti Bank, also play this role as a supervisory body in the banking system. In addition, they can also shape public opinion through their guidance.

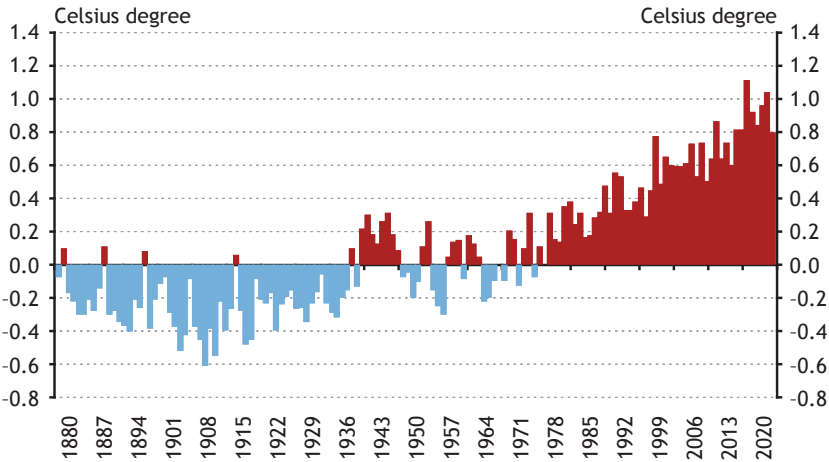
This paper focuses on the implications of climate change for sustainable growth from a monetary policy perspective. The

paper first reviews the potential impacts of climate change on the economy and then the role of economic policy in actions to counter climate change. This is followed by a discussion of the issues of central bank involvement and monetary policy in the context of climate change, including the dilemmas related to central bank mandates, the challenges of the monetary policy toolbox and other central bank activities.

2. Climate change impacts in the economy

The heat records in Europe and worldwide which have been registered since the beginning of weather data recording are being broken with increasing frequency *(Figure 1).* There is more and more information on changes in the Earth's ecosystem, rising sea levels, melting Arctic ice and increasingly extreme weather anomalies. In addition to the natural rate of climate change, increasing weather extremes are caused by greenhouse gas emissions associated with industrialisation *(World Bank, 2012)*. According to a recent report by the UN Intergovernmental Panel on Climate Change *(IPCC, 2020)*, average temperatures rose by 1.53 degrees Celsius from pre-industrial levels (1850-1900) between 2006 and 2015, increasing the frequency of heat waves and droughts. The report points out that a further increase in global average temperatures of 1.5 degrees Celsius above current levels could significantly increase risks. This could lead to widespread, irreversible weather phenomena that would weigh significantly on the natural environment and many sectors of the economy.

Figure 1: Deviation of global surface temperature from the 20th-century average



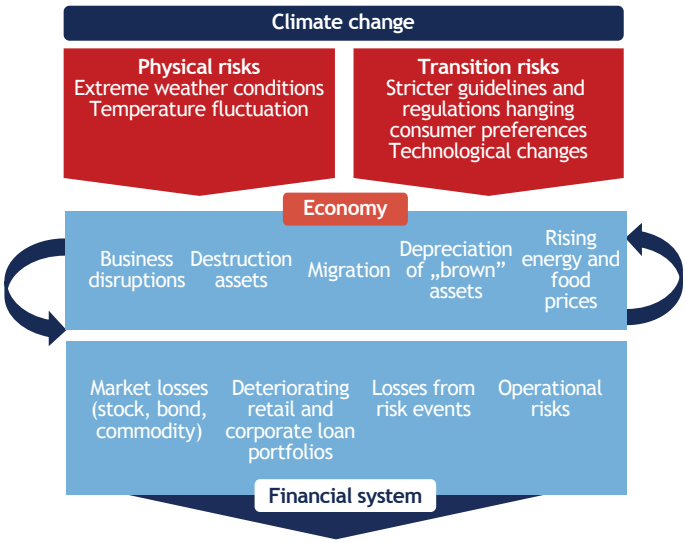
Source: Climate.gov

Extreme weather events, which have become more frequent in recent decades as a result of climate change, also affect the functioning of the economy. Climate change-related risks can be divided into two main categories in terms of the functioning of the economy: physical and transition risks *(BIS, 2020a)*.

- Physical risks are defined as the increasingly frequent and intense damage resulting from extreme weather events (e.g. floods, droughts, forest fires), which can contribute significantly to negative supply shocks.
- As part of the transition risks, it is important to highlight the impacts on output, unemployment and inflation emerging from the transformation, displacement or decline of carbon-intensive industries due to changes in regulatory or consumer preferences.

As these risks have both direct and indirect overall impacts on the functioning of the economy, they can influence both financial stability and the stance of monetary policy *(Figure 2)*.

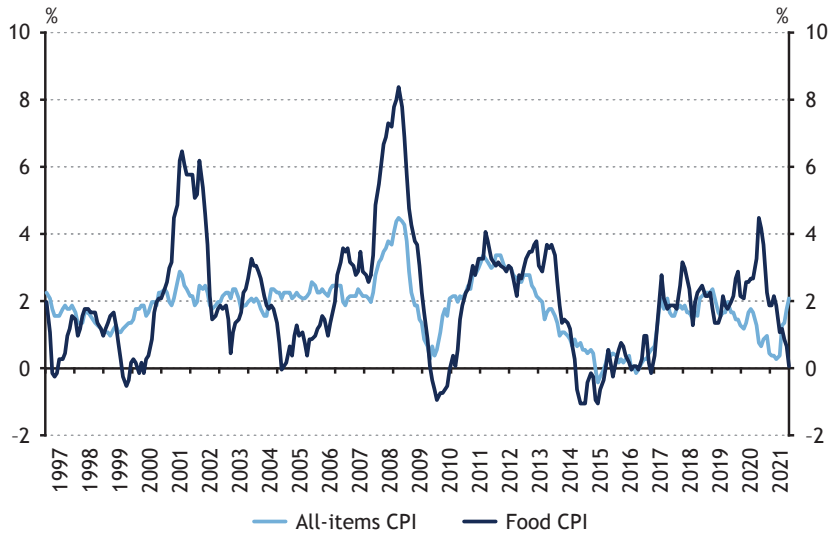
Figure 2: Relationship between climate change and monetary policy



Source: MNB

Increasingly frequent and more extreme weather could increase the likelihood of physical risks materialising, and hence the number of negative supply shocks, which may lead to repeated, short-term increases in inflation. As a result, the volatility of already volatile food prices (*Figure 3*) may increase further, while contributing to rising inflation rates worldwide via the global increase in relative food prices. In addition, in the long run, desertification caused by warming may contribute to a reduction in arable land, which could narrow food supply and hence lead to higher inflation. At the same time, environmental policy regulations are forcing the corporate sector to change technologies and cut their emissions, which will increase their production costs in the short run, but even over the longer term as well. Companies can pass some of their increased costs on to consumer prices, so the costs of structural adjustment to reduce carbon emissions point toward an increase in inflation.

Figure 3: Development of inflation in the European Union



Source: Eurostat

Climate change also threatens financial stability. On the one hand, the fight against climate change creates a difficult situation for many industries that are highly exposed to the financial system (e.g. energy industry). There may be significant direct and indirect links between the actors of the financial system and carbon-intensive industries. This is because banks may lend to, own shares in or have close links with companies operating in such industries, while insurance companies have an inherently high exposure to negative environmental impacts due to their core business.

On the other hand, it is important to be prepared for the fact that climate change could significantly increase the credit risk of assets in bank portfolios, and that collateral could quickly depreciate or be destroyed by the increasing frequency of natural disasters. In the event of physical risks materialising, the solvency and profitability of the insurance sector could deteriorate, bank loans could become non-performing and assets accepted as

collateral could be destroyed. The need for a rapid transition to a greener economy may be accompanied by a higher probability of insolvency of clients. As the stock of non-performing loans rises, the rapid and large depreciation of assets held or accepted by actors in the financial system must also be expected. It is therefore important for the financial sector's future risk management framework to place appropriate emphasis on exposures to the negative effects of climate change and on the measurement and management of such exposures. In parallel, the work of supervisory authorities should also pay attention to assessing the resilience of the financial system to climate impacts.

3. The role of economic policy in mitigating the adverse effects of climate change

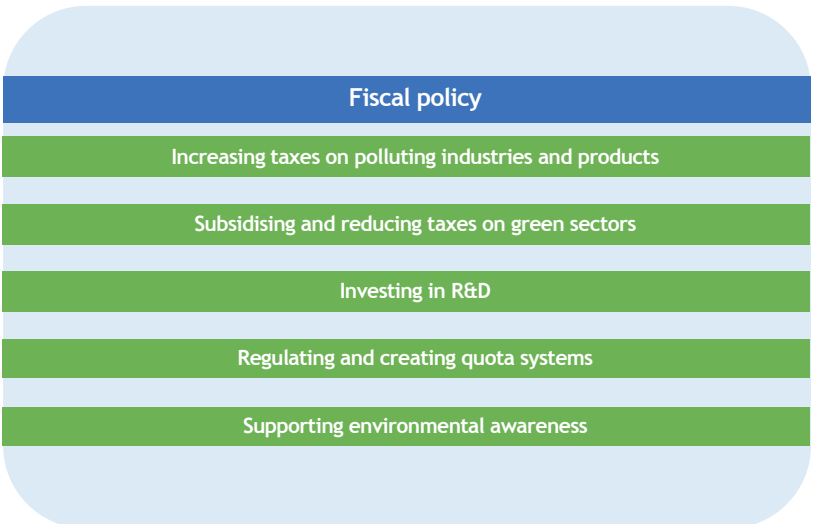
Curbing the pace of warming may require a deep structural transformation of the economy, with potentially significant effects on output, employment and prices. In addition, economic and financial transitions could destabilise certain industries and financial asset classes, potentially increasing the risk of economic crises. Therefore, all branches of economic policy (fiscal, monetary, regulatory and macro-prudential) must pay particular attention to mainstreaming green considerations and ensure a smooth economic transition when implementing measures. It can be assumed that the later the transition to a greener economy occurs, the more pronounced both the physical and the transition risks may become, thus forcing more significant economic and financial adjustment. Consequently, economic policy should take the necessary measures to increase sustainability as soon as possible.

Environmental pollution can be seen as a negative externality that causes welfare losses to society in the long run. For many products and services, the real costs may not be factored into

prices, making them relatively more competitive in terms of prices than similar products and services where producer companies have taken environmental considerations into account in their production. In such cases, it makes sense for the state to intervene in free market processes and manage market failures represented by externalities, in order to contribute to sustainable growth *(Baumol–Oates, 1988)*.

Fiscal policy can make a significant contribution to environmental sustainability, with a range of instruments available to address negative externalities *(Figure 4)*. These include, *inter alia*, various environmental taxes that the government can impose on industries, firms, products and services that are identified as polluting. Green taxes include public levies on various energy products, motor vehicles, measured or estimated emissions or natural resources.

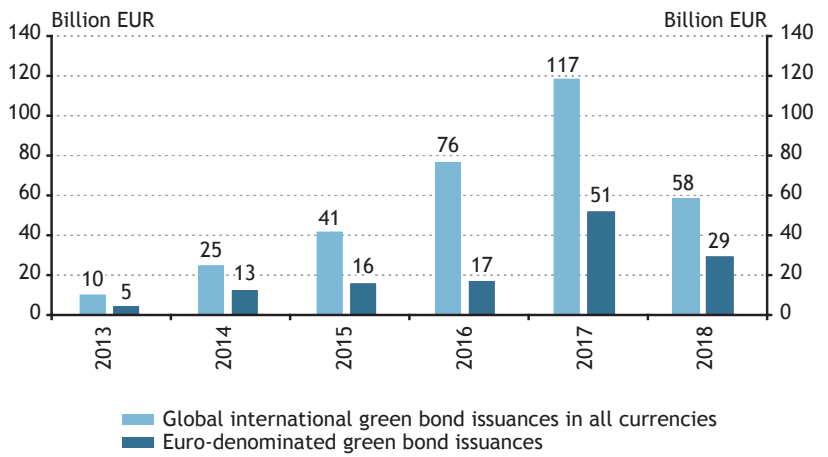
Figure 4: Toolkit of the government for greening the economy



Source: MNB

In doing so, fiscal policy contributes to internalising the previously hidden costs of pollution, which in the long run clearly translate into costs at the level of society as a whole. The environmental taxes imposed make goods and services relatively more expensive, and thus emissions may also fall as their consumption is reduced. Another instrument of fiscal policy is to provide green tax incentives and subsidies to companies and households that take long-term environmental sustainability into account in their production and consumption. Tax advantages and subsidies contribute to increasing the competitiveness of more sustainable products vis-à-vis polluters. This can shift the consumption pattern towards greener categories of goods, thus ensuring sustainability. One example in Hungary is the state subsidy for the purchase of an electric car and/or electric scooter. To finance these subsidies, governments can also issue green bonds, for which there is a growing market around the world *(Figure 5).*

Figure 5: International green bond issuance



Source: ECB

In addition to the direct impact on consumption, the various green taxes and subsidies also contribute to the spread of energy conservation and renewable energies. Subsidies reduce the cost and risk of investing in green technologies, thus increasing their financial return. This is a positive incentive for businesses and households. In addition, government research and development subsidies can contribute to the implementation and spread of green innovations. They can make the deployment of green solutions cheaper, which is key to achieving economic transition and sustainability. An international example is the European Commission, which has earmarked specific funding for green R&D projects under the European Green Deal *(European Commission, 2019)*.

Beyond fiscal instruments, governments can make a significant contribution to environmental sustainability through the regulatory environment and quota systems. With green regulation, governments can impose certain restrictions and requirements on the performance of certain economic activities, consumption of goods and services, directly affecting the level of emissions. Regulation can be further refined through the development of quota systems, whereby a government sets an emission limit for a pollutant of its choice. One example is a carbon dioxide emission allowance, whereby a regulator sets a carbon dioxide emission threshold. These allowances are tradable, and thus unused allowances can be sold by companies to other companies, reducing their emissions while generating revenue. Ultimately, the price of environmental pollution is set in accordance with market processes and can be reflected in the prices of goods and services. Such a system is in place in the European Union, which has the world's first and largest carbon market (ETS) *(European Commission, 2003)*. The ETS is the cornerstone of EU policy to combat climate change and a key tool for reducing greenhouse gas emissions cost-effectively.

Governments can play an important role in raising the environmental awareness of citizens and businesses. Governments can contribute to raising climate awareness through awareness-raising and education, in which environmental sustainability should be a priority. This will help economic actors to make decisions based on their moral insights in favour of environmentally sustainable products and services. Governments can also promote the use of greener solutions. These include "sharing economy" technologies such as carpooling services or public transport. They can also promote the use of bicycles and teleworking. These measures can contribute to reducing the number of automobiles, which will ultimately lead to lower carbon dioxide emissions.

In addition to fiscal policy, regulatory, macroprudential and monetary policy instruments should be used to mitigate the adverse effects of climate change. The branches of economic policy should also coordinate their actions, as different instruments are effective in addressing different problems, and thus higher costs can be avoided and the trade-off between climate protection and economic transition can be reduced. Accordingly, establishing the right economic policy mix is the most effective way to mainstream green considerations.

Global cooperation may be needed to mitigate the effects of climate change. Globally coordinated climate policies and regulations are more effective than locally developed ones *(Bartram et al., 2021)*. As regulatory costs increase, the economic attractiveness of a region relative to unregulated regions is reduced due to a decline in their profitability. Moreover, locally imposed environmental measures are easier for firms to circumvent by relocating their more polluting production units to other unregulated areas. Overall, this does not reduce emissions at the global level. This may be a disincentive to the regulated region to implement environmental measures, as displaced manufacturing capacity reduces the

region's economic output and increases local unemployment. As a result, the government loses tax and contribution revenues, while social spending increases, leading to higher budget deficits and rising public debt. In view of these factors, it makes sense for countries to coordinate climate protection measures as much as possible and act together to mitigate environmental damage.

4. Central bank involvement and monetary policy

Expansion of the mandates of central banks, international outlook

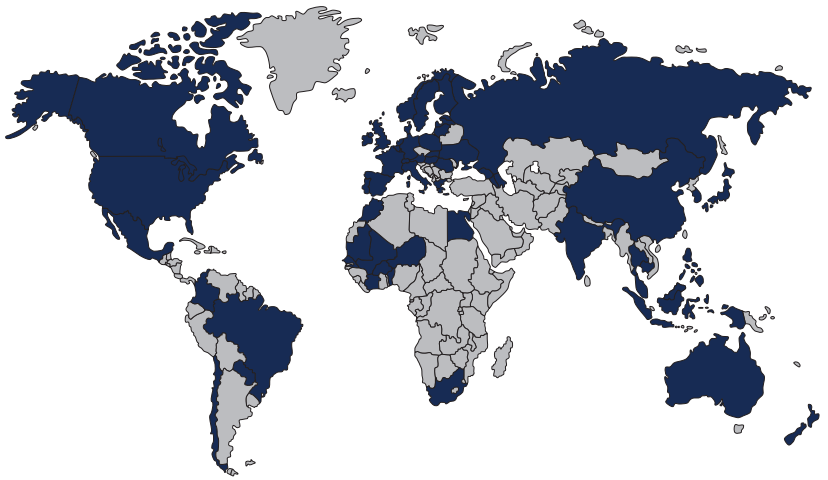
While the main objective of the monetary policy framework is to maintain price stability, it is also important to keep environmental sustainability in mind. There is currently a debate on the role of the central bank in relation to climate policy. There is a general consensus that central banks (and other supervisory bodies) should not ignore climate change *(NGFS, 2021)*, but there is no consensus on the extent to which climate change (or other environmental risks) should be integrated into existing operational frameworks and whether central banks should play a supporting or promoting role in increasing green finance. This should not be surprising given the different histories and policy traditions of central banks in different parts of the world and the differences in their mandates *(Dikau–Volz, 2019).*

Central banks themselves believe that they do have to take part in achieving environmental sustainability *(Reclaim Finance, 2021).* New risks have emerged in the financial sector and in the execution of monetary policy in relation to climate change. In the event of physical risks materialising, the solvency and profitability of the insurance sector could deteriorate, bank loans could become insolvent and assets accepted as collateral could be destroyed,

ultimately jeopardising financial stability. However, compared to financial risks, the impact of climate change on monetary policy has so far received less attention, as many argue that it falls outside the normal time horizon for monetary policy. Nonetheless, without a comprehensive understanding of these effects, it may be difficult to identify the economic shocks relevant to the medium-term inflation prospects. For this reason, an increasing number of central banks have started to examine the issue, as the longer-term effects of climate change may also affect the fulfilment of central bank mandates. Natural effects arising over the short term may increase inflation via negative supply shocks, while they may also further increase the volatility of already volatile food prices. Overall, the effects of climate change could contribute to rising inflation rates worldwide through a global increase in relative food prices. In addition, the costs of restructuring the economy to reduce carbon emissions may raise inflation in the longer run.

In order to mitigate risks, the Network for Greening the Financial System (NGFS), an international financial supervisory and central banking organisation dedicated to environmental sustainability, was established in December 2017, and the Magyar Nemzeti Bank (MNB) joined in January 2019. In April 2021, the organisation already had 90 members and 14 observer members *(Figure 6)*. The NGFS focuses on analysing the instruments that can effectively address the impact of potential negative supply shocks and the room for manoeuvre allowed by central bank mandates to promote a green economy. In the era of climate change, central banks are also inevitably entering uncharted waters. If they wait for other actors to intervene, they run the risk of ultimately failing to deliver on their mandate for financial and price stability *(BIS, 2020a)*.

Figure 6: NGFS memberships around the world

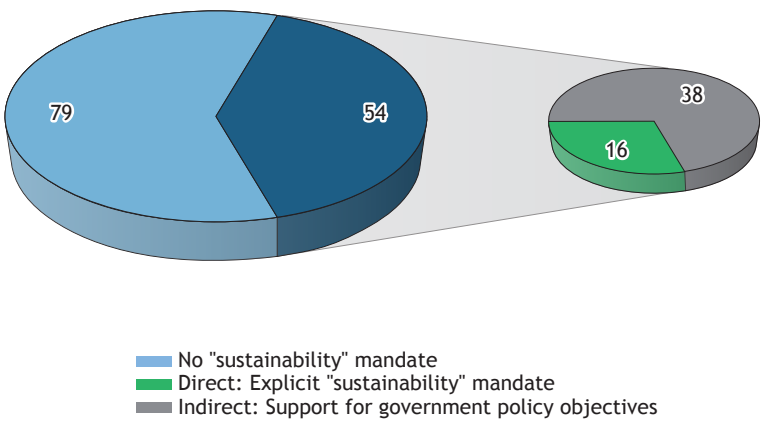


Note: NGFS membership is highlighted in blue.
Source: NGFS

More and more central banks are taking green considerations into account. The primary mandate of central banks in advanced economies that pursue inflation targeting is to achieve and maintain price stability. Only a few central banks have a mandate that explicitly includes the promotion of sustainable growth (*Figure 7*), but recently an increasing number of central banks have started to address sustainability in relation to their own mandates. While sustainability aspects are included in mandates, environmental sustainability is less of an explicit objective among central banks. One of these few is the Bank of England, as Rishi Sunak, UK Chancellor of the Exchequer, announced in March 2021 that the Bank of England's mandate would be expanded in the future to reflect the importance of environmental sustainability and the move to net-zero emissions *(Sunak, 2021)*. This does not change the central bank's main monetary objective, which requires price stability *(Reclaim Finance, 2021)*. The MNB's mandate was extended in 2021 to include environmental sustainability, according to which the central bank will use the instruments

available to it to support the government's economic policies related to environmental sustainability. However, a much larger proportion of central banks do not have sustainability incorporated into their mandate, but the mandate does include supporting the country's economic policies including efforts to this end, provided that they do not undermine the primary objective of price stability. Among these central banks, for example, the Bank of Japan's position is that climate change affects the allocation of resources, and so decisions on climate change should be consistent with maintaining price and financial stability *(Reuters, 2021).*

Figure 7: Central banks with and without sustainability mandates

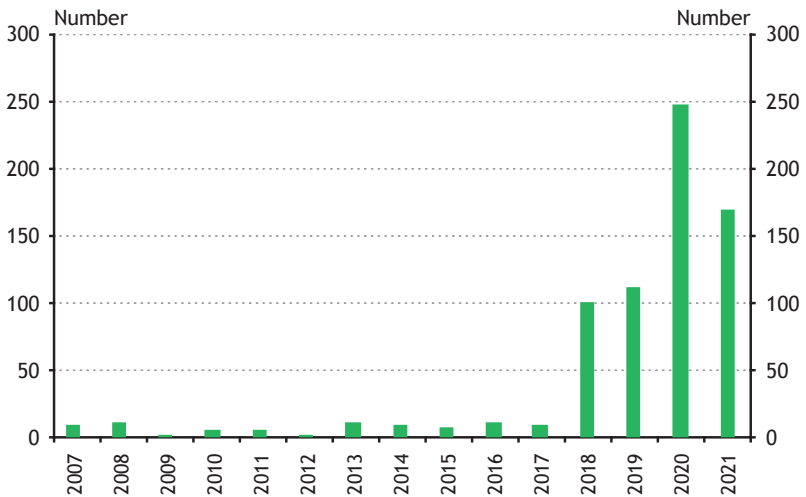


Note: The authors took central banks into account until 2020.
Source: Dikau-Volz (2019)

In recent years, the extent to which it is appropriate to incorporate these aspects into the mandate has become a central question in the course of the target reviews. In terms of the globally dominant central banks, several ECB policymakers have highlighted the importance of tackling climate change in their speeches (*Figure 8*), while ECB President Christine Lagarde has indicated that the central bank is addressing it as a core issue in its ongoing monetary strategy review *(Lagarde, 2021)*. At the same time, Federal Reserve

Chairman Jerome Powell argued that the central bank's mandate includes addressing climate risks, but that this is primarily a financial stability issue. A statement by the Chairman also indicates that the Federal Reserve has less emphasis on climate change from a monetary policy perspective, but is addressing the issue *(Federal Reserve, 2021)*. According to Haruhiko Kuroda, Governor of the Japanese central bank, climate change will have a strong impact on economic activity and the financial system in the medium to long term, and therefore central banks need to take action. According to Kuroda, the most important step is to map the impact of financial risks of climate change on transmission channels and to correctly measure the financial risks of climate change *(Reuters, 2021)*.

Figure 8: Number of green terms in ECB decision-makers' speeches



Note: Number of terms "green, climate, emission, global warming, environmental, carbon" used in ECB decision-makers' speeches.

Source: MNB calculation based on ECB data

The Chinese central bank is already promoting the greening of finance through various incentives. The central bank has indicated that in the future it will strive to develop green financial standards and green financial products, and considers it important to strengthen international cooperation in the area of greening. Yi Gang, Governor of the central bank, has indicated that the impacts of climate change on financial stability and monetary policy are being examined *(BIS, 2020b)*.

From January 2021, the Riksbank of Sweden only buys corporate bonds that meet international sustainability standards and norms. The Riksbank justified its decision on financial stability grounds, saying that climate change poses significant physical and transitional risks that the central bank, as the body responsible for financial stability, must manage *(Riksbank, 2021)*. The Swiss central bank announced in December 2020 that, as regards its investment policy, it would exclude companies from its portfolio that are currently active in coal mining in order to decarbonise its balance sheet (so-called negative screening). It is also continuously assessing the potential consequences of climate change for the economy, financial stability and the stability of the Swiss banking system as a whole *(Green Finance Platform, 2020)*. In Hungary's region, the Romanian and Czech central banks are also addressing the financial stability and monetary policy implications of climate change *(BIS, 2020c; Bloomberg, 2021)*.

Opportunities and challenges for the development of a green central bank toolbox

Achieving the objectives stemming from the central bank's mandates justifies the development of a monetary policy toolbox that integrates sustainability aspects. In the operational functioning of central banks, it is necessary to take environmental and climate protection aspects into account and to integrate them into the implementation framework of monetary policy. Only by broadening the central bank toolbox in a targeted manner and,

where necessary, by adapting existing instruments will it be possible to address effectively the challenges posed by climate change.

The mainstreaming of environmental sustainability values in the monetary policy toolbox requires the combined consideration of several aspects. The fight against climate change requires a long-term commitment from economic policy actors that goes beyond the traditional time horizon of central banks. In order to address this, it is necessary to take into account the time horizon needed to mainstream climate change and environmental sustainability considerations when defining the framework for central bank instruments, while keeping the time horizon of monetary policy unchanged. The experience of recent years has shown that targeted central bank instruments that focus on a specific challenge can provide an effective response to the challenges that arise and it is therefore appropriate to design sustainability-focused monetary policy instrumentality in such a way that the central bank contributes as directly as possible to the fight against climate change. However, the use of green banking instruments can only be implemented in parallel with the continued safe operation of existing and successfully used instruments; therefore, efforts should be made to maintain a balance between central bank instruments.

The NGFS technical paper published in March 2021 provides detailed guidance on the options for greening the monetary policy toolbox. The financial risks related to climate change may have an impact on the group of central bank counterparties and the financial instruments used in monetary policy operations. Banks may thus suffer direct losses through deterioration in asset quality, on the one hand, and, on the other hand, the amount of liquidity available will be reduced as the collateral value of assets decreases. Recognising these risks, central banks can green their operational framework. Based on the NGFS recommendations, this is possible in particular in the case of the restructuring of

credit facilities, collateral assets and asset purchase programmes. When pricing credit facilities, central banks may take into account the green lending activity of the counterparty, the green nature of the assets backing the credit and may also set green criteria. When reshaping collateral management practices, it is possible to set different collateral values through the use of green haircuts or even to exclude certain collaterals. Asset purchase programmes can be restructured to overweight green assets or to exclude certain brown assets that may be considered environmentally harmful *(NGFS, 2021)*.

Green central bank

Central banks can take a number of steps to counter the effects of climate change. The first set of responses is to assess and identify financial stability risks and then address them through macroprudential instruments. This implies capturing climate change risks among financial stability aspects, stress testing the financial system's climate change sensitivity, disclosing identified risks and integrating them into risk management systems. In addition, central banks manage such risks using macro-prudential tools such as credit risk weights.

Central banks can also make a significant contribution to financing the green transition by mobilising green funds and developing markets of financial products taking into account green considerations. This could take the form of asset purchases, green corporate bond programmes and mortgage bond purchases. However, green objectives can also be achieved through targeted programmes.

Central banks have tools at their disposal to support green corporate lending. Central banks are able to reduce the cost of financing projects that produce slower or lower returns, but are environmentally sustainable or more favourable to an extent that will encourage market players to implement green investments.

Lending for environmental investments is for the long term. As a result, commercial banks may face increased liquidity risk due to transformation. Central banks have the ability to support such lending through targeted programmes.

Sustainability-focused targeted programmes can take several forms. The central bank can launch a programme to purchase green mortgage bonds. It is internationally accepted practice to include green bonds in the central bank's portfolio as part of an asset purchase programme. Within the financing programmes for small and medium-sized enterprises, the central bank offers preferential conditions for loans that can be linked to green activities. Central banks can also formulate green banking risk management recommendations and develop green capital market strategies. Finally, knowledge sharing is a priority, which central banks can achieve by organising awareness-raising programmes for professionals and households, and with training courses.

Digitalisation and financial innovation are of paramount importance in the fight against climate change. The spread of robotisation in production and consumption, as well as data-driven smart solutions and the communications revolution, all make the economy and the financial system work more efficiently. Digitalisation thus contributes to a more energy-efficient economy and financial system. Central banks have a key role to play in supporting technological progress and innovation. Hungary set an excellent example in the field of digitisation with the introduction of the Instant Payments System (IPS) in March 2020. Experience with the IPS shows that there was demand for a convenient, continuously accessible service. One of the greatest achievements of digitalisation could be digital central bank money, which could also open up new horizons for monetary policy. From a climate change perspective, the advantage of digital central bank money is that by owning it, households and companies would digitally own definitive, i.e. completely risk-free money issued by the central bank *(Szabó–Kollarik, 2017).*

5. The MNB's role in greening the Hungarian financial system

The Magyar Nemzeti Bank has also recognised the importance of tackling climate change and is committed to creating sustainable, green finance. The main objective of its green strategy is to ensure that the financial sector makes a strong contribution to environmentally sustainable economic growth, leading the way and providing financing for the Hungarian economy as a whole in the fight against climate change *(Kandrács, 2021)*.

Steps taken so far and possible directions for greening Hungarian monetary policy

An environmental sustainability aspect has been added to the mandate of the MNB. Under its previous mandate, the central bank supported the government's economic policies without compromising the primary objective of maintaining price stability. However, in order to achieve broader economic stability, the central bank also considers environmental sustainability to be essential. Accordingly, as of 1 August 2021, environmental sustainability was explicitly built into the MNB's mandate, making it one of the first central banks to do so. The primary objective remains to achieve and maintain price stability.

The development of the Hungarian green bond market and the central bank's innovative attitude and green approach contribute to the greening of the MNB's toolbox, while the immature international practices and the short-term approach of the financial system pose challenges to the transformation. Hungary's green bond market has seen significant development in the recent period, with the first sovereign and the first corporate green bond issued in the watershed year of 2020, followed by further issuances. The developing green bond market offers the opportunity to green the current monetary policy toolbox or to

introduce new green instruments. This is strongly supported by the MNB's innovative attitude and green credentials as its strengths: the central bank's proactive, exemplary behaviour and early, strong commitment to sustainability goals can ensure the success of the greening the monetary policy toolbox. However, the still-immature international practices (e.g. taxonomy, limited availability of standards), the low number of good examples and the generally short-term approach of the financial system could pose a major challenge to greening the monetary policy toolbox.

At its meeting on 6 July 2021, the Monetary Council decided to adopt and publish the MNB's Green Toolbox strategy. The purpose of the strategy document is to provide an overview of the tasks stemming from the new central bank mandate and to provide a framework for the central bank's toolbox focusing also on environmental sustainability values. In this context, it lays down the core values and strategic objectives for a more sustainability-oriented monetary policy and provides an overview of possible directions for greening monetary policy.

Green bonds appeared first on the corporate bond market in Hungary, and were issued under the MNB's Bond Funding for Growth Scheme. Putting the approach focusing on environmental values into practice requires the creation of appropriate financial products and related best practices and market infrastructures. The recent emergence of green bonds on the Hungarian market can contribute to the development of a green central bank toolbox. The first green bond issuance took place in August 2020 and, as the popularity of the asset class has gradually grown, several new issuances have followed since then. In Hungary, corporate green bonds are predominantly linked to the real estate development sector, which is of key priority in terms of carbon mitigation, but there have also been examples of green bond issuance by industrial production companies. The bonds are part of a corporate Green Bond Framework that has been validated by external reviewers meeting international standards (Green Bond

Principles). The MNB has enabled the launch of these bonds under the Bond Funding for Growth Scheme, and their share in both the central bank programme and the overall market is steadily increasing due to growing investor requirements and demand.

Hungary's first green government bond issue denominated in forint has played a prominent role in the development of domestic markets. Following the successful launch of euro and Japanese yen green bonds in 2020, the first forint-denominated bond earning "green bond qualification" debuted on 22 April 2021. With a 30-year maturity, the government will finance its spending related to renewable energy, energy efficiency improvement investments, land development, waste and water management, and green transport *(Government Debt Management Agency, 2021).* The MNB has helped to stimulate investor activity and ensure adequate market liquidity through its government bond purchase programme.

Green mortgage bond purchase programme

Improving the energy efficiency of the residential property stock is essential to meet climate protection targets, and can be supported by green housing lending. In order to avoid market frictions, incentives should be put in place to ensure that green considerations are taken into account in lending. Currently, residential buildings are responsible for nearly one quarter of domestic primary energy use. From an energy perspective, only a very low percentage of the domestic housing stock can be considered green property according to international green definitions. Although newly built properties are significantly more energy efficient, there is still substantial scope to improve energy efficiency.

The MNB's Green Mortgage Bond Purchase Programme is the first asset purchase programme to focus on sustainability. This programme can contribute to the spread of green mortgage loans

via targeted purchases. The strategic goal of the transformation of the MNB's presence in the mortgage bond market is to create a domestic green mortgage bond market and to introduce best practices. In the programme, the MNB expects to follow international standards, which will support the development of a liquid, transparent domestic green mortgage bond market laid down on uniform bases. In designing the terms and conditions of the programme, the MNB also sought to ensure that – in line with the Government's efforts to create homes – central bank purchases give priority to newly disbursed consumer green mortgages for home purchase purposes, thus contributing to the construction of more energy-efficient housing and a healthier housing stock in Hungary.

Green housing loan incentives

Green household lending can also be encouraged via favourable central bank refinancing. The renewal of the energetically obsolete housing stock could make a significant contribution to meeting climate targets. Currently, residential buildings are responsible for nearly one quarter of domestic primary energy use. From an energy perspective, only a low percentage of the domestic housing stock can be considered green property according to international green definitions. The availability of low-interest loans for the purchase of new properties could greatly improve the availability of credit for the purchase of new homes. By providing funds from the central bank, it may be possible to create products that are significantly cheaper than market loans and have fixed interest rates until their maturity date. Other economic policy measures, such as state interest rate subsidies or guarantees, may also help to reduce the remaining interest rate premium in part or in full. The central bank could provide favourable loans, while the government could help priority social groups to buy or build new homes by assuming the credit risk or by subsidising the interest rates.

Greening of reserve management; green bond portfolio

Based on the Monetary Council's decision, the MNB started to build up a dedicated green bond portfolio in 2019, making it one of the first central banks worldwide to demonstrate its commitment to green objectives in reserve management as well. Current trends show that more and more central banks are opening up to measuring climate risk variables and integrating them into their decision-making, also for foreign exchange reserve portfolios. The MNB's green bond portfolio developed in 2019 includes euro-denominated bonds with well-diversified geographical exposure: the portfolio consists of securities from a number of countries and regions. The backbone of investments is predominantly supranational institutions and EU issuers, reflecting the composition of the investment universe. The green bonds must comply with the ICMA's Green Bond Principle and have a favourable green rating from an independent external partner. In 2021, the environmental impact of the green bond portfolio was published for the first time, with the key finding that the pioneering central bank practice has contributed to avoiding around 55,000 tonnes of carbon dioxide emissions per year *(Elek et al., 2021).*

Greening collateral management

By integrating sustainability considerations into the collateral management framework, the central bank can manage its own green risk and contribute to the development of the bond market and best market practices. By accepting assets as collateral, the central bank takes on green risks, even if only indirectly. The introduction of a *green haircut* can effectively contribute to the development of a sustainability-oriented bond market through the preferential treatment of green securities. Acceptance at higher collateral values can increase the number of future green issues, thus supporting the green bond market. Renewal of the collateral management system on the basis of sustainability aspects has

the potential to have a significant impact on the banks' liquidity management practices and thus on their business.

6. Summary

Environmental sustainability has recently become a key issue. The reason for this is that extreme weather events, which have become more frequent in recent decades as a result of climate change, also affect the functioning of the economy and cause negative supply shocks. These shocks can lead to a rise in inflation. As a result, the volatility of already volatile food prices may increase further, while contributing to rising inflation rates worldwide through the global increase in relative food prices. In parallel, restructuring the economy to reduce carbon emissions also points toward a longer-term rise in inflation. At the same time, climate change also threatens financial stability.

Curbing the pace of warming may require a deep structural transformation of the economy, with potentially significant effects on output, employment and prices. Therefore, all participants of economic policy should pay particular attention to mainstreaming green considerations and ensuring a smooth economic transition. It is important to formulate global responses to the problem, and for all economic policy participants to coordinate their actions to achieve the objectives.

As key economic policy actors, central banks can contribute to mitigating the economic impacts of climate change. Central banks themselves consider that they do have to take part in achieving environmental sustainability. This is supported by the fact that, in recent years, the extent to which it is appropriate to incorporate these aspects into the mandate has become a central question in the course of the target reviews. While the main objective of the current monetary policy framework is to maintain price stability, it is also important to keep the mandate of environmental

sustainability in mind. In the long run, green considerations can contribute to price stability and therefore extended mandates are needed. Taking into account international practice, in some cases sustainability has been included in central bank mandates, while many central banks take green considerations into account in the design and implementation of their monetary instruments. Achieving the objectives stemming from the central bank's mandates justifies the development of a monetary policy toolbox that integrates sustainability aspects.

In addition to incorporating sustainability aspects, central banks have a range of tools to support the fight against climate change. They have macro-prudential tools at their disposal, they can contribute to financing green solutions through targeted programmes, and their exemplary behaviour and knowledge sharing can help to raise the environmental awareness of economic actors.

The MNB has recognised the importance of taking action to tackle climate change. It is taking steps to develop sustainable, green finance. The main objective of its green strategy is to ensure that the financial sector makes a strong contribution to environmentally sustainable economic growth, by providing financing for the Hungarian economy as a whole in the fight against climate change. A number of programmes of the Hungarian central bank take green considerations into account, and it is also developing its monetary policy toolbox in line with its green toolbox strategy.

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China's Policy Practice for Encouraging Innovation and its Effects

Junkuo Zhang

Since the introduction of the policies of "reform and opening up" in 1978, China has become one of the world's leading scientific and technology powerhouses. This paper provides a comprehensive overview of the steps and measures taken by China to achieve this outstanding result. The priorities of the 14th Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035 are highlighted with regard to science, innovation, technology and their applications in a modern digital economy. According to these objectives, China is set to further enhance basic research, strengthen the system of innovation labs and encourage talents to unleash their potential. The paper shares the valuable experience of China in regional innovation development, i.e. the establishment of different types of innovation zones. Several achievements are presented based on international rankings and data, for example Chinese investments in basic research, the number of patent applications, scientific papers and international student exchanges, inter alia. Thus, the study adds to the existing literature by demonstrating how China has succeeded in enhancing its overall independent innovation capabilities in various industries and segments of the economy.

Journal of Economic Literature (JEL) codes: O20, O31, O38, O43, N10

Keywords: reform and opening up, innovation policy, innovation zones, technology and development, China, world rankings

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Science and technology innovation is a key driver of the Chinese economy. In tandem with the economic reform and opening up in 1978, the Chinese government launched the institutional reform for science and technology innovation to continuously promote the transformation of the government's science and technology management function and create a pro-innovation institutional environment. With a combination of government and market forces, China's strength in science and technology innovation has been remarkably enhanced, effectively driving the sustainable development of the Chinese economy.

1. Evolution and orientation of China's innovation policy

(I) From state central planning to systematic national innovation

Since the reform and opening up in 1978, China's science and technology innovation system went through broadly four stages: science and technology system rebuilding, market-oriented transition, national innovation system development, and the implementation of innovation-driven development strategy.

1. Science and technology system rebuilding (1978-1984)

Reform and opening up heralded in a new phase in China's economic, social, and science and technology development. During that period, the government implemented a host of major science and technology initiatives and industry programs[3] and stepped up efforts to foster science and technology talent and import advanced technologies. The Outline of the National Plan

[3] These include national key technological transformation programs, national key scientific and technological research programs, national key technological development project programs, national key laboratory construction programs, national key industrial testing programs and major technological equipment development programs.

for Science and Technology Development 1978-1985 published in October 1978 was the first medium-to-long-term strategy for science and technology development after reform and opening up.

2. Market-oriented transition (1985-2005)

Concurrent with economic reform, China launched the market-oriented transition of the science and technology system. The Decision on the Reform of the Science and Technology System released in March 1985 proposed a shift from a highly planned system to a more market-oriented approach. In January 1987, Several Provisions on Further Reforming the Science and Technology System was issued, further relaxing the management of scientific research institutes and science and technology personnel and promoting the combination of scientific research with production. The Decision on Several Issues Concerning Deepening the Reform of the Science and Technology System announced in May 1988 encouraged scientific research institutes to introduce competition mechanisms, actively promote all forms of contract responsibility systems and take measures to separate ownership and management control. The Decision on Strengthening Technological Innovation, Developing High Technology and Realizing Industrialization of 1999 set forth to deepen supporting reforms for economic, science and technology and education systems and advance the development of the national innovation system. During this period, the government started to pay more attention to basic research and high technology. The Decision on Several Issues Concerning the Establishment of the Socialist Market Economic Structure released on November 1993 called for strengthening basic research, developing high-tech research and liberalizing the research, development and operational activities of technology developers and science and technology service providers.

3. National innovation system development (2006-2011)

During this phase, China's innovation policy was geared toward enhanced independent innovation capability and the strengthened role of businesses as innovators for all-round progress in developing a national innovation system. In October 2005, China proposed to "continuously enhance business innovation capability and accelerate the development of the national innovation system". In February 2006, China published the Outline of the National Plan for Medium- to Long-Term Science and Technology Development 2006-2020, setting the goal of making China an innovative nation by 2020 and a world-class science and technology powerhouse by the middle of the century. To facilitate the building of the national innovation system with businesses as innovators and independent innovation as the key lever, many policies were announced over the period in support of science and technology companies, including Several Opinions on Encouraging Technology Import and Innovation and Promoting the Transformation of Foreign Trade Growth Model (2006), Several Policies for Supporting Technological Innovation of Small and Medium-sized Enterprises (2007). By significantly increasing research and development spending, implementing key science and technology projects, formulating intellectual property strategy and deepening open innovation, the country greatly enhanced its overall innovation capability.

4. Implementation of innovation-driven development strategy (2012 to present)

As the Chinese economy grows rapidly, resource and environmental constraints have heightened, with rising factor costs. It is imperative for the growth model to shift from factor and investment to innovation. In November 2012, the 18th National Congress of the Communist Party of China unveiled the innovation-driven development strategy, placing science and technology innovation at the center of the large picture of

national development. In March 2015, China released Several Opinions on Deepening Systematic and Institutional Reforms for Accelerated Implementation of the Innovation-driven Development Strategy, calling for all-round innovation and a pilot for all-round innovation reform. In May 2016, the Outline of the National Strategy for Innovation-driven Development was officially published. During this period, China has continuously increased science and technology investment, strengthened basic and frontier technology research, reformed science and technology programs and project management and intensified incentives for the conversion of science and technology outcomes.

(II) New development stage for building a science and technology powerhouse faster with science and technology self-reliance and self-empowerment as the strategic linchpin for national development

Released in March 2021, the 14th Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035 underlines the central role of innovation in China's modernization drive, identifies science and technology self-reliance and self-empowerment as the strategic linchpin for national development, and sets out to improve the national innovation system and expedite the building of a science and technology powerhouse.

First, continue to strengthen basic research. Fiscal input will be increased and the expenditure mix improved for basic research, with tax breaks for corporate spending on basic research. Investment from multiple channels will be encouraged such as private donations and foundations to form sustained and stable input mechanisms, so that basic research accounts for over 8% of total R&D spending.

Second, enhance national strength in strategic science and technology. Science and technology resources allocation will be consolidated and optimized according to national goals and

strategic needs. National lab development will be advanced and the national key lab system reorganized. In basic and core areas concerning national security and development security, strategic scientific plans and scientific projects will be formulated and implemented. In frontier areas, a batch of forward-looking and strategic key national science and technology projects will be implemented. Beijing, Shanghai and the Guangdong-Hong Kong-Macao Greater Bay Area will receive support to develop international science and technology innovation centers. Comprehensive national science centers will be built in Huairou of Beijing, Zhangjiang of Shanghai, the GBA, and Hefei of Anhui.

Third, improve business technological innovation capability. Inclusive beneficial policies such as R&D spending deductions and tax breaks for high-tech businesses will be intensified to incentivize corporate spending on R&D. Industry champions are encouraged to partner with institutes of higher learning, research institutes and upstream and downstream companies to build national industry innovation centers. The leading and supporting role of big companies will be leveraged to support micro-, small and medium-sized enterprises to grow into key sources of innovation, while synergetic innovation will be promoted among all businesses in the industrial chains and companies of all sizes. Smooth channels will be provided for technology companies to access domestic IPO financing.

Fourth, unleash the innovation spirit of talent. Talent will be trained, introduced and leveraged in an all-round way to perfect the training and discovery mechanisms for the world's leading science and technology talent and innovation teams and foster young science and technology talent reserves with international competitiveness. An income distribution policy aimed at increasing the value of knowledge will be implemented. A more open and internationalized innovation system and scientific research environment will be developed to attract more international talent.

Fifth, improve science and technology innovation systems and mechanisms. Public spending on scientific research will be more selective. The filing and organization and management of key national science and technology projects will be reformed and more effective funding mechanisms explored. A stricter IP protection system will be enforced. Efforts will be made to promote opening up and cooperation on science and technology.

2. China's experience in regional innovation reform and development

Aimed at unleashing the role of science and technology in driving economic development, innovation parks began to emerge in China in the early 1980s. From the Shenzhen Science and Industry Park established in 1985, to the first high-tech industry development zone (hereinafter referred to as "high-tech zone"), namely the Beijing New Technology Industry Development Pilot Zone, and then to the national innovation demonstration zones and the comprehensive innovation and reform pilot zones, China has blazed a trail of continuous exploration and constant improvement as regards regional innovation reform and development.

(I) High-tech zones: from the "trade-production-technology" model to a pacesetter for innovation

High-tech zones are science parks established in areas with a high concentration of universities and research institutes, to provide a favorable environment for tech entrepreneurs who start a business based on domestic scientific and technological outcomes. Their purpose is to transform scientific and technological achievements and promote the development of high-tech industries. The objective for creating high-tech zones is to establish bases for developing high-tech industries in China,

following the model of foreign science and technology parks. The development of high-tech zones can be divided into three stages.

First, the incubation period from 1978 to 1987. The Decision of the Central Committee of the Communist Party of China on the Reform of the Science and Technology System promulgated in 1985 clearly proposed that "in order to speed up the development of new industries, a number of knowledge-intensive areas in the country should be selected and special policies should be adopted to initially form new industrial development zones with different characteristics". In 1985, Shenzhen Science and Industry Park was officially established. Almost at the same time, an "electronics street" emerged at Zhongguancun, Beijing, and firms such as Lenovo, Founder and Unigroup were successively founded by former researchers who had gone into business. Many of these firms did not develop high-tech products on their own in the early days and were rather mainly engaged in commercial activities, but they formed the basis of China's high-tech industry.

The second stage was the period of rapid development from 1988 to 2000, when the State Council approved the Provisional Regulations for the Beijing New Technology Industry Development Pilot Zone in May 1988, marking the inception of the first national high-tech industrial development zone. Subsequently, the State Science and Technology Commission formulated the "Torch Plan", proposing the construction of high-tech industrial development zones throughout the country. A total of 52 national high-tech zones, in two batches, were approved by the State Council and established. A large number of start-ups were incubated in the high-tech zones, and a number of high-tech enterprises with strong innovation capabilities and products with independent intellectual property rights emerged. During this period, the high-tech zones were still following the "trade, production and technology" model, focusing mainly on low-end manufacturing and staying at the lower end of the global value chain.

Third, the second trailblazing stage featuring comprehensive expansion since 2001. Given the relatively weak innovation capacity, from 2001-2002, the Ministry of Science and Technology proposed that the national high-tech zones enter the second trailblazing stage, with scientific, technological and institutional innovation as drivers and cultivating new- and high-tech industries as the main task. In August 2005, the government of China proposed that the high-tech zones should strive to become important platforms boosting technological advance and innovation capability and powerful engines for regional restructuring and changes in growth patterns. Since 2010, the growing number of national high-tech zones has expanded to the central and western provinces and prefecture-level cities. By 2020, China had established 168 national high-tech zones in total.

(II) National innovation demonstration zones: the upgraded high-tech zones

After the 2008 international financial crisis, the green shoots in a new round of scientific and technological revolution and industrial transformation offered a window of opportunity for the development of emerging high-tech industries. To enhance innovation capacity, the State Council decided to build national innovation demonstration zones (NIDZ) on the basis of high-tech zones as engines of regional economic growth. Reform and pilot projects on equity incentives for technology commercialization and technology finance are also launched to further break down policy barriers that stifle innovation and to stimulate vigor for scientific and technological innovation. NIDZs have already become pacesetters in support of regional innovative growth and the cultivation of new business models, technologies and drivers.

(III) Comprehensive innovation and reform pilot zones: from parks to regions

After the 18th National Congress of the CPC, in order to further promote innovation-driven development through deepening reforms, in May 2015 the government of China decided to pilot systemic reforms for all-around innovation in some regions. In September, comprehensive innovation and reform pilot zones were established in the eight regions of Beijing-Tianjin-Hebei, Shanghai, Guangdong, Anhui, Sichuan, Wuhan, Xi'an and Shenyang, with four major directions of development for exploration: the effective mechanism to leverage the roles of market and government, effective ways to promote the in-depth integration of science and technology and economy, effective measures to motivate innovators and stimulate creativity, and effective models for greater openness and innovation.

These pilot zones are vastly different from high-tech zones and NIDZs: First, the zones are expanded to cities, provinces or even trans-provincial areas, clearly beyond the confines of parks; second, the zones put more emphasis on promoting innovation through reforms and market-based allocation of factors for innovation to improve local innovation efficiency; third, the zones try to coordinate scientific and economic development more broadly, shifting from the science and technology department-oriented approach, and removing inter-departmental barriers to the flow of resources and elements to create synergy for development.

The comprehensive innovation and reform pilot zones achieved notable results. Their trailblazing policies on investment and financing information service, patent pledge financing service, patent protection service, employment and entrepreneurship for international students in China, research instrument and equipment sharing, among others, have made progress. Some policies are rolled out nationwide.

3. China's support for innovation has made the country a major innovation power

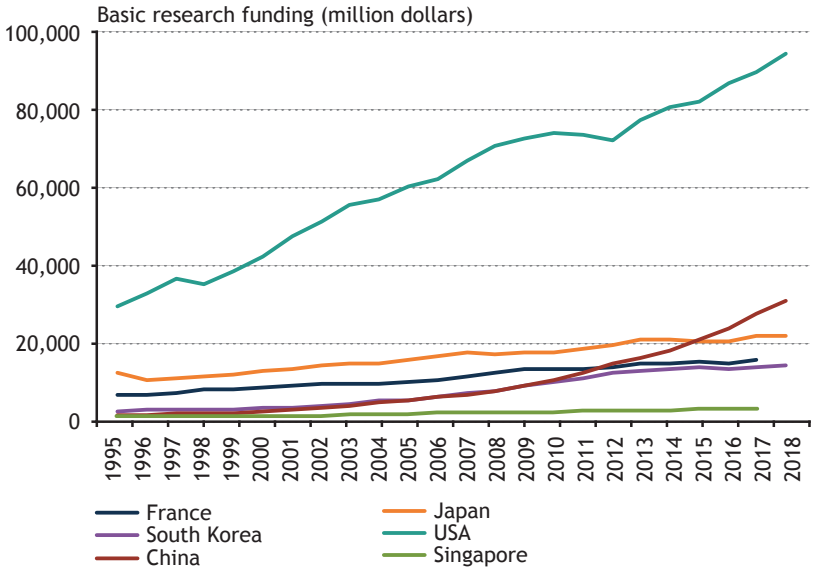
Since the beginning of reform and opening up, China's innovation capacity has rapidly increased. The country has become one of the world's leading innovative countries,[4] with significant improvements in basic research capacity, production technology, industrial competitiveness and innovation and entrepreneurial activities.

(I) The capacity for basic research has continued to grow and the number of science papers published is among the highest in the world

China's investment in basic research has driven significant progress in scientific research. First, China's investment in basic research has increased to become the second largest in the world. In 1995, its investment in basic research amounted to just USD 664 million, about 2.2% of that of the United States (USD 29,607 million), and also behind countries such as France and Japan. In 2018, China's investment in basic research reached USD 30,716 million, 31.8% of that of the United States (USD 96,490 million) (see *Figure 1*).

[4] According to the Global Innovation Index 2020 jointly released by WIPO, Cornell University and INSEAD, China ranked 14th out of 131 economies participating in the global ranking with a score of 53.28, the only middle-income economy to enter the top 30 of the Global Innovation Index. Specifically, China's innovation input score ranked 26th and innovation output score ranked 6th.

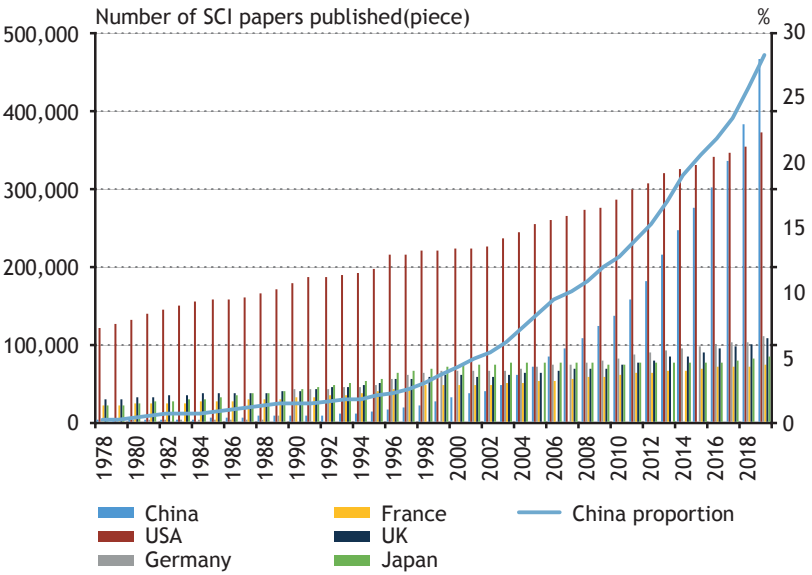
Figure 1: China's annual investment in basic research ranked second in the world



Source: OECD MSTI database

Second, China has jumped to the top position in the world in terms of the number of high-quality academic papers published. From 1978 to 2019, the number of SCI papers published increased rapidly, from 180 to 464,597, rising from 0.05% to 28.19% of the total number of global SCI papers in that year, and China's world ranking jumped from 58th to 1st (see *Figure* 2).

Figure 2: China jumped to the world's top position in terms of number of SCI papers published[5]



Source: Web of Science Core Collection SCI database

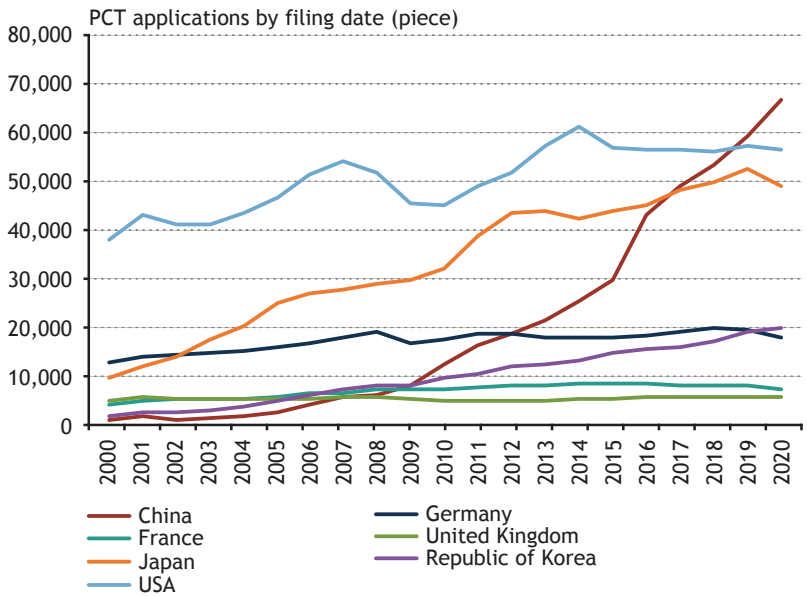
(II) Significant improvement in technology level, with the number of patents and share of net exports of high technology ranking among the top in the world

With vigorous implementation of innovation policies, China's technology level has risen significantly. China leads the world in terms of the number of international patent applications under the Patent Cooperation Treaty (PCT). The technology level of its enterprises has steadily improved. From 2000 to 2019, the number of patents submitted under the PCT of the World Intellectual Property Organization (WIPO) increased from 742 to 58,990, ranking first in the world (see *Figure 3*). With a growing share of high-tech exports and ICT services exports, China's export structure continues to upgrade. In 2018, its share of high-tech

[5] Including SCI-EXPANDED papers.

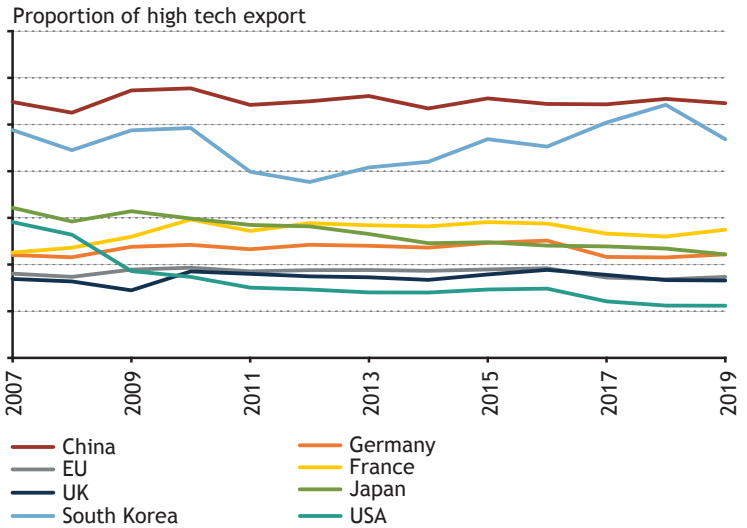
products in the value of total exports of goods and services was 27.56%, also the highest in the world (see *Figure 4*). The relatively large share of high-tech exports reflects the gradual increase in the technology content of China's goods exports and the further optimization of the export structure. ICT service exports reflect the level of development of the emerging services sector. From 1996 to 2017, the share of China's ICT service exports in service exports rose rapidly from 1.53% to 12.66%, an average annual increase of 0.53 percentage points (see *Figure 5*).

Figure 3: China's PCT patent applications ranks first in the world



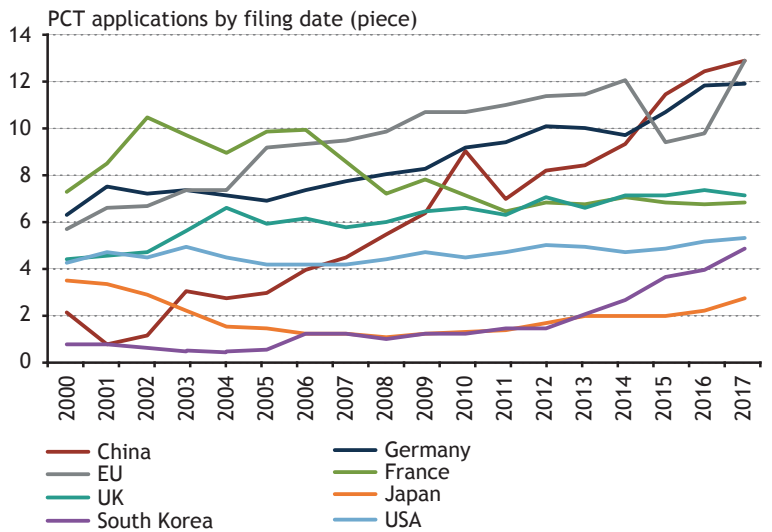
Source: WIPO PCT Yearly Review

Figure 4: China leads the world in terms of the share of high-tech exports in total exports of goods and services



Source: World Development Indicators database

Figure 5: China leads the world in terms of the share of ICT service exports in total exports of services



Source: World Development Indicators database

(III) Rising technology levels of enterprises and increasing competitiveness of industries

On the 2018 Global 100 Most Valuable Technology Brands list released by Brand Finance, a total of 18 Chinese technology brands were included, with a combined brand value of USD 249.4 billion, accounting for 17% of the total value of brands on the list. By 2019, the total value of Chinese technology brands on the list was USD 379 billion, rising to 21% of the total value,[6] indicating an overall improvement in the technology level of Chinese enterprises and the increasing competitiveness of the industry.

(IV) Innovation and entrepreneurship are active, with the number of emerging enterprises among the world's top

China's entrepreneurial environment has improved significantly, and technology-based entrepreneurship is active. According to the Global Entrepreneurship Monitor (GEM) 2018/2019 Global Report, China's entrepreneurial environment is generally good, with an overall rating of 5.0, ranking 6th among G20 economies. China's strengths lie in, among other things, physical infrastructure, internal market dynamism, and cultural and social norms, with scores of 7.4, 6.67 and 6.02 respectively.[7] With a large number of science and technology start-ups and increasingly active technology entrepreneurship, Beijing, Shanghai and Shenzhen have become globally renowned centers of technological innovation alongside the Silicon Valley and America's eastern region.

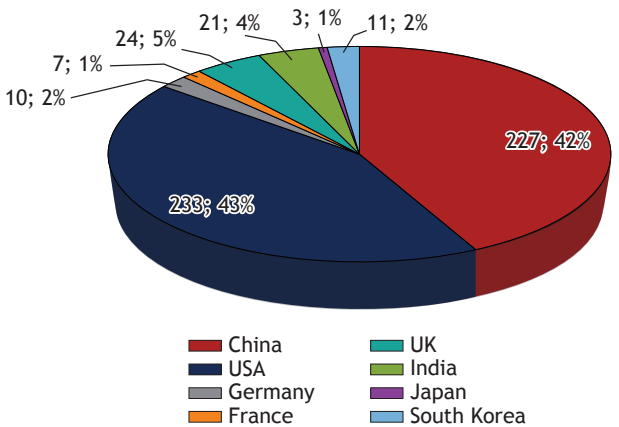
The number of unicorns in China has grown to the second highest in the world. According to the Hurun Global Unicorn List 2020 published by Hurun Research Institute, as of 31 March 2020, there were 586 unicorns in 29 countries and 145 cities around the

[6] Source: https://brandfinance.com/knowledge-centre/reports/brand-finance-tech-100-2019/.

[7] Source: https://www.gemconsortium.org/.

world.[8] The USA leads the world with 233 unicorns, compared to 227 in China, with the number of unicorns in these two countries accounting for approximately 85% of the total number of unicorns globally (see *Figure 6*).

Figure 6: China ranks the second in the world in terms of unicorns



Source: Hurun Global Unicorn List 2020

4. China adds new momentum to Eurasian innovation cooperation and development

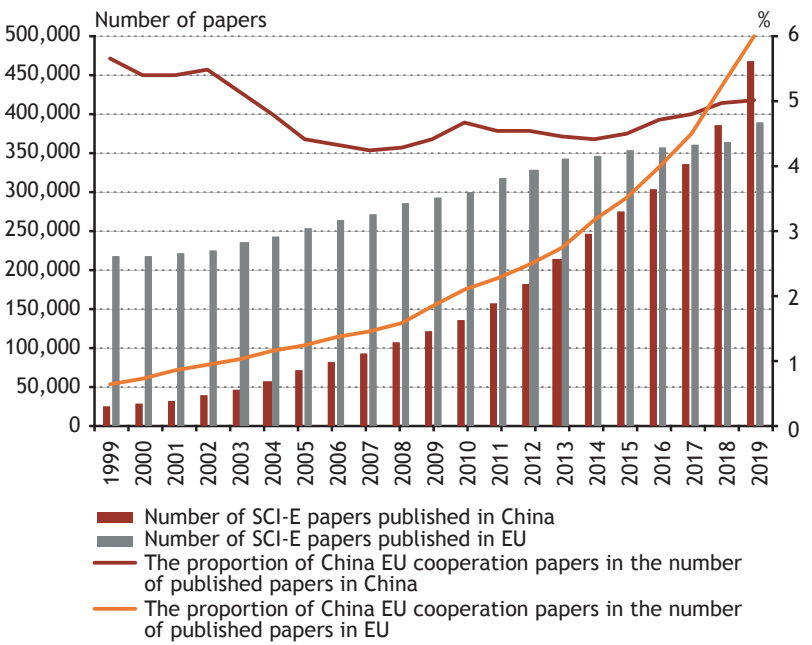
(I) China-Europe science and technology cooperation is deepening, and China is gradually becoming an important partner of Europe in this area

China and Europe have increasingly close cooperation on research and development, and are each other's second largest collaborator

[8] The Hurun Research Institute defines unicorns as technology startups worldwide with a valuation of US$1 billion or more that were founded after the beginning of 21st century, have received private investment and are not yet listed.

on academic papers.[9] The number of collaborations is expanding, areas of collaboration gradually are shifting to applied science, and mutual dependence between the two is increasing. From 1999 to 2019, the number of China-Europe collaborated papers increased from 1,430 to 23,213, with a cumulative total of about 160,000 (see *Figure 7*). Among them, Sino-German collaboration is the largest, with more than 60,000 papers in total, accounting for nearly 40% of Sino-European collaborations; Sino-French is the second largest, accounting for about 25%.

Figure 7: SCI-E papers published in China and EU and degree of China-EU collaboration



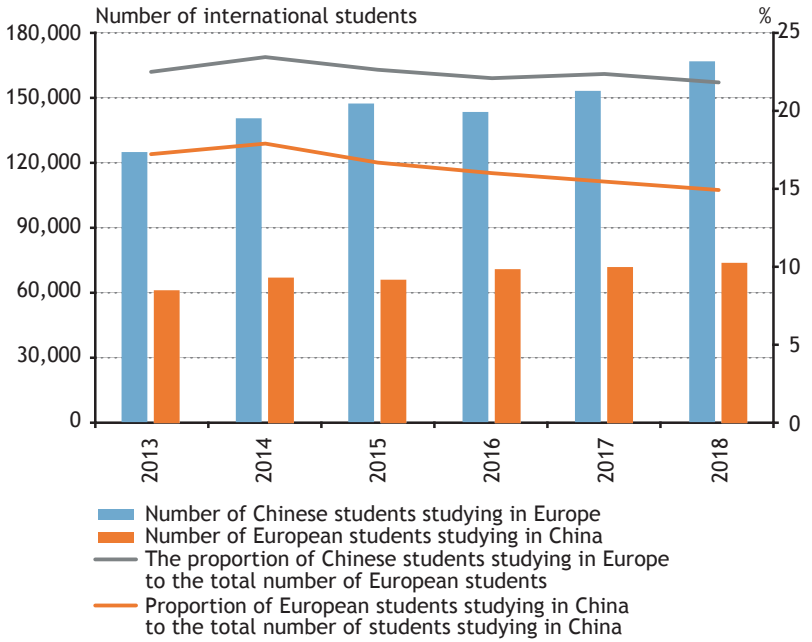
Source: Web of Science database, author's calculations

[9] As the UK officially left the EU in January 2020, unless otherwise stated, the scope of "EU" membership in this report does not include the UK.

Bilateral talent exchange has been steadily expanding. China is the largest source of international students in higher education in the EU, and the EU is the third largest source of overseas students in China.[10] From 2013 to 2018, the number of Chinese students going to Europe increased from 126,000 to 167,000, accounting for about 22% of the total cumulative number of international students in Europe (*Figure 8*). The share of Chinese undergraduate and above students going to Europe has remained stable at around 23% of the latter's total international students intake, making China the top source country; among these Chinese students, postgraduate students (master's degree) and short-term visiting students account for a large proportion, followed by doctoral students and undergraduates. Accordingly, the number of international students from Europe to China increased from 62,000 to 74,000, cumulatively accounting for about 16% of the total number of overseas students in China. In 2018, Europe accounted for about 15% of international students coming to China, second only to Asia (about 60%) and Africa (about 17%).

[10] Data on international students in the UK is not publicly available, making it impossible to exclude it. Therefore the data in this section includes that of the UK. It should be noted that Eurostat reports that the UK has been the main destination for Chinese students to Europe in recent years, accounting for nearly 50% of the total.

Figure 8: China-EU-28 student exchanges

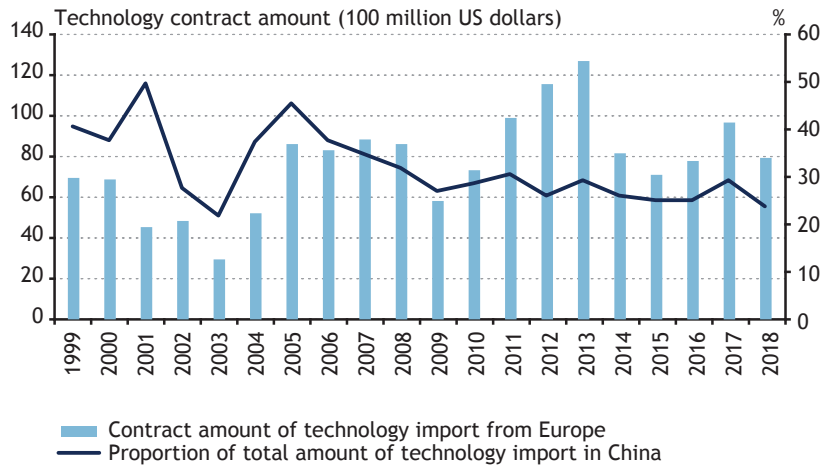


Note: Data on EU students coming to China in 2017 is an estimate; Europe refers to all countries on the European Continent.

Source: Ministry of Education of China, Eurostat, author's calculations

The EU is the main source of China's technology imports and an important destination for China's high-technology exports. It is the second largest source of technology imports for China. From 1999-2018, China's technology imports from Europe increased from USD 7 billion to USD 7.95 billion (second only to the USA), and the cumulative total during this period amounted to USD 154.26 billion (see *Figure 9*). Among them, shares of imports from Germany and France were high, accounting for about 40% and 12%, respectively. The share of China's technology imports from Europe has remained relatively stable in the last decade (25%-30%).

Figure 9: China's technology import contracts with the EU



Source: Ministry of Science and Technology of China, National Bureau of Statistics of China, author's calculations

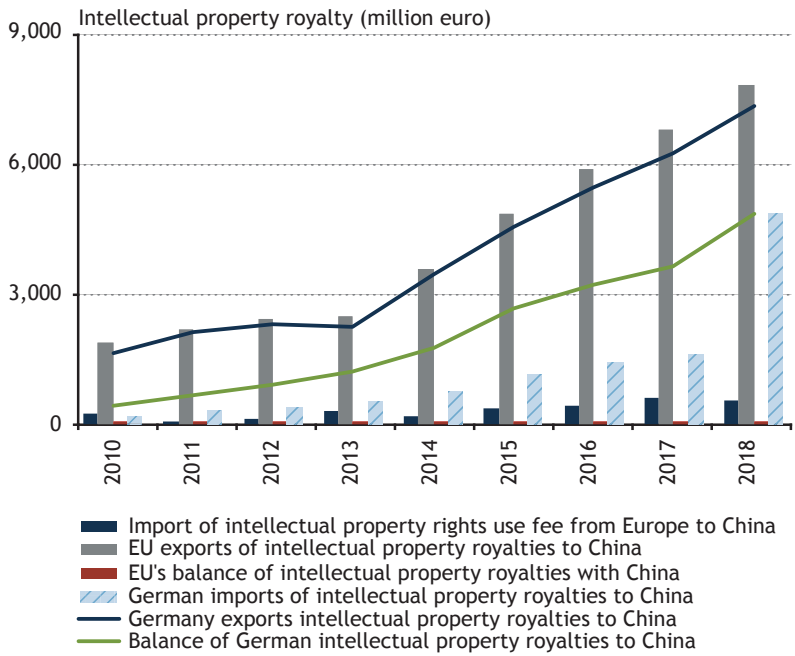
(II) China-EU trade in intellectual property and high-technology products has been growing steadily, and China's demand for European high technology remains high

The EU is the second largest source of China's intellectual property imports by royalties.[11] China's deficit with Europe has continued to widen, the largest deficit being with Germany. From 2010 to 2018, China's IPR royalty payments to Europe increased from EUR 1.84 billion to EUR 7.71 billion, with a cumulative total of EUR 37.23 billion, accounting for 10.6% to 18.2% of China's total annual IPR royalty imports (see *Figure 10*). Of this amount, China's payments to Germany increased from EUR 400 million to EUR 4.79 billion, with a cumulative total of EUR 19.12 billion. From the EU's perspective, exports of IPR royalties to China as a percentage of its total exports increased rapidly from 1.6% in

[11] This section includes the UK (i.e. the EU-28), as the UK does not publish data on imports and exports of IPR royalties.

2010 to 4% in 2018, and the importance of the Chinese technology market has been growing.

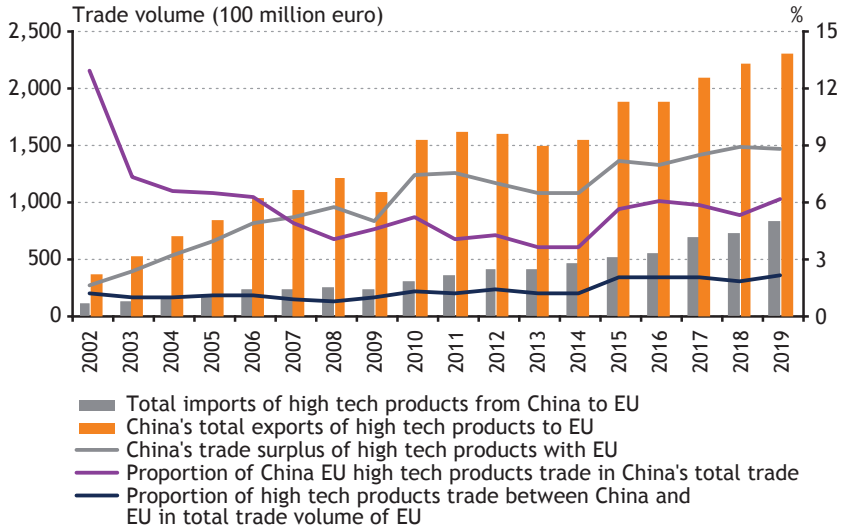
Figure 10: EU-28's trade in intellectual property with China



Source: Eurostat, author's calculations.

China is the EU's top importer and second largest exporter of high-tech products, and the EU is China's second largest trading partner in high-tech products. In 2019, 32.5% of the EU's total high-tech imports came from China and 11.7% of its total high-tech exports went to China (second only to the USA at 25%). In 2018, total trade in high-tech products between China and the EU accounted for 20% of China's total trade in high-tech products. Interdependence between the two sides has steadily increased in recent years (*Figure 11*).

Figure 11: China-EU trade in high-tech products



Source: Eurostat, author's calculations

(III) Two-way investment between China and Europe is growing steadily, with cross-border entrepreneurial investment becoming a new area of growth

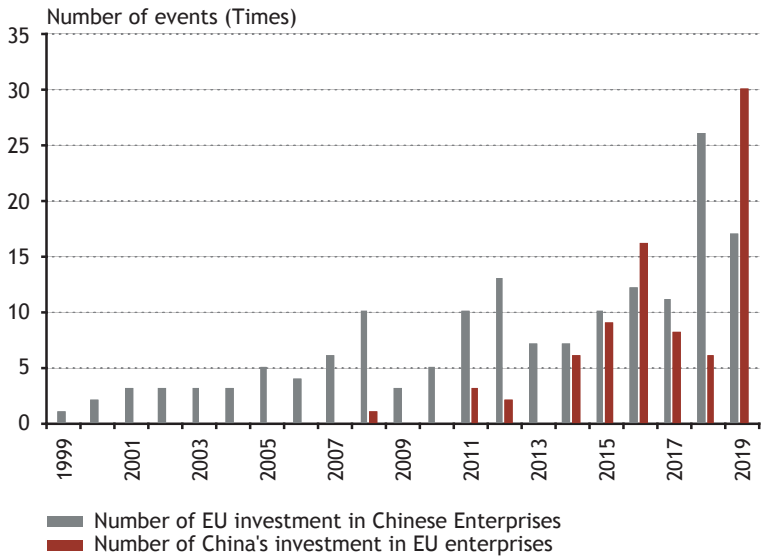
The EU is the second largest destination for Chinese outward direct investment (ODI) and the second largest source of inward FDI for China,[12] while China is the fourth largest source of FDI for the EU and its third largest ODI destination.[13] From 2009 to 2018, the EU's FDI to China increased from USD 3.65 billion to USD 6.53 billion, with a cumulative total of USD 51.25 billion. Chinese investment in the EU rose from USD 2.77 billion to USD 7.84 billion, with a cumulative total of USD 57.47 billion (see *Figure 12*). EU investment in China increased from 3.8% to

[12] Both are second only to Hong Kong, China.

[13] For the EU, China is second only to the USA, Bermuda and Barbados in terms of FDI sources and second only to the Cayman Islands and Bermuda in terms of FDI destinations.

4.7% of China's total inward FDI, and Chinese investment in the EU increased from 0.6% to nearly 2% of the EU's total inward FDI.

Figure 12: China-EU bilateral FDI



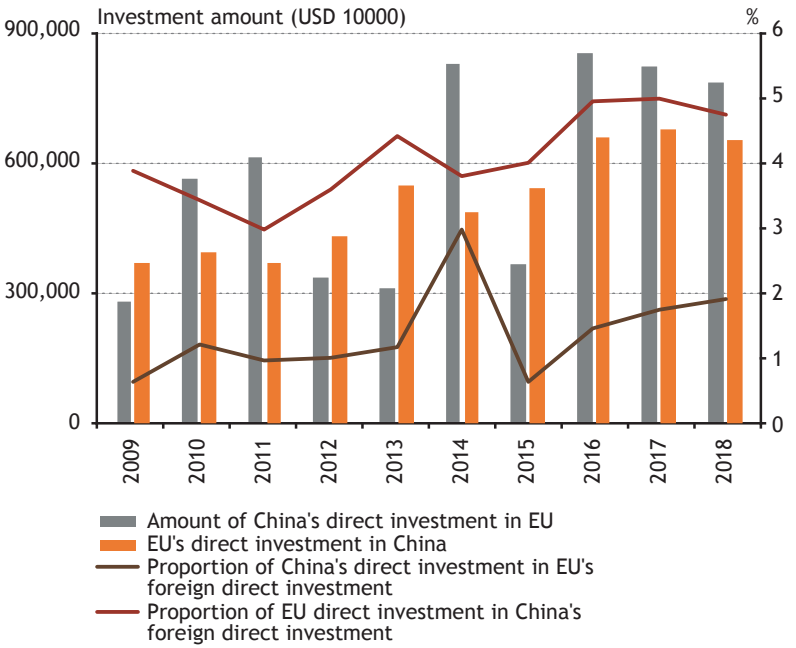
Source: Ministry of Commerce of China, National Bureau of Statistics of China, World Bank, author's calculations

Cross-border entrepreneurial investment between China and Europe has also been expanding rapidly, with much of the Chinese investment going to the UK and Germany, and much of the EU's investment in China coming from France. According to market survey data,[14] from 1999 to 2019, the cumulative number of European investments in Chinese companies was 161, and the cumulative number of Chinese investments in the EU was 81, with the rise in the numbers taking place mainly after 2011 (see *Figure 13*).

[14] Data comes from the China Entreprenurship and Investment Big Data Platform (PEdata) of Zero2IPO Research Centre, which contains data on venture capital and private equity investments in major countries around the world. This report is based on an advanced search of the EU-27 capturing big data on investments by China, France and Germany in each other's companies.

By investment round, both sides invested in Series A and B rounds,[15] accounting for about 60% of the total; investment occurred mainly during the expansion and start-up stages of the companies. By country, Germany, the Netherlands, France and Finland are the main destinations for Chinese investment in Europe, while France is the main source of investment in China.

Figure 13: Comparison of numbers of Chinese and EU investments



Source: Zero2IPO Research Centre, author's calculations

Looking ahead, as its scientific and technological level and innovation capacity continue to improve, China will not only be able to achieve innovative, green and sustainable development, but will also be able to make a greater contribution to driving

[15] There are different fund-raising rounds for start-ups, which generally include (in order from early to mid-late stage): Seed, Angel, Pre-A, Series A, Series B, Series C, and Series D, E, F, etc.

the world's scientific and technological progress and economic growth. Despite the headwinds facing globalization and international trade and economic cooperation in recent years, China-EU cooperation in the fields of science and technological innovation as well as trade and commerce enjoys a good foundation and is being upgraded to a more in-depth, mutually beneficial and value-added level. China and Europe should seize this historic opportunity and contribute to the sustainable development both bilaterally and globally.

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Sustainable Recovery and Economic Transition After the Pandemic in South Korea in Light of the Korean New Deal

Sang Hyeong Lee

The Korean New Deal is a comprehensive national development strategy aimed at improving the country's economic structure, which currently faces limitations to input-based growth, driving an early recovery from the COVID-19 pandemic, and transforming the country into a first-mover in the global economy. The Korean New Deal mainly focuses on the digitalization of the overall economy and society (Digital New Deal) and the shift to a low-carbon economy (Green New Deal). In addition, the Korean New Deal enhances social safety nets to help people adapt to the new economic environment and promotes balanced regional development through the Regionally Balanced New Deal. To ensure its successful implementation, the Korean government has set up a New Deal Fund, induces both the public and private financial sectors to expand funding for related projects, and establishes relevant systems for green financing. Bank of Korea (BOK) is contributing to the shift to a digital and green economy through research and development on digital currencies, improvements in payment and settlement systems, and research on a strategy for addressing climate change. BOK is also dedicated to the early identification of financial risks that could arise in the course of structural changes and to ensuring financial stability. Since the outbreak

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The paper contains the views of the author which are not necessarily the same as the official views of Bank of Korea. The information on the Korean New Deal (Chapters 1-3) originates from publications of the Korean government, and if the details are different, the information from the Korean government has priority.

of COVID-19, many countries have been propelling transitions to digital and low-carbon economies. However, those transitions cannot be achieved by a few countries alone. They require concerted efforts from the international community. Given the many similarities between the Korean New Deal and the EU's economic strategy, which has the green and digital economy at its center, an enhanced partnership between the two parties would help us gain upper hands in related industries in future global markets.

Journal of Economic Literature (JEL) codes: O38, O44, Q01, Q58

Keywords: Green New Deal, Digital New Deal, sustainable growth

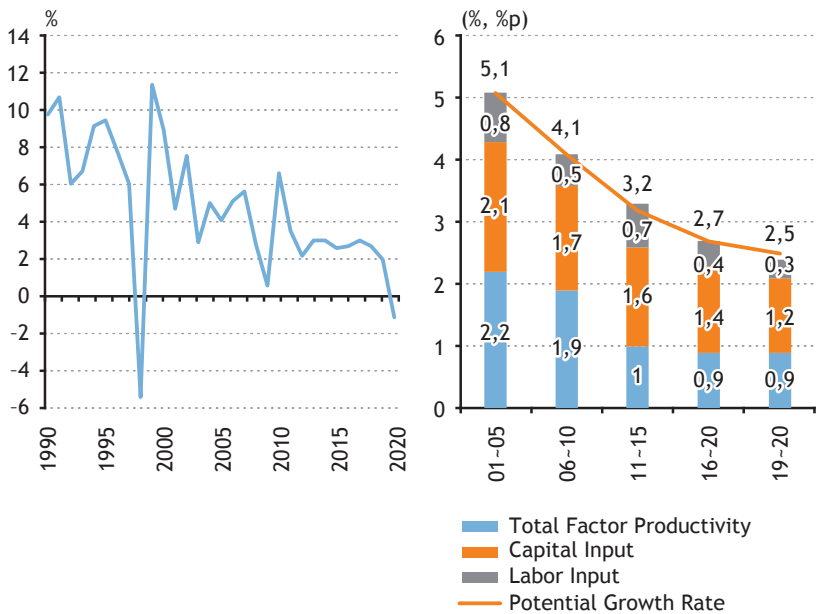
1. Background of the Korean New Deal[16]

The Korean economy has achieved remarkable growth by overcoming numerous challenges. It rose from the ashes of war and successfully withstood two oil shocks and the Asian Financial Crisis. However, after the Global Financial Crisis, the country's GDP growth slowed from an annual average rate of 6.9% in the 1990s to 2.9% in the 2010s, as quantitative, input-based growth faced limitations due mainly to demographic changes. Furthermore, concerns are now being raised that potential growth could decline further, considering the continued slowdown in the investment trend due to mature major industries, mounting uncertainties, and a shrinking working-age population with a low fertility rate and population ageing *(Kwon et al., 2019)*.

[16] It is named after the measures put forward under the leadership of F.D. Roosevelt, the 32nd president of the United States, for overcoming the Great Depression.

In addition, income inequality in Korea has been worsening as the country has developed into an advanced economy with a GDP per capita exceeding USD 30,000. The income quintile ratio has surged from an annual average of 3.86 in the 1990s to 4.57 in the 2010s. Escalating income disparity is a global phenomenon, attributed partly to skill-biased technical change *(Kang et al., 2012)*, and has further deteriorated in Korea due to an increased share of non-regular workers since the Asian Financial Crisis, to a widening income gap between regular and non-regular workers, and to the accelerated aging of the population *(KIHASA, 2020)*.

Figure 1: Korean GDP Growth and Contribution to Potential Growth by Factor



Source: Bank of Korea

Source: Kwon et al. (2019)

Against this backdrop, the COVID-19 pandemic hit in 2020, causing the worst recession and job losses in the global economy since the Great Depression *(IMF, 2020)*. The Korean economy also experienced severe economic difficulties, particularly in relation

to face-to-face services, small and medium-sized enterprises, and the self-employed. There have been growing concerns that the Korean economy could fall into a vicious cycle of "domestic demand contraction → income decline → demand fall → huge job losses → economic contraction" without strong intervention by the government to maintain employment and boost domestic demand.

On the other hand, changes in behavior and perception among economic agents caused by the unprecedented pandemic have resulted in significant economic and social changes. The virus caused online and non-contact demand to soar across global markets as the world attempted to maintain everyday life while preventing the spread of the COVID-19.[17] Therefore, a successful transition to a digital economy has become a critical component of securing economic competitiveness for Korea, which is highly dependent on global markets. Moreover, the outbreak of COVID-19 has triggered the international community to reassess the impact and seriousness of climate change and begin making full-fledged efforts to transform into a low-carbon economy (*BIS, 2020)*. Given that carbon-intensive industries account for a large share of the Korean economy, concerns were raised that Korea could lose competitiveness within the global value chain if it lagged behind in the transition to a low-carbon economy.[18]

The Korean government announced its Korean New Deal in July 2020 to simultaneously induce sustainable growth, facilitate an early recovery from the COVID-19 pandemic, and transform the country into a first-mover from a fast follower. This paper

[17] Of Korea's credit card payments in 2020, the volume of online payments increased by 16.9%, while offline methods declined by 5.6% compared to the previous year *(BOK, 2021a)*.

[18] Korea's high carbon footprint industries (petrochemicals, oil refining, primary metals, metal processing, and transportation equipment manufacturing) account for 11.4% of the economy as of 2018, relatively higher than in major countries such as Germany (11.3%), Japan (9.7%), and the USA (5.8%) *(BOK, 2021d)*.

looks into the main contents of the Korean New Deal and its progress so far, the role that finance and Bank of Korea will play in implementing the New Deal, and the need and areas for potential international cooperation.

2. The Korean New Deal and its progress

2.1. Vision and structure

The core vision of the Korean New Deal is to transform the country from a technological fast follower to a first mover, from a carbon-dependent to a low-carbon economy, and from a socially divided to an inclusive society. To achieve this goal, the Korean government introduced two principal policies, the Digital New Deal and the Green New Deal, as well as policies for strengthening the social safety net and achieving balanced regional development.

2.1.1. Digital New Deal

The Digital New Deal aims to enhance the Korean economy's capacity to lead global megatrends as a digital hub based on data, networks, and AI (DNA).

Korea commercialized 5G network services in April 2019 for the first time in the world and has been recognized for its digital competitiveness, ranking 8th in the IMD World Digital Competitiveness Rankings 2020. However, the integration of traditional industries and digital technology has not progressed widely in the overall economy. In this regard, the Korean government promotes digital innovation throughout the economy with large-scale ICT infrastructure and efficient data processing (collecting, standardizing, processing, and integrating data), and is fostering new growth engine industries through this innovation.

The Digital New Deal focuses on strengthening the DNA ecosystem, digitalizing the educational system, fostering non-contact (Untact) industries, and digitalizing social overhead

capital (SOC). First, the strengthening of the DNA ecosystem is purposed to accelerate the use of data, 5G, and AI across all sectors. It involves establishing and developing data closely related to people's everyday lives and integrating 5G and AI technology into primary, secondary, and tertiary industries.[19] Also, it promotes establishing smart government services and developing a Korean model for cyber-security based on 5G and AI technology. Second, digitalization of the educational infrastructure is for incorporating on- and off-line blended education environments at all elementary, middle, and high schools, universities, and job training institutions across the country. Its key projects include creating technology-based educational infrastructure and strengthening the online educational system at universities and job training institutions. Third, to foster Untact industries, the government will focus on building smart medical and care infrastructures, promoting remote working at SMEs, and supporting the online activities of microbusinesses. In terms of the digitalization of SOC, the focus will be on making people's lives safer and more convenient, and enhancing the competitiveness of relevant industries. As part of this scheme, a smart management system will be built in four sectors,[20] digital innovation will be added to urban spaces and industrial complexes,[21] and a smart logistics and distribution system will be built.

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[19] To effectively respond to the accelerated digitalization and the consequent increase in cyber threats, cyber security will be strengthened, and support will be provided to promising businesses with security technologies.

[20] The four key infrastructure sectors designated by the Korean government are transportation, the "digital twins" (high-definition road mapping and 3D maps of underground utility-pipe conduit), the water supply system, and disaster management systems.

[21] The main projects include the setup of platforms utilizing closed-circuit television (CCTV) for traffic management and crime prevention, the use of smart city solutions, such as smart crosswalks, demand-responsive transportation, and drone delivery services, and the establishment of comprehensive control centers for the real-time management of safety, traffic, and crime in industrial complexes.

2.1.2. Green New Deal

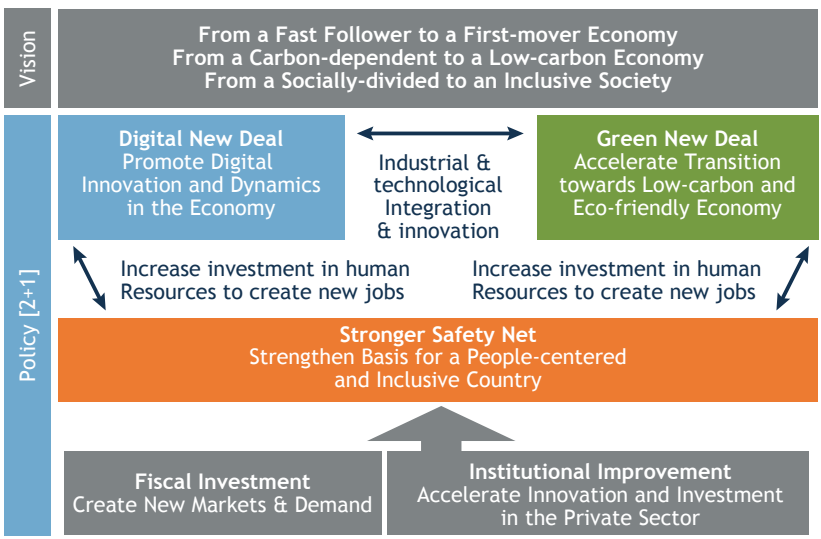
The Green New Deal aims to transform the Korean economy from a fossil fuel-based, carbon-intensive economy to a low-carbon, eco-friendly economy, based on renewable energy.

Aware of the significant impact of climate change, the international community stepped up its efforts to curb greenhouse gas (GHG) emissions by signing the Paris Agreement on Climate Change in 2015. The COVID-19 pandemic has been an impetus to redouble these efforts. The Korean government is also working harder to implement GHG emission reductions and transition toward a low-carbon economy by establishing the "2050 Carbon Neutral Strategy" in October 2020 *(MOEF, 2020c)*. However, given that high-carbon industries, such as steel, chemicals, and oil refining, account for a large share of the Korean economy, the transition costs are expected to be high, especially for large GHG-emitting industries *(BOK, 2021b)*. In addition, once the regulations on carbon-intensive industries under initiatives like the Border Carbon Adjustment (BCA) are in place, which are scheduled to be implemented in 2023 *(EC, 2021b)*, industries with high energy consumption and trade dependency are likely to suffer. In response, the Korean government endeavors to establish an eco-friendly energy infrastructure and strengthen the competitiveness of eco-friendly industries, including green mobility and renewable energy, through the Green New Deal.

The Green New Deal focuses on the green transition of infrastructure, the supply of decentralized, low-carbon energy, and the building of an innovative environment for green industries. The green transition of infrastructure aims to create a future where humans and nature coexist. It focuses on creating zero-energy public facilities, building a management system for clean and safe water, and restoring terrestrial, marine, and urban

ecosystems.[22] The supply of decentralized, low-carbon energy aims to promote the use of sustainable and renewable energy across the country. It includes building a smart grid for more efficient energy management, promoting renewable energy use and supporting a fair transition to it, and expanding the supply of electric and hydrogen vehicles. Establishing an innovative environment for green industries to build infrastructures needed to support the green industry will include initiatives such as fostering prospective green businesses, establishing low-carbon and green industrial complexes, and setting up the foundation for green innovation via R&D.

Figure 2: Structure of the Korean New Deal



Source: MOEF (2020a)

[22] As part of this initiative, projects include constructing or remodeling green and energy-efficient public buildings, establishing smart water supply and sewerage systems, and creating smart green cities and urban green spaces.

2.1.3. Stronger Safety Net[23]

The Stronger Safety Net is a strategy for mitigating the negative effects of unemployment and the income gap that occur with economic restructuring and helping economic agents adapt to the new structure.

Korea has been regarded as successful in minimizing unemployment shocks by effectively preventing the spread of the coronavirus *(OECD, 2020)*. Nevertheless, the COVID-19 pandemic has once again highlighted the vulnerabilities in Korea's social safety net. The shift toward a digital and green economy to overcome the pandemic also raises concerns about a mismatch between jobs and skills and the worsening of unemployment and income polarization caused by reduced demand for low-skilled labor *(BOK, 2020a)*.

In this regard, the Korean government seeks to resolve the weaknesses in the labor market and social safety net. Also, it dramatically expands investment to the extent possible within the budget to establish a future-oriented job training system, ensure a smooth transition in occupations, and support talents for innovation. Establishing an employment and social safety net is aimed at protecting those who are particularly vulnerable in times of crisis and minimizing any loopholes in the social safety net. Building a universal employment safety net, strengthening the social safety net for an inclusive society for all, ensuring the livelihoods and employment stability for those not covered by employment insurance, helping new employees in the labor market and those looking for new positions, and improving the work environment and industrial safety standards will be prepared for this end. Investment in human resources focuses on nurturing talents in response to economic structural changes and helping to reduce the digital divide. It will be pursued through

[23] In its updated Korean New Deal 2.0 plan, announced on July 14, 2021, the Korean government changed "Stronger Safety Net" to "Human New Deal," and added "young adult packages" and "bridging the gap" as policy goals.

training in digital and green skills, restructuring the job-training system to be future-oriented, and enhancing digital access for rural residents and vulnerable people.

2.1.4. Regionally Balanced New Deal

The Regionally Balanced New Deal expands the Korean New Deal to provincial areas for invigorating local economies and promoting balanced national development.

Since many of the central government's New Deal projects are to run in regional areas,[24] cooperation between the central and local governments is essential for the success of the Korean New Deal. In addition, as economic concentration has deepened in the Seoul metropolitan area,[25] it is necessary to spread the results of the Korean New Deal to other regions across the country to achieve balanced national development. To this end, the central government has linked the Korean New Deal with policies implemented by local governments on their own and has supported the nurturing of new projects tailored to each region.

The Regionally Balanced New Deal focuses on the prompt execution of Korean New Deal projects taking place in local areas, support for the implementation of New Deal projects led by regional governments and public institutions residing in local areas, as well as the creation of a sustainable ecosystem for the Regionally Balanced New Deal. While expediting local New Deal projects, in consideration of balanced national development, the government has linked Regulation-free special zones[26] and

[24] Local projects of the Korean New Deal are worth KRW 75.3 trillion, accounting for 47% of the total investment plan (160 trillion won, including local government finances and private investment) *(MOIS, 2020)*.

[25] The share of the greater Seoul area in the national GRDP rose from 42.3% in 1990 to 47.4% in 2019.

[26] It is designed to relax regulations on new businesses in the non-metropolitan area, in order to nurture regional innovative growth industries and regional strategic industries.

Free Economic Zones[27] with regional New Deal projects and strengthened efforts to transform existing local government policies and projects toward New Deal projects. To support local government-led New Deal projects, the central government is simplifying the screening procedure for local government fiscal investment and expanding support for the issuance of municipal bonds beyond their ceilings[28] and for local subsidies to local governments.[29] It has also increasingly fostered New Deal-related projects led by local public institutions and developed local Innovation cities[30] into hubs for the Regionally Balanced New Deal. In addition, to create a sustainable ecosystem for the Regionally Balanced New Deal, a separate division for cooperation between the central and local governments has been set up, and a task force on legislation and regulation designed to address restrictions hindering Regionally Balanced New Deal projects, such as the designation of ways of using areas.

2.2. Size of investment and key projects

The Korean government is attracting follow-up private investment to ensure the successful Korean New Deal by making the

[27] They include special economic zones that enjoy better business environments and living conditions, as well as deregulation for foreign companies investing in Korea, in order to actively attract foreign investment.

[28] In order to issue local government bonds beyond the established limits, it is necessary to have a prior agreement or approval from the minister of interior and safety. However, if the projects subject to the issuance of local government bonds meet the requirements for Korean New Deal projects, it has been ensured that frequent consultations and prompt support are possible when issuing local government bonds beyond the standard limits.

[29] This includes subsidies given to local autonomous organizations that are facing financial difficulties.

[30] As of July 2021, there are 10 innovative cities in total, regional cities that have been selected with the aim of generating new growth engines based on cooperation among universities, research institutes, businesses, and local governments, while relocating major public institutions headquartered in Seoul and its surrounding areas to such growth hub cities in each province.

large-scale injection of the budget as well as refining institutions. The government plans to invest KRW 160 trillion through 2025, with KRW 49 trillion going tio the Digital New Deal, KRW 61 trillion to the Green New Deal, and KRW 50 trillion to Stronger Safety Nets. The Regionally Balanced New Deal will be funded with KRW 75.3 trillion for local projects included in the Korean New Deal and also by local governments and private investment. Since announcing the Korean New Deal in July 2020, the Korean government invested KRW 4.8 trillion in related projects in 2020 and is investing KRW 21.0 trillion through 2021.

To accelerate the transition toward a digital and green economy, the government regularly finds areas for institutional improvement while implementing the New Deal, introduces measures for improvement, and has selected 10 key subjects requiring legislation as well.[31] To accelerate the transition toward a digital and green economy, the government identifies areas for institutional improvement in implementing the New Deal, introduces measures for improvement, and has selected 10 key subjects requiring legislation as well. As of January 2021, the government has enacted and revised 15 laws, including the Civil Petitions Treatment Act, the Infectious Disease Control and Prevention Act, and the Employment Insurance Act. In addition, it has found a total of 240 tasks in need of institutional improvement and come up with refinement for 191 issues, such as relaxations of regulation on electronic finance for remote working at financial institutions and mandatory collective training for industrial safety and health supervisors.

[31] The 10 key bills that should be made into laws are those on i) transformation toward a digital economy, ii) transformation toward a green economy and responses to climate change, iii) energy conversion and autonomy, iv) the fostering of digital and contactless industries, v) mobility of the future, vi) nurturing green industries, vii) support for a just transition approach, viii) the vitalization of New Deal finances, ix) the building of solid safety nets and the nurturing of talent, and, x) support for regionally balanced development.

Table 1: 10 key projects and their details

Key Projects	Details	Sub-projects
Data Dam	Strengthens data utilization, such as collection, processing and trading of data, and spreads integration of 5G and AI across industries through 5G networks	Expands big data platforms across industries, makes public data available to the public, develops technology for self-driving vehicles, and increases smart factories
AI Government	Provides public services using new digital technologies such as 5G networks and blockchain technology	Provides contact-free public services based on a mobile identification system, establishes a 5G national network, and digitalizes books at libraries
Smart Healthcare	Establishes a smart medical infrastructure based on digital technology to enhance the convenience of patients in treatment	Establishes digital-based smart hospitals, sets up clinics specializing in respiratory diseases, and develops AI-based diagnosis software
Green and Smart Schools	Installs energy-saving facilities at elementary, middle, and high schools, and creates an environment that enables digital education	Remodels old school buildings, provides full wifi coverage in all classrooms, expands use of smart devices, and establishes an integrated platform for online learning
Digital Twins	Creates virtual counterparts for roads, underground spaces, harbors and dams	Draws 3D maps for major areas like city centers, establishes a digital management system for utility-pipe conduits, dams and harbors, and sets up a national pilot smart city
Digitalization of SOC	Infrastructures and prepares an efficient disaster prevention and response system	Builds a C-ITS system,[32] contactless bio-metrics systems at airports, a real-time river and reservoir monitoring system
Smart and Green Industrial Complexes	Transforms industrial complexes into smart and eco-friendly manufacturing spaces	Establishes smart energy platforms,[33] smart ecological plants,[34] and clean factories[35]
Green Remodeling	Installs solar panels and eco-friendly insulation systems in public buildings	Installs solar panels in old public buildings, uses highly efficient and eco-friendly materials when constructing public buildings
Green Energy	Fosters an industrial ecosystem for renewable energy industries	Finds locations for large-scale offshore wind farms, and supports installation of solar panels for residential and commercial buildings
Eco-friendly Mobility of the Future	Reduces greenhouse gas emissions and enhances competitiveness in the future car market	Supports provision of electric and hydrogen vehicles, establishes charging facilities, and supports replacement of old vehicles and vessels

Source: MOEF (2020a)

[32] A Cooperative Intelligent Transport System (C-ITS) is a next generation intelligent transport system that seeks safety and convenience through mutual communication among vehicles, and between vehicles and traffic infrastructure.

[33] Representative projects include the collection of data based on ICT and the visualization of energy flows, and the operation of an integrated control center for electricity.

[34] These are smart ecological plants that minimize pollution by reusing waste heat and other wastes and by using renewable energy.

[35] Representative projects are those diagnosing company-specific emission characteristics and the facilities and technical support used for their reduction in pollutants.

Of the total 28 sub-tasks of the New Deal, the Korean government selected 10 key projects based on their contribution to private investment and job creation, public sentiment, and regionally balanced development, which will be epicenters for spreading the effects of the Korean New Deal. The 10 key projects are Data Dam, AI Government, Smart Healthcare, Green and Smart Schools, Digital Twin, Digitalization of SOC, Smart and Green Industrial Complexes, Green Remodeling, Green Energy, and Eco-friendly Mobility of the Future.

3. Korean New Deal and financing

To successfully implement the Korean New Deal, private funding – and not only the government's policy support – should be concentrated on the New Deal projects and relevant companies via financial intermediation. To this end, the Korean government set up the New Deal Fund by injecting a large budget and induces public and private sector financial institutions to expand the provision of funds to New Deal projects. The government is also launching a Green Finance Task Force to establish an institutional framework to activate green finance.

3.1. New Deal Fund

Since the announcement of the plan for the Korean New Deal, the Korean government has been seeking to create the New Deal Fund jointly with the private sector in order to support the stable provision of funds to New Deal-related projects. The New Deal Fund is broken down into three categories, depending on the structure, the fund-raising agents, and the investment targets for the funds involved: the public sector-led New Deal fund, the New Deal SOC investment fund, and the private sector New Deal fund.

The public sector-led New Deal fund consists of a master fund contributed to by the government and policy banks and feeder funds raised by matching investments from individuals, pension funds, or private financial institutions. The funds from the government and policy banks take the form of subordinated investments, bearing the risk ahead of the feeder funds. The funds raised through the public sector-led New Deal fund invest in New Deal projects or relevant businesses. The public sector-led New Deal fund was launched in March 2021[36] and a total of KRW 20 trillion will be funded over five years, from 2021 through to 2025.

The New Deal SOC investment fund has been created based on the public sector-led New Deal fund and the private sector SOC funds.[37] It invests in private-sector projects related to the digital and the Green New Deal, such as digital SOC safety management systems, wind or solar power generation, and hydrogen fueling stations. To stimulate the New Deal SOC investment fund, the government provides tax incentives on dividend income from the New Deal SOC investment for the private sector and makes the public sector-led New Deal fund bear the risks from the related investment ahead of the private sector.

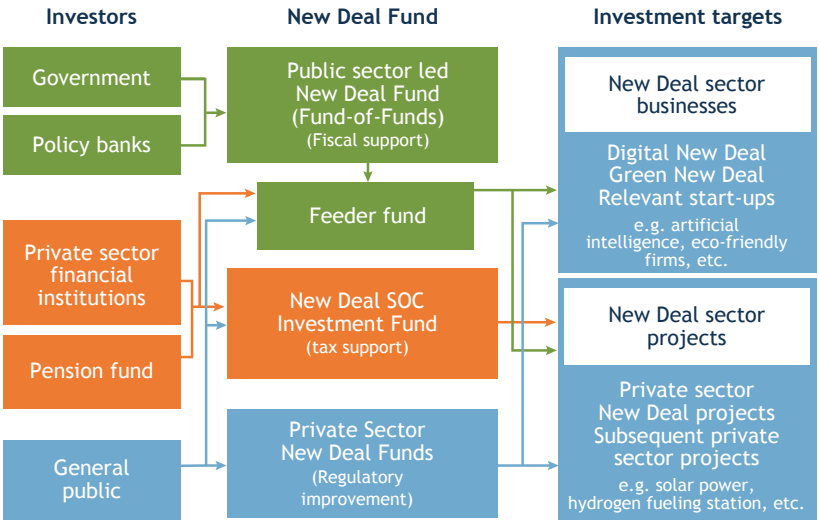
The private sector New Deal fund was planned to encourage private financial institutions to fund New Deal investment projects with high profits and design funds based on fund flows following their investment plans. The government plans to activate the private sector New Deal fund by providing incentives for funds

[36] One New Deal fund worth KRW 146 billion went on sale in April 2021 for the first time and sold out within a week. The fund currently invests in smart healthcare industries *(KFIA, 2021)*.

[37] Private SOC investment funds based on existing laws include infrastructure funds by the Act on Public-Private Partnerships in Infrastructure, special asset funds or real estate funds under the Financial Investment Services and Capital Markets Act, and real estate investment trusts (REITs) under the Real Estate Investment Company Act.

approved by the government, such as imposing separate taxation on dividend income.[38] In 2020, 29 private New Deal funds worth KRW 1.5 trillion launched, and the volume is gradually on the rise thanks to active participation by private financial institutions.

Figure 3: Overview of the Korean New Deal Fund



Source: MOEF (2020b)

[38] Supervisory authorities are reviewing separate taxation on dividend income, and partial relaxation of regulation likely to constrain financial institutions from lending to New Deal projects and businesses.

Table 2:Timeline of Korean New Deal Fund

Type	Policy Tasks	Timeline
Public Sector-led New Deal Fund	1. Preparing guidelines for investment targets 2. Reflecting contributions by the government and state-backed financial institutions 3. Posting a recruitment notice for fund management companies 4. Selecting fund management companies 5. Forming and managing feeder funds	1. ~Sep 2020 2. ~Dec 2020 3. Jan 2021~ 4. Early 2021 5. 2021~
New Deal SOC Investment Fund	1. Preparing standards and review system for SOC 2. Revising laws to provide tax support 3. Revising laws to relax regulations 4. Developing institutional arrangements to promote the use of SOC funds as retirement funds 5. Searching for New Deal SOC businesses	1. ~Sep 2020 2. ~Dec 2020 3. ~Dec 2020 4. Early 2021 5. Ongoing
Private Sector New Deal Fund	1. Business information sessions for each project area 2. Laying the groundwork for launching financial investment products 3. Running a support group to resolve on-site difficulties 4. Improving a system to activate private investment	1. Oct 2020~ 2. ~Dec 2020 3. Ongoing 4. Ongoing

Source: MOEF (2020b)

3.2. Policy banks investment and regulation easing

The government seeks to expand the supply of funds to New Deal projects by injecting new finances into them and through policy banks. In addition, to ensure the seamless supply of funds from financial institutions to New Deal projects, the government is seeking to ease regulations on financial institutions, including applying low risk-weights to government funds injected New Deal projects and expanding credit offerings by securities companies.[39]

[39] For financial institutions to increase their investment in New Deal areas, supervisory authorities are reviewing applying low BIS risk weight to New Deal PF investments risk-shared by the public sector, revising the risk coefficient of RBC for insurance companies on New Deal projects whose returns and stability are guaranteed, and an increase in the credit line to New Deal areas by comprehensive financial investment business entities (large securities companies).

Accordingly, specialized banks such as the Korea Development Bank and credit guarantee institutions plan to increase their shares in New Deal projects from 8.4% in 2019 to the 12% level by 2025. They also plan to develop new loan programs and run special guarantee programs, and as a result, they will expand low rate lending to New Deal businesses up to KRW 100 trillion over five years. Private financial institutions also recognize New Deal projects as a new source of revenue and are planning to expand credit offerings in New Deal areas.[40]

3.3. Green Finance Task Force

Together with the private sector, the government launched its Green Finance Task Force[41] to encourage financial institutions to systematically support the 2050 Carbon Neutral Strategy and the Green New Deal. The Green Finance Task Force will set up a system to analyze and monitor the impact of climate risks, plan to strengthen the role of the public sector for green finance, and improve legislations, disclosure, taxonomy, and incentive system to activate green finance. The Green Finance Task Force has three working groups: one on financial risk assessment and management, one on green investment, and one on corporate disclosures. The working group on financial risk assessment and management is in charge of assessing the impact of climate risks using stress tests and elaborating a supervisory framework for climate risk management. The working group on green investment seeks to develop a taxonomy for the green economy and finance,

[40] In September 2020, five major Korean financial groups – Shinhan, KB, Hana, Woori, and Nonghyup – announced plans to invest more than KRW 70 trillion in New Deal-related businesses over the next five years.

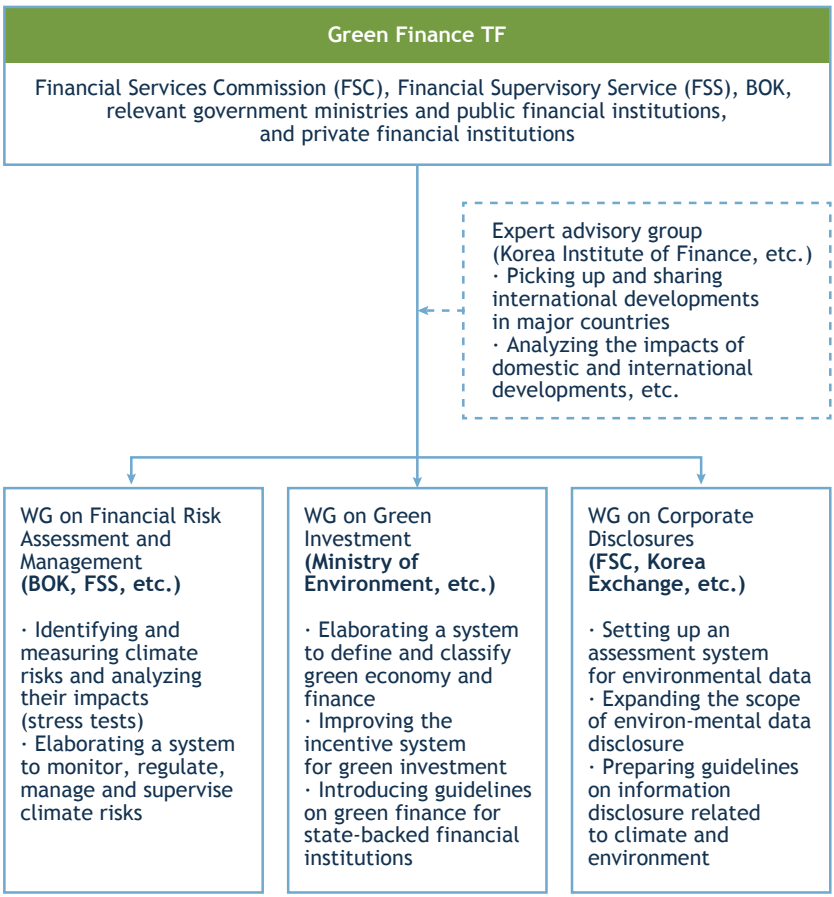
[41] The Task Force is joined by numerous institutions, including government ministries such as the Ministry of Environment and the Ministry of Economy and Finance, as well as the Financial Services Commission, Bank of Korea, the Financial Supervisory Service, state-backed financial institutions, research institutes, an expert advisory group, and private sector financial institutions.

improve incentive systems for green investment, and introduce guidelines for green finance for state-backed financial institutions. Finally, the working group on corporate disclosures is setting up an assessment system for environmental data, widening the scope of data disclosure, and introducing guidelines on information disclosure related to the climate and the environment.

Awareness among market participants concerning ESG finance,[42] including green finance, is growing thanks to the government's policy to activate green finance, and related financial products have been on the sharp rise. As of the end of 2020, ESG funds in Korea were worth upwards of KRW 1.5 trillion, up 29% compared to 2019, and the total amount of ESG bonds outstanding stood at KRW 82 trillion as of the end of 2020, showing a threefold increase from the KRW 2.7 trillion seen in 2019.

[42] For corporate management, economic development, or a financial investment strategy, green financial instruments considering non-financial factors, such as environmental responsibility, social responsibility, and governance (ESG), as well as traditional financial factors account for the lion's share of their criteria *(IMF, 2019)*.

Figure 4: Green Finance Task Force Organization Chart



Source: FSC (2020)

4. Korean New Deal and the central bank

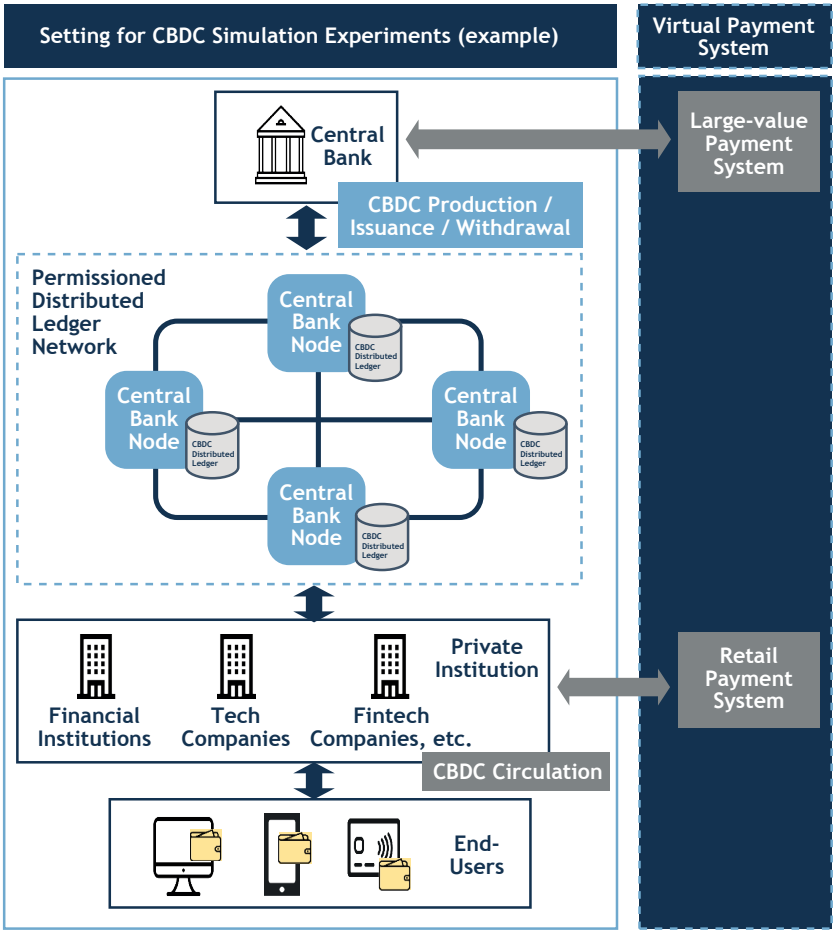
The Korean New Deal is expected to cause rapid structural changes in the financial system, not only in the real economy. While digital innovation is rapidly creating an environment in which several fintech firms compete with traditional financial institutions, changes in the industrial structure for addressing

climate change are likely to cause changes to the value of financial assets held by financial institutions and therefore have substantial impacts on financial system stability *(BOK, 2021b)*. In line with this, to contribute to the transition toward a digital and green economy as a central bank, Bank of Korea researches and develops a central bank digital currency, improves the payment and settlement system, and devises strategies to respond to issues concerning climate change. It also endeavors to keep the financial system stable, such as identifying potential financial instability factors that might arise in economic restructuring.

4.1. Introduction of CBDC

As the transition toward a digital economy is in place, BOK must respond to potential changes in the future payment and settlement environment that will increasingly require the introduction of a digital currency. BOK is testing the introduction of a central bank digital currency (CBDC) and developing the related technologies. It has completed a preliminary review of the technical and legal issues required to adopt a CBDC, has built a simulation environment for the CBDC using distributed ledger technology, and is testing how to use the CBDC and whether all the related work is running perfectly. Simulations include a 2-tier system, where BOK is in charge of the production, issuance, and withdrawal of the CBDC, and the participants in the private sector deal with its circulation. Simulations will proceed in two steps. The first step will validate the technical requirements for preparing a simulation for CBDC based on distributed ledgers and the fundamental functions such as its issuance, circulation, and withdrawal in the simulation. In the second step, BOK will check the CBDC extension functions such as offline settlements, digital asset purchases, and the widened system of the central bank. Also, it will be checked whether new technology, such as enhanced privacy security, is applicable in this step.

Figure 5: Virtual Setting for CBDC Experiments (example)



Source: BOK (2021b)

4.2. Payment and settlement system and financial stability

The digitalization of payment and settlement systems has been accelerating, as artificial intelligence (AI), big data, and many other innovative technologies have recently been applied to payment and settlement systems. As the lender of last resort and manager of the payment and settlement systems, BOK promotes innovation in these systems by allowing fintech companies to participate in

retail payment systems *(BOK, 2020b)*, while strengthening the supervision of payment and settlement systems *(BOK, 2021a)*.

The expanded financial services offered by fintech companies thanks to digital innovation have positive effects, such as the ensuing financial innovation and enhanced consumer convenience. However, they can cause sudden structural changes in the banking industry and also lead to various types of risks, such as an increase in operational risks due to a high dependence on information technology, a rise in liquidity risks at fintech companies, and financial institutions' risk-taking tendencies due to intense competition with fintech companies *(BOK, 2018)*. BOK assesses potential risks in the financial system that might arise as the roles of fintech companies are expanding, issues early warnings about these risks, and devises measures to stabilize the financial system, if needed, in cooperation with the government.

4.3. Response to climate change risks

To ensure financial market stability in shifting toward a green economy, BOK is working to enhance public understanding of how significant the climate change risks are and encourage concentrating market capital in low-carbon industries. BOK conducts stress tests of climate change on the real economy and the exposure held by financial institutions to high-carbon industries and its potential risks and publishes test results in its Financial Stability Report. To encourage market participants to increase their investment in green finance, BOK has adopted ESG investment in its foreign currency asset management for trial and plans a gradual expansion of such investment. In addition, BOK has participated in the aforementioned Green Finance Task Force, to support the response to climate change and activating green finance. It carries out full-fledged research on the effects of climate change on the real economy and financial system as well as the policy instruments that central banks could use to cope with these effects.

5. Korean New Deal and international cooperation

The two most apparent trends in the global economy since the outbreak of COVID-19 are digitalization and a faster transition toward a low-carbon economy *(Forbes, 2020)*. Since the pandemic, non-face-to-face economic and social activities based on digital technologies have become commonplace. Online consumption has replaced offline purchases, and online education, remote working, and teleconferences have spread widely in everyday life. In addition, the pandemic triggered a reassessment of the urgency and devastating consequences of the climate crisis. To address climate change, Korea and many countries hurry to shift to a digital and low-carbon economy. However, such a transition of the global economy is a common task for the global community that is difficult to achieve solely through the efforts of a few countries and calls for the cooperation of the international community *(UN, 2021)*.

5.1. Digital New Deal and international cooperation

With the Fourth Industrial Revolution spreading and non-face-to-face activities becoming commonplace, the fast-paced digitalization of the global economy has been intensifying competition between countries to preoccupy related markets and giving rise to various international issues, such as the increased influence of global unicorn firms, the protection of property rights to knowledge-based assets, information security, global standard-setting for new technologies, and digital technology polarization (Joint workshop between the Ministry of Science and ICT and the OECD; *MSIT, 2020b*). The need for international cooperation to address these issues is growing accordingly.

Under the Digital New Deal, Korea is trying to disseminate digital technologies to all industries. Meanwhile, Korea also hopes to

respond actively to international issues that may arise from the digitalization of the global economy through cooperation with major countries concerning digital and information and communications technology (ICT) policies. In line with this, the digital policy directions and investment strategies suggested under the 2030 Digital Compass,[43,44] which the EU released in March 2021, have a great deal in common with Korea's Digital New Deal.

It is expected that Korea and the EU will accelerate their digital transformation, and their relevant industries will secure leading positions in global markets if the two expand their understanding of digital policies and pursue joint R&D based on the High-Level ICT Policy Dialogue channel.[45] In particular, Korea has a world-class competitive edge in 5G and other ICT sectors and has already started developing 6G,[46] a core technology required for transitioning to a digital economy. Considering this, cooperation between the two parties in 6G mobile communications, AI, and setting international standards in these areas is more likely.

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[43] 2030 Digital Compass: the European Way for the Digital Decade *(EC, 2021a)*

[44] There are four cardinal points for mapping the EU's trajectory. The first two are focused on digital capacities in infra-structures and education & skills, and the two other are focused on digital transformation of business and public services. *(EC, 2021a)*

[45] Korea and the EU agreed on the formation of the High-Level ICT Policy Dialogue during a summit in June 2020, and the first Korea-EU High-Level ICT Policy Dialogue took place in November 2020.

[46] To develop the 6G technology required for a digital economy, the Korean government has been conducting R&D on five focus areas (ultra performance, ultra space, ultra intelligence, ultra bandwidth, and ultra precision) and nine strategic technologies (Tbps wireless communications, optical communication infrastructure, space mobile communications, space satellite communications, intelligent wireless access, THz spectrum RF technology, constant network quality monitoring technology, end-to-end ultra-precision networks, and, intelligent 6G mobile core network technology) *(MSIT, 2020a)*.

5.2. Green New Deal and international cooperation

Global warming is a global issue and cannot be resolved by the efforts of some countries alone. International cooperation is needed across various subjects, such as setting targets to cut greenhouse gas emissions, introducing regulations on emissions, and setting criteria on eco-friendly investments. One good example is that the signatories to the Paris Agreement[47] have now set long-term low emission development strategy (LEDS) targets and nationally determined contribution (NDCs) targets.[48]

To lead global efforts in responding to climate change, in October 2020 Korea pledged to be carbon neutral by 2050[49] and, in December 2020, it announced an updated NDC and its 2050 Carbon Neutral Strategy.[50] The Green New Deal mentioned earlier is a major driving force to achieve carbon neutrality by 2050. Through the Green New Deal, Korea is establishing stronger safety nets for climate and environmental crises and promoting a low-carbon industry ecosystem by expanding the use of low-carbon and dispersed power generation.

Discussions on the Green New Deal have begun, led by major advanced economies and multilateral organizations, to promote sustainable growth in consideration of climate change and economic recovery after the 2008 Global Financial Crisis, and many countries have emphasized green new deals and expanded investment in eco-friendly areas in the process of pursuing

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[47] As of July 2021, 196 countries have signed the Paris Agreement on climate change *(UNFCCC, 2021)*.

[48] As of July 2021, 192 countries submitted the first NDCs, and 9 countries have submitted updated NDCs *(UNFCCC, 2021)*.

[49] Address at National Assembly to Propose Government Budget for 2021 *(Moon, 2020)*.

[50] Under the roadmap for greenhouse gas reduction by 2030 announced in July 2018, Korea had a target of cutting emissions by 37% compared to the BAU, but in the updated plan announced in December 2020, it revised the reduction target to 24.4% compared to 2017 and stated that it would actively review raising the 2030 NDC target before 2025 *(MOFA, 2020)*.

economic stimulus packages to overcome COVID-19 *(Moon et al., 2020)*.[51] The EU announced that it would carry out large-scale investments to achieve zero emissions by 2050 in the European Green Deal initiative in December 2019. The EU has also set green deals, digitalization, equality, and employment as policy fundamentals for economic recovery in the announcement of its proposal for a recovery fund and the EU's long term budget 2021-2027 in May 2020 *(EC, 2020)*.

It is very likely there can be policy cooperation between the response of the EU to climate change and the Korean Green New Deal in a circular economy and green finance. In particular, Korea is expanding investment in renewable energy, e.g. solar or hydrogen power, and green mobility, e.g. electric or hydrogen vehicles and batteries. If Korea pursues joint R&D with EU countries having tech power and human resources in these areas, developing the relevant technologies will gain momentum. In the meantime, with the recognition that government funds alone are insufficient to pursue the Green New Deal, the Korean government is also making efforts to lay the institutional framework to induce more private investment in green finance. EU countries' experiences and know-how would be of great help to Korea in forming green finance ecosystems.

6. Future tasks

The Korean New Deal is a comprehensive national development strategy aiming to be a first mover in the global economy after COVID-19 by helping Korea overcome the COVID-19 crisis early and achieve sustainable growth. The Korean New Deal focuses on digitalizing the Korean economy and society and making a fast transition toward a low-carbon economy through the Digital New

[51] A report on the expenditure of COVID-19 related economic recovery funds in 17 major countries, including Korea, the EU, and the USA, shows that about 30% of the funds have been spent in eco-friendly sectors *(Vivid Economics, 2020)*.

Deal and the Green New Deal. In addition, the stronger safety nets and the Regionally Balanced New Deal are expected to help ease income inequality and regional imbalances.

For the successful digitalization and structural transition to a low-carbon economy, government-led projects alone are insufficient, and large-scale private investment should accompany it. It is, therefore, required for private funds to flow into New Deal projects and relevant companies. In this regard, a continuous supply of funds by financial institutions and activation of green finance is a prerequisite for the success of the Korean New Deal. For the private sector's active innovation and investment, the institutional framework and regulation improvement for the transition to a digital and green economy should be more effective.

Digital innovation and the transition to a low-carbon economy are expected to have substantial impacts on financial stability, as they can cause abrupt structural changes in the financial system and changes in the value of financial assets held by financial institutions. Bank of Korea needs to make considerable efforts to monitor potential risks that could arise from such an economic restructuring and devise measures to stabilize the financial system, if necessary, all while supporting the transition to a digital and green economy.

The Korean New Deal will prepare for fundamental changes in economic and social structures in Korea and act as a new engine of economic growth in the medium to long term. The Korean New Deal has been well received by the international community in general. The OECD has assessed that the Korean New Deal supports eco-friendly and inclusive economic recoveries by investing in digital, green, and human resources (Economic Outlook, December 2020). The IMF has also said that the Korean New Deal pursues both new engines of economic growth and the expansion of inclusiveness after the COVID-19 pandemic. It also positively noted that eliminating entry barriers, promoting competition, and resolving labor market rigidity as parts of the

New Deal would further elevate the potential growth of the Korean economy (IMF Article IV Consultation with Korea 2021; *IMF, 2021b*).

However, there are concerns that fiscal soundness in Korea could be undermined with additional budget injections on massive scales for the Korean New Deal in a situation where government debt has already risen rapidly in response to COVID-19. (The government debt to GDP ratio in Korea rose by 6.4%p in 2020, while an average of 1.0%p between 2013 and 2019 [*IMF, 2021a*]). To maintain fiscal soundness while maximizing policy effects, the government should care for both ex-ante evaluations of projects to avoid unnecessary expenditure of the budget and ex-post review for preventing any moral hazard in executing the budget.

Lastly, it must be recalled that the efforts of individual countries alone have limitations when it comes to digitalization and the transition to a low-carbon economy and that cooperation and joint responses at the global level are essential. In turn, for the successful Korean New Deal, not only Korea's efforts but also the cooperation with the international community regarding digital and climate policies is vital. Moreover, we are confident that stronger cooperation among countries through joint R&D will be a moment for the countries to take the lead in digital and green industries, which are the engines of future economic growth.

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Chapter 4

Finance

Greening the Financial System – A New Opportunity for Eurasian Cooperation?

Csaba Kandrács – Balázs Sárvári – Renátó Ritter

Climate change is no longer just a problem for environmentalists. As the topic attracts more attention every day, monetary policy has had to react to this phenomenon as well. Central banks seek to understand the economic consequences of climate-related events and to adapt their activities, modelling and regulatory profiles to this new challenge. Eurasia has made globally meaningful advancements in this respect. In addition to China and the European Union, the ASEAN countries and Japan are the key players. Their steps and tools are not harmonised yet, and there are significant similarities and differences between green finance policies across the continents. The following study presents these wide-ranging efforts and the use of the most widely applied green financial tool, green bonds.

Journal of Economic Literature (JEL) codes: E50, E52, E58, N10

Keywords: central banks, climate change, Eurasia, climate resilience, green finance frameworks, green bonds

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1. Introduction

Climate change is no longer just a problem for environmentalists. As the topic attracts more attention every day, politics and finance have had to react to this phenomenon as well, leading to the recognition that climate-related shocks may also affect the integrity of financial systems. This has triggered a professional debate among central bankers as to whether or not it is necessary to incorporate green targets into monetary strategies. The answer is not canonical, but we see robust efforts by Eurasian actors to seek innovative monetary tools and regulatory initiatives to fight against climate change and its effect on our socioeconomic systems (*Durrani et al., 2020; Volz, 2018*).

In the following sections, we present the current phase of green policy development on the theoretical, institutional and practical levels. We start with the first cornerstones (Section 2), guiding the reader through the main fundamental principles of green finance. We present examples and specific cases and discuss the above debate. In a short block, we emphasise the efforts of the central bank of Hungary (Magyar Nemzeti Bank, hereafter MNB) as it was the first central bank in Central Europe that made preparations for achieving a breakthrough in national green policies in 2021 (*Kandrács, 2021*).

Section 3 summarises the similarities and differences in such efforts in Asia and Europe. Although China was a pioneer in the field of legislation, there are still challenges and financial gaps in climate finance. Since 2016, the EU has been quickly catching up with China *(CBI, 2019)*, and Asian countries are also taking steps to support their transition to low carbon economies. Besides these two Eurasian giants, the ASEAN countries and Japan have also made globally meaningful advancements. This section provides a comparative overview of the development of green finance in these countries and regions and the first moves towards harmonising the existing differences. (Other countries, such as

the UK, Canada, Australia and the USA have also announced the development of sustainable finance frameworks, but as this study focuses only on Eurasia, these countries' efforts fall outside the scope of our paper.)

We continue with Section 4, which presents the most widespread tool used in green finance, namely green bonds. The main goal of green bonds is to offer climate-friendly investment opportunities. Since their introduction in November 2008, green bonds have made impressive progress around the world. This section describes their regional spread and development over time – with a special focus on green bonds issued in the ASEAN countries. Finally, Section 5 provides a summary.

2. The new role of central banks: what can they do for a greener future?

Hurricanes are not unexpected phenomena like tsunamis. However, the exact timing, extent and location are unknown and cannot even be estimated ahead with great certainty. Broeders and Schlooz (2021) analysed the catastrophe (cat) bond returns around Hurricane Irma which hit coastal areas in September 2017. They found that the Swiss Re Global Cat Bond Price Index showed a very high level of volatility for two weeks after this extreme event. All risk measures increased rapidly, e.g. the value-at-risk Pre Irma was 2.0 and jumped up to 5.6 Post Irma. Such events and climate change itself result in significant uncertainties for all market actors and thus pose unorthodox responsibilities for decision-makers and regulators.

Climate-related shocks can impact monetary policy from either the demand side (via a possible reduction of households' disposable income; *Batten, 2018*) or the supply side (e.g. agricultural yields or energy prices; *McKibbin et al., 2017*). These two forces shift inflation in opposite directions and hence simple estimations offer

only a limited understanding of the extent and consequences of such shocks.

In recent years, realisation of the above correspondence has led monetary leaders to seek to embed climate-related effects in their models and integrate this issue into their mandates. Central banks' goals evolve over history: sometimes it is price or financial stability that take priority, while in other crucial moments it is the state's crisis management that takes precedence in decision-making *(Goodhart, 2010)*. Climate change may have significant impacts on both price and financial stability.

The possible future role of central banks is a topic of lively discussion nowadays *(Arnold, 2021)*. One extreme view states that central banks should become climate activists, while the other extreme standpoint is that climate change does not fall within the scope of their mandates, and thus there is no responsibility of the part of monetary regulators. Despite this radical divide, we can see an increasingly rapid transformation of their profiles. Dikau and Volz (2021) investigated 135 central banks and monetary unions: based on this sample, they found that 52% support the government's green policies or even explicitly aim for sustainable targets, whereas 48% of the sample was not related to green objectives.

In contrast to the actual trend in the USA *(Christie, 2021)*, the European Central Bank (ECB) aims to incorporate climate-related concerns into its new strategy *(Arnold–Vladkov, 2021)*. This position is supported by many European countries. Hungary is not only following the shared principles, it is also applying innovative solutions. While the ECB's main goal is to mitigate climate-related financial risks (the most highlighted tools are green bonds, which are covered in Subsection 4), the central bank of Hungary aims to channel existing resources toward green objectives. In order to develop green loan markets, the MNB announced preferential capital requirement treatment for the period between 1 January 2020 and 31 December 2024. We

would highlight that this step is backed by the realisation that more sustainable economies are more resilient to financial risks stemming from climate change *(Gyura, 2020)*, which is the main pillar of the MNB's comprehensive green programme launched in February 2019 *(MNB, 2019)*.

Despite the differing positions on central banks' mandates and climate change, the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) was established to support the transition towards a sustainable economy and to foster cooperation among central banks in this field. As of 1 June 2021, the NGFS already had 91 members and 14 observers. As an NGFS member, working together with other central banks, the MNB is committed to addressing the negative impacts of climate change on the financial system. To strengthen this commitment, the Hungarian Parliament added sustainability to the MNB's mandate in June 2021, making it the first European central bank with such an endorsement *(MNB, 2021a)*.

Besides disputes around central banks' mandates and role in the issue, the "climate change debate in monetary policy is first and foremost about the ECB's allocation of monetary reserves to high-carbon companies" *(Schoenmaker, 2021)*. It is the central bank's option to choose from different reactions: it may shift its portfolio to a greener one or deal exclusively with greener companies or completely exclude the most polluting ones. The wide range of available options highlights the need for a strategic answer: if a central bank has numerous tools to mitigate climate change, is it necessarily imperative to use them? These institutions have built up their reputations and best practices over centuries, but not in this field. Biodiversity, land use and extreme weather do not belong to their core competencies, and many other institutions have been working on this agenda for decades. Thus, the recent recognition by central banks leads them into waters which are uncharted for them, but not for others. This entails the need for

broad-based, comprehensive cooperation, instead of autonomous revolutionary steps *(Park–Kim, 2018)*.

It is also important to keep in mind that – in addition to physical risks (such as severe weather events or natural disasters which damage assets, e.g. Hurricane Irma) – climate also affects the economy by way of transition risks. The transition to a carbon-neutral economy involves decisions and new standards which favour some companies and industries, and thus raises their value and handicaps other, causing stranded assets *(Dikau–Volz, 2018; Ferrari–Landi, 2021)*.

In this section, we summarised some of the dilemmas a central bank may face in relation to climate change and we can conclude that the solutions constitute a new strategy. The contents of this new strategy are being steadily formulated over time, and it requires multipolar negotiations, interdisciplinary approaches and brave, insightful and visionary steps. A significant part of this evolutionary process is occurring in Eurasia. In the next section, we provide an overview of this process.

3. Similarities and differences between Asia's and Europe's finance-related green taxonomies and standards

3.1. Financing climate change

Climate change mitigation and adaptation finance lack a tremendous amount of investment, according to the 2017 OECD report "Investing in Climate, Investing in Growth". The volume of investment required for infrastructure amounts to an estimated USD 6.3 trillion annually between 2016 and 2030 (OECD, 2017a). Taking into account the additional needs to reach a 2°C temperature goal, the estimate increases by 10% to

USD 6.9 trillion. However, annual investment falls well below this level, coming in at USD 3.3–4.4 trillion *(OECD – World Bank – UN Environment, 2018)*.

The need arose for investments which promote sustainability as more and more investors started to perceive the problem and the lack of action on it. In the absence of legal regulation, the markets reacted first, by creating catalogues for eligible projects which have a positive impact on the environment, by defining guidelines and by labelling bonds as "green" if they complied with established standards, which was usually verified by third-party institutions. Issuers started to apply for green labels and tried to comply with the standards to successfully raise capital for projects which were otherwise difficult to finance. As time passed, investors started to differentiate between green labels, as doubts emerged about the credibility of market-inspired labels, in particular the criteria established for green projects, and the lack of guarantees for investors that their investment was being used to finance real green projects.

Until recently, these green certifications (labels) (some of which became globally accepted) were dominant when enrolling investments under the green label.

1. One of the most influential initiatives from the financial market is the Climate Bonds Standard and Certification Scheme of the Climate Bond Initiative (CBI). Launched in 2010, this scheme labels bonds, loans and other debt instruments based on the Climate Bonds Taxonomy *(Climate Bonds Initiative, 2021)*, a tool to determine if an asset or project is climate aligned, or able to aid the transition to a low carbon economy. As of March 2021, CBI alone had certified USD 170 billion worth of debt, encompassing 339 debt instruments.

2. Launched in 2014, the International Capital Market Association's (ICMA) Green Bond Principles (GBP) *(ICMA, 2018)* is a set of voluntary best practice guidelines with four

core components: (i) use of proceeds, (ii) process for project evaluation and selection, (iii) management of proceeds, and (iv) reporting. The GBP allow the issuers to determine which investments are green, leaving investors uncertain about the true fate of their investments. Despite their wide acceptance, recent developments suggest a change in sentiment about financial market created labels, as more and more jurisdictions are taking legislative action when it comes to defining green investments *(OECD, 2020)*.

The People's Republic of China was the first country to take legislative action in sustainable finance. China is the largest coal consumer and emitter of greenhouse gases in the world. High levels of local air pollution have become a significant concern. In 2006, the Chinese government decided to strongly promote environmental insurance. The 17th National Congress of the Communist Party of China (2007) proposed the construction of an "eco-civilisation". As early as the following year, the government started national trial applications of pollution insurance in several cities and provinces *(Feng et al., 2014)*. In terms of financial regulation, China has three main frameworks for green finance definitions. The core framework is the "Guiding catalogue for the green industry", originally established in 2016 and updated in 2019.

Taxonomy developments in Eurasia, focusing on the EU, China, the ASEAN countries and Japan, are presented in the following.

3.2. Taxonomy developments in Europe

EU Regulation 2020/852 on the establishment of a framework to facilitate sustainable investment (the EU Taxonomy Regulation; *European Parliament and Council, 2020*), which is now in effect, is the main driving force to achieve the goals specified in the European Green Deal *(European Commission, 2019a)*, by setting criteria for sustainable investments and market participants.

The purpose of the Regulation is to create a classification system which establishes a common language and clear definitions around sustainable finance, to guide market participants, policymakers and many others in green finance. In order to achieve transparency and strengthen credibility, the EU Taxonomy Regulation includes disclosure requirements for both financial and non-financial institutions. The Technical Expert Group on Sustainable Finance (TEG), established by the European Commission, was tasked to develop principles, metrics and thresholds for substantial contribution to climate change adaptation and mitigation for 72 economic activities.

The technical experts are the main contributors to creating taxonomies and standards, although cooperation is strong with legislative entities and financial market participants (such as the aforementioned CBI and ICMA) as well. The EU Taxonomy Regulation consists of eligible project types that can contribute to one of the six defined environmental objectives,[52] complying with the screening criteria (usually supported by sustainable indicators) set out in Article 19 of the Regulation. The EU Taxonomy Regulation tasks the Commission with establishing the actual list of environmentally sustainable activities by defining technical screening criteria for each environmental objective through delegated acts. The first delegated act was published by the Commission in April 2021, defining screening criteria for climate change adaptation and mitigation objectives *(European Commission, 2021)*.

[52] The regulation defines six environmental objectives: (i) climate change mitigation; (ii) climate change adaptation; (iii) sustainable use and protection of water and marine resources; (iv) transition to a circular economy; (v) pollution prevention and control; and (vi) protection and restoration of biodiversity and ecosystems. In order to be eligible as "environmentally sustainable", an economic activity must be checked at the same time against the six objectives, one for "substantial contribution" and the five others for "Do No Significant Harm" (DNSH) *(European Commission, 2020)*.

3.3. Chinese taxonomy developments

While the ambitious EU Taxonomy is in the spotlight nowadays, China was a pioneer in green finance regulation. The first green credit regulation was issued in 2012 by China Banking Regulatory Commission, consisting of guidelines, key performance indicators and green credit statistics forms. The National Development and Reform Committee issued the Green Bond Catalogue regulating corporate bonds in 2016 and the Green Finance Committee of China Society of Finance and Banking (under the People's Bank of China) published its Green Bond Endorsed Project Catalogue in 2015, regulating green bonds issued by financial institutions (the latter is widely referred to as "the Chinese Taxonomy"). The two separate regulations for bonds were later harmonised in 2020 based on the Green Bond Endorsed Project Catalogue.

The Chinese Taxonomy is based on both industrial policies and environmental considerations. The Catalogue states that it "must take multi-dimensional environmental benefits as the defining standard. Project definition should take special consideration of environmental benefits in GHG emission reduction, pollution reduction, resource conservation, ecological protection" *(OECD, 2020:122)*. However, it contains no metrics or thresholds when deciding on a project's eligibility.

Although China is working hard to give clearance for investors and issuers when it comes to green finance by adopting more scientific and precise definitions for green projects, the lack of monitoring and disclosure requirements harms not just the legitimacy of the taxonomy, but the development pace of green finance as well (especially the green bond market) *(Ng, 2021)*.

3.4. Taxonomies in the ASEAN region

Other Asian countries are also taking steps to establish their own classification systems, building on the fundamentals of the EU Taxonomy. Among the members of the Association of Southeast Asian Nations (ASEAN), Singapore has issued a consultation paper on a proposed green taxonomy that will, to a large extent, be aligned with the EU Taxonomy Regulation. However, the Green Finance Industry Taskforce, convened by the Monetary Authority of Singapore, proposed in a consultation paper (Association of Banks in Singapore, 2021) that the Singapore taxonomy will be developed in a manner that ensures relevance to the ASEAN region *(Kwok, 2021)*.

Another ASEAN country, Malaysia published its Climate Change and Principle-based Taxonomy (CCPT) *(Bank Negara Malaysia, 2021)* in April 2021 *(Brown, 2021)*. The CCPT introduces a principle-based taxonomy for financial institutions to assess and categorise economic activities according to the extent to which the activities meet climate objectives and promote the transition to a low carbon economy. Its aim also includes supporting risk assessments at the institution and systemic levels by facilitating standardised classification and reporting of climate-related exposures, strengthening accountability and market transparency, and encouraging financial flows towards supporting climate objectives *(Samtani, 2021)*.

The national taxonomies of both Singapore and Malaysia will have a significant effect on the development of the proposed regional ASEAN Taxonomy of Sustainable Finance (ASEAN Taxonomy), which was announced at the 7th ASEAN Finance Ministers and Central Bank Governors' Meeting (AFMGM) in March 2021. The ASEAN Taxonomy will be the overarching guide for all ASEAN member states, complementing their respective national sustainability initiatives and serving as ASEAN's common language for sustainable finance.

3.5. Japan's transition taxonomy

Japanese climate experts also proposed their own Transition Finance Guidance *(Ochi, 2020)* ("brown taxonomy" or "transition taxonomy") in April 2020, which focuses on debt financing and seeks to classify projects, assets and activities that can contribute to the transition from high to low carbon intensity and environmental impact, rather than ones that are strictly green *(Milburn, 2020)*. The transition taxonomy distinguishes between financing various business activities (A-Type transition finance, similarly to other taxonomies, it predefines green projects) and financing companies (C-Type transition finance directly supports the transition of companies involved in carbon-intensive or high-environmental impact activities). The transition taxonomy proposes "financial incentives" for beneficiaries of A-Type or C-Type finance. For the case of a beneficiary failing to meet the expected transition targets or goals, financial instruments should be designed to include some sort of collateral clauses in their product documents, such as a "variable coupon system" for bonds or "covenant clauses" for loans, both penalising the beneficiary in the case of failing to meet the set transition goals, thus avoiding the market value depreciation of such investments.

3.6. Harmonisation developments

To reduce the inconsistencies between various nationally developed taxonomies, the European Commission launched the International Platform on Sustainable Finance (IPSF) *(European Commission, 2019b)* in September 2019. IPSF members can promote best practices, compare their different initiatives and identify barriers and opportunities of sustainable finance while respecting national and regional contexts. Where appropriate, willing members can make further efforts to align their initiatives and approaches. China, India, Hong Kong, Indonesia, Japan and Singapore (among others) are already part of the initiative.

In April 2021, China took a step towards harmonisation, when they removed clean coal from the updated Green Bond Endorsed Project Catalogue, a hardly disputed element of the previous version. By comparison, the EU Taxonomy entirely excludes fossil-fuel-based power generation *(Davis et al., 2021)*. Action was needed by Chinese regulators, as the share of primary energy from fossil fuels in China was still 85% in 2019, and 58% of energy consumption still came from coal-based power generation *(Our World In Data, 2021).* One of the future possible topics for a specific working group of the IPSF would be to work on a closer alignment of the Chinese definitions and the EU Taxonomy Regulation, including – where possible – metrics and thresholds *(OECD, 2020)*.

As we have seen, taxonomy developments are well underway and will continue to be a dominant part of green finance in the years to come. If we want to secure the funding needed to tackle climate change in time, regulators will have to work towards harmonised, sound and credible taxonomies, in order to be able to guide market participants towards a more sustainable future. One of the platforms of specific harmonisation is green bonds, which is the topic of the next section.

4. Building resilience through green bonds

4.1. The concept of green bonds – state of the market

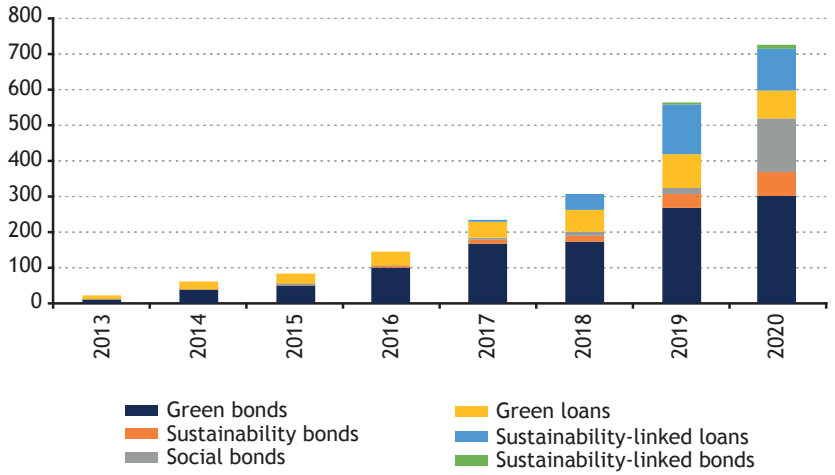
The concept of green bonds was developed by a group of Swedish pension funds – through Skandinaviska Enskila Banken, with the help of the World Bank. They worked together to design a new product that offers climate-friendly investment opportunities, is liquid and should not carry additional project risk. Issued in November 2008, it was the first financial instrument to define the criteria for projects eligible for green bond support, include

a recognised climate research institution, CICERO, as a second opinion provider, and add impact reporting as an integral part of the process. The first green bond received strong support from the market and interest from others, including climate policymakers Ceres, a non-profit organisation working towards sustainable capital markets, and the CBI. They raised awareness for the challenges of climate change and demonstrated the potential for institutional investors to support climate-smart investments via liquid instruments without giving up financial returns. It formed the basis for the green bond principles coordinated by ICMA *(World Bank, 2018)*. In Hungary, the MNB intends to jump-start the green bond market as well, through green finance regulation (preferential capital treatment for green bonds) *(MNB, 2020)* and by improving the conditions of green investment financing, for example in the area of domestic renewable energy production *(MNB, 2021b)*.

Green bonds are the main source of financing[53] economies' green transition, according to the Bloomberg database *(Bullard, 2021)*. Although the first years of the green bond market were small in volume, since 2014 the market has developed dynamically, setting new records every year. The total cumulated size of the green bond market reached USD 1.1 trillion in 2020. In a year characterised by uncertainty, green issuance rebounded in the second half of 2020 to reach a record-breaking USD 290.1 billion by the end of December, compared to the previous record of USD 266.8 billion set in 2019 *(Harrison–Muething, 2021)*.

[53] The green debt market differentiates between debt instruments according to their use of proceeds and debt type. There are green, social and sustainability (GSS) bonds, green loans, sustainability-linked loans and sustainability-linked bonds.

Figure 1: Global sustainable debt issuance by type



Source: Bloomberg database (Bullard, 2021)

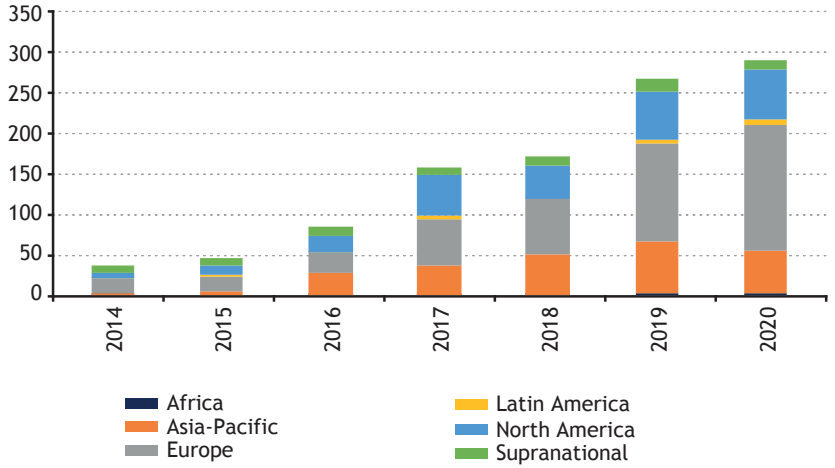
The biggest issuer in 2020 was the United States (USD 52.1 billion), followed by Germany (USD 41.8 billion) and France (USD 37 billion). China came in 4th place (2nd largest issuer in 2019) with USD 31.4 billion, reaching only 70% of the previous year's volume, a clear sign of the COVID pandemic's impact on Chinese green bond issuance. This trend-breaking point is rather unfortunate, as China is the world's second-biggest green bond market with roughly USD 130 billion worth of green bonds outstanding, after the USA (USD 224 billion). Development in this area is far from over if China wants to meet President Xi Jinping's carbon neutrality pledge, which needs USD 21.33 trillion worth of finance over the next 40 years, according to China International Capital Corp estimates *(Reuters, 2021)*. Despite the difficulties in 2020, green bond issuance rebounded in China in 2021, leading the market in the first quarter of the year, with USD 15.7 billion worth of green bonds issued.

4.2. Climate finance through green bonds

Financing goals such as carbon neutrality and environmental protection can be rather challenging in some countries, as the regional distribution between issuers is significant. The majority of green bonds was issued on developed markets, although developing markets need at least that much funding, if not more, to reduce their environmental impact. Most developing economies in Asia are more carbon-intensive than their advanced economy counterparts. The total primary energy supply growth in China and Asia is accompanied by markedly larger surges in carbon dioxide (CO_2) emissions compared with other OECD countries (World Bank, 2019). Thus, satisfying the funding needs for green solutions is an important question for the region. India, for example, struggles to adequately fund renewable energy projects in the country, experiencing 24–32% higher costs compared to similar projects in developed countries, primarily due to the higher cost of debt in India *(Polzin, 2017).* This is not exceptional: for example, financial barriers for renewable energy investments include factors such as weak local financial markets and unfavourable project scale. In countries where there is a lack of bank credit, the high costs of debt and limited length of loan maturity can be issues *(IRENA, 2018)*.

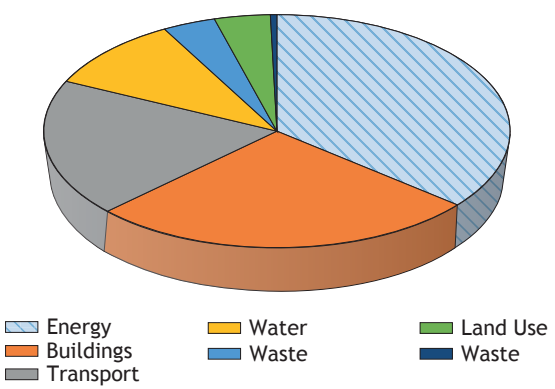
These difficulties in obtaining capital are the reason why green bonds are mainly used in areas such as the production of green energy, the improvement of the building stock and the greening of transportation systems. Together, these uses cover 82% of outstanding green bonds worldwide.

Figure 2: Regional distribution of green bond issuers



Source: Green Bond Data Platform (CBI, 2020)

Figure 3: Use of proceeds of green bonds worldwide (USD billion)



Source: Green Bond Data Platform (CBI, 2020)

4.3. Green bonds in ASEAN countries

In addition to the aforementioned issues, the main barriers in the region include the lack of eligible projects, as small and medium-sized enterprises have no access to the process of issuing green bonds, due to their small size and limited credit absorption ability. Due to the unavailability of appropriate projects in countries such as Singapore, the absence of a domestic market for sustainable investments can be experienced, which acts as a major impediment in universalising green bonds *(Chang, 2019)*. In the ASEAN countries, according to CBI, the top two use of proceeds of green bonds were energy and buildings, which accounted for two thirds of proceeds in 2019 and 79% in 2020. This fits in with the world trend – these projects, constituting the core of a transition to a low carbon economy, are the hardest to adequately finance and thus green bonds are needed.

Six of the ten ASEAN countries have issued green bonds according to CBI, namely Vietnam, Thailand, Singapore, Indonesia, Malaysia and the Philippines. They had cumulatively issued USD 29.4 billion as of the end 2020, with Singapore leading the way, mainly through green loans, and Indonesia in second place. Rapid development in the region can be attributed to governments taking action, mobilising funding and paving the way for green bonds via extensive support schemes and issuing green sovereign bonds. Singapore is a pioneer in green finance, as the region's first issuer of green bonds in 2016. Although Indonesia joined the green bond market two years later, it became the largest issuer of 2018, mainly by issuing green sovereign bonds *(Nguyet et al., 2021).* Surprisingly, Indonesia and the Philippines are the 2nd and 3rd largest issuers of green bonds in the region (respectively), while Indonesia only has the 3rd largest conventional bond market and the Philippines has the 5th largest conventional bond market *(Azhgaliyeva et al., 2020)*. This means that green bonds can draw investors to the table even without the existence of a well-established bond market, thus enabling less experienced

markets to exceed their more experienced counterparts in respect of green bonds.

4.4. Supporting factors for green bond issuance

Straightforward, comparable green definitions are needed to make green bonds more appealing, and not just in the areas suffering from the problems mentioned above. Taxonomy developments and the lack of comparable definitions have been already covered by our paper, but it warrants mentioning them again here, as capital markets need to widely accept green bonds in order to adequately finance climate change mitigation and adaptation.

Bearing this in mind, on the issuer side, financial barriers can arise when issuing green bonds. In some markets, the relatively high cost of obtaining a second-opinion or third-party assurance (ranging from USD 10,000 to USD 100,000) is a barrier for small issuers, but this is nonetheless expected by market participants when issuing green bonds. Some issuers have also complained about the high costs of managing disclosure requirements *(OECD, 2017b)*. To tackle this, green bond grants are provided in countries around Asia in order to promote the listing of green bonds. Malaysia, Singapore, Hong Kong and Japan have already established green bond grant schemes to boost green bond issuance, ranging from USD 70,000 up to USD 100,000 *(Azhgaliyeva et al., 2020)*. Switching gears, investors (in particular institutional investors such as asset managers, pension funds and insurance undertakings, as well as banks in their function as underwriters) play an essential role in developing and promoting best practices and standards. They can contribute to the promotion of standards and taxonomies by making their expectations known via public statements by investor associations (such as for example the Green Bond Pledge, or the Statement of Investor Expectations for the Green Bond Market) and by communicating their expectations clearly and actively through dialogue with green bond issuers *(TEG, 2019)*.

Finally, as the EU Taxonomy Regulation comes into effect, mandatory climate-related disclosures will apply to institutional investors, namely the Green Asset Ratio for financial institutions, including the ratio of green bonds in the asset pool. The French experience with mandatory climate-related disclosures under Article 173(vi) of the French Energy Transition for Green Growth Act adopted in 2017, where investors are required to comply with new requirements or explain why they do not apply to them ('comply or explain' approach), has already demonstrated how increasing transparency can play a significant role in triggering demand and spurring growth in the European green bond markets *(TEG, 2019)*. The same could be true for markets around Asia as well.

To assure European investors about their investment utilisation and to be more accessible for bond issuers, the European Green Bond standard which is under development will build on the experiences of previous standards and will rely strongly on the EU Taxonomy Regulation.

5. Summary

In the above, we described the evolution in central banks' profile due to climate change. We discussed the theoretical, institutional and practical (mainly through green bonds) steps in this direction by the main Eurasian actors. These steps are in accordance with the following assessment: "without aiming to replace policymakers and other institutions, central banks must also be more proactive in calling for broader and coordinated change, in order to continue fulfilling their own mandates of financial and price stability over longer time horizons than those traditionally considered" *(Bolton, 2020:48)*.

The first actor which took legislative action in sustainable finance was China. It became a flagship for further initiatives, but it seems that the European Union's[54] fast and comprehensive reaction has become the main reference point for many international actors. It is unquestionable that taxonomy developments in Eurasia were heavily influenced by the EU taking legislative action on the topic, spurring into motion the lagging sustainable finance regulations. While the EU hopes that the framework established on the foundations of the TEG's work to classify environmentally sustainable activities will steer other authorities towards harmonisation, as we noted, not everyone is on board with the idea of adopting the proposed system word for word. However, with the EU proposing such an ambitious, complex system as the EU Taxonomy Regulation, it will be an unavoidable first step for any regulator which wants to develop a green finance taxonomy. Although alignment with the EU Taxonomy is important, taking into consideration regional differences will have an impact on comparability between various national taxonomies. This study presented the related experiences of the ASEAN countries and Japan (in addition to China and the EU). The UK, Canada, Australia and the USA are also important actors, but they are not part of Eurasia and thus their examples were not discussed in this analysis. We also provided insights into the players and trends on the green bond market.

Financing climate change may be a trigger point for monetary regulation and supervision. The challenge is highly complex, and central banks do not have historical experience in this field, and numerous related levels and actors are involved in the mitigation of climate-related risks. All of this necessitates a humble approach from regulators to cooperate with each other and with other

[54] The European Union declared ambitious climate goals when proposing the European Green Deal *(European Commission, 2019a)* in 2019. The Green Deal is a new growth strategy that aims at no net emissions of greenhouse gases in 2050 and to decouple economic growth from resource use.

related actors as well. If they are all willing to serve, they may lead the financial markets to a more stable functioning.

The aforementioned developments demonstrate that greening the financial system represents a new opportunity for Eurasian cooperation, which was the main goal of this paper.

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DC/EP & e-CNY: Digitalization of China's Payments System in the Digital Age

Xiaochuan Zhou

Digital Currency and Electronic Payment (DC/EP) and the e-CNY, which were introduced as an alternative and an emergency plan for China's payments system, have attracted international attention. This paper summarizes several key aspects of the digitalization of China's payments system in the digital age, including the progress achieved on the DC/EP, the popularization of mobile payments in China, the major driving forces of the DC/EP development, the consideration for the demand of cross-border payments, etc. While technological development is important, the exchange rate regimes and currency sovereignty in each economy need to be respected for cross-border cooperation in digital payments, including in Eurasia.

Journal of Economic Literature (JEL) codes: E41, E42, E58, G21, G35

Keywords: digitalization, payments system, digital economy, DC/EP, mobile payments, cross-border payments

1. Introduction

In 2020, mankind has been confronted with the raging COVID-19 pandemic and an economic recession unseen since the Second World War, while other global challenges, such as geopolitical

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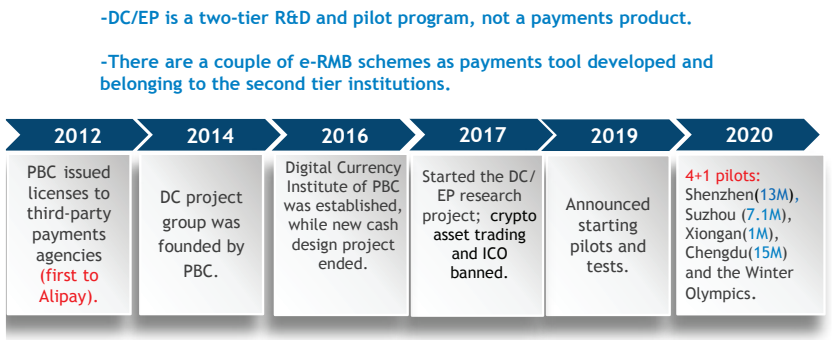
tensions, global economic disorder, food insecurity and climate change, linger on. At this critical juncture, all nations can only meet threats and challenges and find solutions through joint action rather than by standing alone. Historically, Hungary has long played an important role in linking Europe and Asia. We highly commend the Budapest Eurasia Forum's endeavor to promote dialogue at the current time between Europe and Asia, to address global issues and to promote sustainable development. The Boao Forum for Asia has also been working hard to promote exchanges and cooperation between the two continents in a wide range of areas, including trade, investment, financing, science and technology, culture and education.

The COVID-19 pandemic has changed the world in a profound way. Digitalization of the economy has accelerated across the globe, due to lockdowns and social distancing. Looking to the future, digitalization and the digital economy will develop even faster in the post-COVID-19 era. The digital economy will account for a large percentage of the whole economy. In the digital economy, digital currency is one of the most important issues, which may promote investment and tourism. Recently, a group of 7 countries and the BIS put forward a report discussing Central Bank Digital Currency ("CBDC") principles. The main concern is to deal with the challenges raised by Libra, Bitcoins and other similar cryptocurrencies. In China, we have also worked very hard to push forward the development of DC/EP — Digital Currency and Electronic Payment. However, to some extent, the major points of our concepts and the contents differ from the principles drawn up by those 7 countries. We not only pay attention to technology development, but also respect the exchange rate regimes, currency sovereignty and the issue of dollarization in many economies, including those in Eurasia.

2. Progress China has made on DC/EP

Figure 1 shows the progress China has made on DC/EP. In 2012, the PBC issued licenses to some third-party payments agencies. The first license was granted to Alipay. Two years later, we set up a DC project group. In 2016, the Digital Currency Institute of the PBC was established and a new cash design project was ended. In 2017, China started the DC/EP research project, while crypto asset trading and ICO were banned. We intended to push ahead with payments modernization, rather than digital asset trading and speculation. In 2019, China started pilot programs for digital currency and electronic payments. In 2020, there were already several pilot projects and implementations, starting with 4 pilot cities. The first one is Shenzhen, which has a population of 13 million and is quite a large city. The second one is Suzhou with a population of 7.1 million. The third – Xiongan – is relatively small, with a population of just 1 million. The fourth is Chengdu, which is a quite large city, with 15 million inhabitants. We are also preparing for the application of DC/EP in the 2022 Winter Olympics. DC/EP is a two-tier R&D and pilot program, instead of a payments product. There are a couple of developed e-CNY schemes of payments tools belonging to the second-tier institutions.

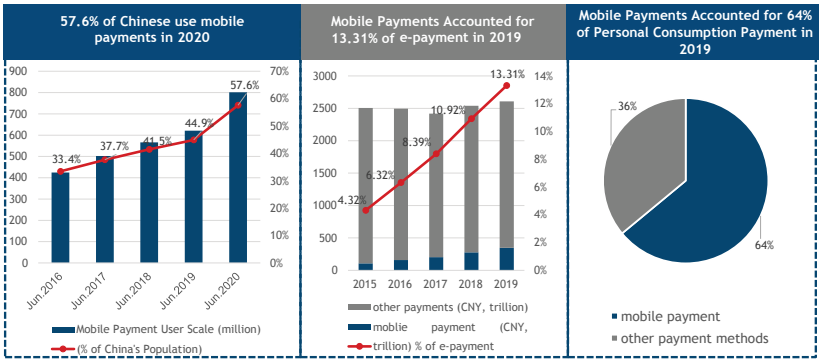
Figure 1: Progress China has made on DC/EP



3. Popularization of mobile payments in China

Figure 2 shows the popularization of mobile payments in China. The chart on the left shows that 57.6% of Chinese used mobile payments in 2020. Mobile payments have been developing quite quickly and accelerating in these years, especially during the pandemic. In the middle chart, we can see that mobile payments accounted for 13.31% of e-payments last year. This is based on gross payments and also reflects rapid development. The chart on the right shows that mobile payments accounted for 64% of personal consumption payments in 2019, which means that Chinese people increasingly prefer the use of mobile phones for payments and transactions.

Figure 2: Popularization of mobile payments in China



Source: The 46th China Statistical Report on Internet Development. CNNIC

Source: Payment and Settlement Department, PBC

Source: China UnionPay 2019 Mobile Payment Report

4. Driving forces and opportunities for DC/EP development

Figure 3 shows the major driving forces of DC/EP development. We focus mainly on enhancing the efficiency of the existing payments system, especially the retail payments system. In recent years, Chinese consumers prefer to go out only with their mobile phones, which can carry digital wallets, personal IDs, credit cards, keys (home keys and car keys), newspapers, magazines and entertainment applications. They do not have to worry about bringing much stuff with them when they go out. Of the mobile phone payment systems, several products can be used, for example, the NFC applications in the form of P2P (one side or both sides offline) and QR codes. These systems largely depend on the central bank's policy. Thus, the central bank tries to set up a two-tier system, which is not as typical as the traditional wholesaler and retailer partnership (In a traditional wholesaler-retailer partnership, the central bank acts as a wholesaler, while the second-tier institutions act as retailers). The central bank tries to ensure the dynamic development and evolution of the system for the second tier, in order to create new products and a new system, which evolve dynamically from time to time. At the same time,

the central bank works to prevent financial disintermediation and its related risks, and to ensure that commercial banks and other third-party payment systems continue to play their important roles. Furthermore, we try to steer them away from virtual assets trading. We also pay close attention to the protection of individual data privacy and the fight against telecom cheating and payment fraud.

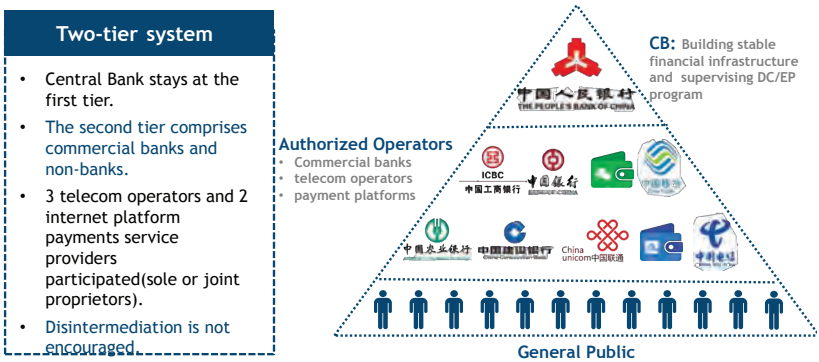
Figure 3: Driving forces and opportunities for DC/EP development

- Enhance efficiency of payments system (retail payments system in particular), to cut costs and better serve users.
- Chinese people prefer going out only with their mobile phones, which carry e-ID cards, digital wallets(cash ,credit card, e-bank), and keys, newspaper and magazines and entertainment applications.
- Retailers accept a variety of payments methods and the acquiring business of payments are all conducted through internet.
- As a backup facility, besides using cash, offline payments can be done through mobile phone to mobile phone by using NFC "touch&go" App, in forms of P2P(one side or both sides offline).
- Create Competition among commercial banks, telecom operators(mobile service providers) and payments platforms, without imposing specific technological schemes or influenced by these schemes in advance.
- Prevent financial disintermediation and subsequent risks, keeping distance with virtual assets trading.
- Emphasize on measures to protect individual data privacy and fight against telecom cheating and payments fraud.

5. DC/EP: A two-tier program

In Figure 4, we can see that the central bank remains in the top tier, in charge of building up financial infrastructure and supervising the DC/EP program. In the second tier, we have the four large Chinese banks, including Industrial and Commercial Bank of China, Bank of China, which has a branch in Budapest, Agricultural Bank of China and China Construction Bank. Besides the four major banks, there are also three telecom and mobile phone operators: China Mobile, China Telecom and China Unicom. We also have two internet platforms. One is Alibaba's newly established financial service company called Ant Financial Service. Another is Tencent, a social networking platform providing payments service (Wechat).

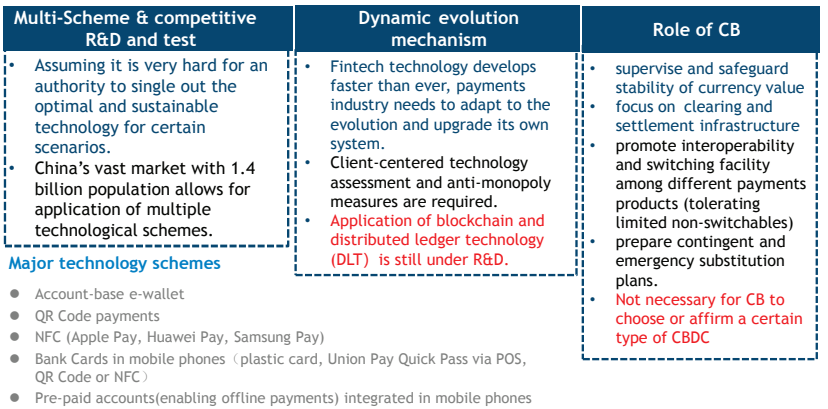
Figure 4: DC/EP is a two-tier program



6. DC/EP: A dynamic two-tier, multi-scheme program with competitive R&D and operations

Next, I would like to briefly present the DC/EP's two-tier characteristics (Figure 5). China is a large economy, which can accommodate multi-scheme solutions with competitive R&D and operations. We assume it is very difficult for the authority to single out the optimal, sustainable technology for certain payment scenarios. With a vast market of 1.4 billion population, China can accommodate several applications with multiple technological schemes. Even today, we cannot single out an optimal technology choice, due to the rapid technological development. Two years or three years later, there may be a brand-new and better technology. We are trying to set up the DC/EP system to accommodate this kind of evolution.

Figure 5: A dynamic two-tier, multi-scheme program with competitive R&D and operations



In this program, we are paying attention to blockchain and distributed ledger technology. However, up to now, they are still under research and development. There is still some ways to go before we reach the pilot application stage. As already mentioned, the role of the central bank is to supervise and safeguard the stability of currency value; to focus on clearing and settlement infrastructure; and to promote interoperability and switching facility among different payment products. We have several products and we encourage each second-tier institution to provide switchable facilities which are more convenient for merchants as well as for consumers. If it is not switchable, we also tolerate limited non-switchable facilities. The central bank prepares contingent and emergency substitution plans, to ensure that a substitution system can switch on in the event that one or two payment systems fail. It is not necessary for the central bank to choose a certain type of CBDC, which is different from the principles set by the group of 7 countries. The program we have may not be a typical central bank-oriented program.

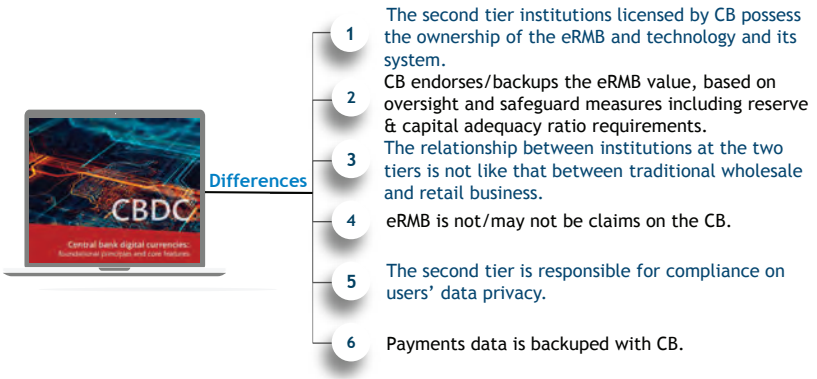
The major technologies now under research and development and in pilot operation are: (1) Account-based e-wallet; (2) QR Code

payment; and (3) NFC, which includes Apple Pay, Huawei Pay, Samsung Pay. These systems are very inclusive. We use the NFC facility to conduct offline Peer-to-Peer payments by two mobile phones; (4) Bank cards can be put into mobile phones and thus do not need to be carried separately. All kinds of plastic cards such as Union Pay and Quick Pass via POS, QR Code or NFC can be held by mobile phones; (5) We also allow pre-paid cards to perform some small amount payments, which can also be integrated in mobile phones. People can choose some of similar payment methods such as plastic cards to do the same thing.

7. E-CNY under DC/EP can be different from CBDC

Next, we can see that e-CNY under DC/EP can be different from CBDC (Figure 6), the concept of which is developed especially against the private sector cryptocurrency and digital assets such as Bitcoin and others. In China, indirect liability to the central bank still remains an option to the PBC. Second-tier institutions may have ownership of the e-CNY and its technology and concerned system, while for CBDC, ownership belongs to the central bank. The central bank can endorse and support the e-CNY value, based on some oversight and safeguard measures including reserve and capital adequacy ratio requirements. If there is any default or failure of one scheme of digital currency or electronic payment, the second-tier institutions are responsible for the purchasing power of e-CNY. If there is a bank run, the run happens on the second-tier institutions, rather than the central bank. Second-tier institutions are also responsible for compliance with user data privacy requirements. The payment data is only backed up at the central bank.

Figure 6: E-CNY under DC/EP is different from CBDC



8. Protection of data privacy and implementation of managed anonymity

In this program, the protection of data privacy and its implementation in China falls under the framework of what we refer to as 'managed anonymity' (Figure 7). We emphasize data privacy protection and have made strong efforts to absorb some of the rules from the European General Data Protection Regulation (GDPR). We have learned about concepts for providing better protection of privacy from Europe. We strike a balance on maximizing the degree of anonymity and satisfying the related regulations. The data backed up at the central bank will be used only to prevent money laundering and counter terrorist financing, as well as to fight illegal cheating and fraud and to correct operational errors and mistakes. During the process of development, we uncovered numerous cases of criminal cheating and fraud. Thus, the central bank must be capable of countering these illegal activities. The payment providers, which are the second-tier institutions, are prohibited from copying, transferring and selling the concerned data. They should delete the customer's data on request. In reality, however, data leakage occurs quite often. To better protect users, we have decided to adopt multi-layer accounts and transaction limits, which are designated and accepted by the users, to provide

higher security protection. Users can choose different kind of accounts and different kind of limits for the account transactions. Consumers can also protect themselves by setting and using these transaction limits.

Figure 7: Protection of data privacy and implementation of managed anonymity

Objectives: emphasize on data privacy protection and absorb some rules of European GDPR; strike balance on maximizing the degree of anonymity and satisfying regulations. Data backuped with CB for serving anti-money laundering and countering terrorist financing, anti-criminal cheating and fraud, as well as correcting operational errors and mistakes.

Approaches:

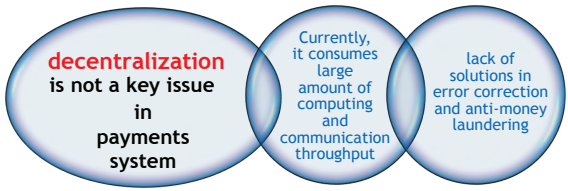
- Encryption and token mechanism adopted to upload transaction data to CB as the only exception, which is allowed to keep track of necessary data for the above mentioned regulation purpose. CB shall ensure date confidentiality.
- Operational errors must be considered and reversed, as the chargeback practice in credit card payments under certain legal or binding procedures.
- Payments providers are prohibited from copying, transferring, selling concerned data(not including backup with CB), and shall delete some type of data upon requests of users.
- Taking consideration of data leakage, and to better protect users, multilayer accounts and transaction limits are adopted for higher security protection, the higher the layer of the account, the larger the transaction limit.

9. On the application of blockchain and DLT in e-CNY design

Figure 8 shows some of the thinking behind the application of blockchain and DLT in e-CNY design. We hope that DLT can be adopted as one of the second-tier choices, but right now the technology is undergoing further research and development. So far, the DC/EP system has a reconciliation function on the central bank side based on DLT. DLT does not play a dominant role in the current phase of the DC/EP program. We also realize that some of the key features of DLT, such as decentralization, are not a key issue in payments system. For the time being, the blockchain still consumes a large amount of computing and communication throughput. We are also trying to overcome the lack of solutions in error correction and anti-money laundering of the blockchain system. This is something we are going to see whether we can have further development in this regard.

Figure 8: On the application of blockchain and DLT in e-CNY design

- Can be adopted for one of the second tier choices. Now the technology is under further exploration and development.
- Not playing a dominant role at current phase:



10. E-CNY and cross-border payments

Finally, we discuss the considerations involved in cross-border payments (Figure 9). If we carefully review existing international payments system, the incumbent technology and system are actually OK for trade settlement, investment settlement and financial transactions. But there is inefficiency and dissatisfaction in cross-border payments for tourists, internet shopping and remittances, which require further development and improvement. However, for the US, the Eurozone and those convertible currency zones, it does not seem difficult to conduct currency exchange and even less difficult to carry out cross-border transactions. Nevertheless, for some emerging markets and developing countries, we need to consider that any new system should respect their currency sovereignty, different exchange rate regimes and convertibility regulations, as well as the need to protect their foreign exchange reserves.

We must keep our new system consistent with the existing policy framework. As we strongly emphasize cross-border payments, there is not much difficulty in terms of technology when we promote the modernization of retail payments. If retail payments facilities are widely available domestically, they can also be adopted for payments in cross-border transactions. Therefore, our mandate is to build up a solid base of retail payments domestically. We focus on current account payments such as those in the tourism sector. We need to consider that, for many countries, the development of digital currency should avoid dollarisation and there is no push for the use of RMB. This is not

only concerning our cooperation with Eurasia, but also reflects our discussions with neighboring countries in Southeast Asia and other emerging markets. We all realize that we need to follow the existing rules, while adopting modern technology.

Figure 9: Be clear on demands for cross-border payments

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Chapter 5

Technology and Infrastructure

A Conceptual Model of Smart City for a Healthy Future: Case Study of Four High-Density Asian Cities

Eng Chye Tan – Chye Kiang Heng – Ke Fan – John Chye Fung

Urbanisation poses multiple challenges globally, such as poor sanitation, urban congestion and pollution, which exacerbate health problems. Smart city is integral to the solutions to these problems. Many countries have implemented smart city projects focusing on information and communications technology infrastructures. In recent years, the paradigm of smart city has shifted from technology to human-centricity – using technologies to improve human health and the urban living experience. Yet little is known about how smartness, city and health are connected, resulting in difficulties in forecasting technological changes and identifying market needs in the health sector. This study posits a conceptual framework to explain the mutually constructive relationships between smartness, city and health by studying four cases in high-density Asia – Shanghai, Kashiwa-no-ha, Songdo and Singapore. The case studies identify underexplored areas of smart city and the significance and possibility of an emerging market for technological innovations. The experience of these cities in deploying technologies to promote health in the urban context can offer lessons for other cities.

Journal of Economic Literature (JEL) codes: I12, I18, I23, I31, O21, O33

Keywords: health behaviour, public health, higher education, well-being, planning models, technological change

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1. Introduction

The United Nations projected that approximately 68% of the world's population would live in cities by 2050 *(United Nations, 2018)*. In this era of rapid urbanisation, urban inhabitants are faced with many challenges, such as air and water pollution, energy demand and food security, that affect human health considerably. *Kuddus et al. (2020)* claim that poor nutrition, environmental pollution, poor housing conditions and sanitation, and communicable diseases are the major health issues resulting from urbanisation. As the city is a complex system, few models or theories are able to explain its complex nature and how it affects the physical, mental and cognitive health of its inhabitants. This exacerbates human's ability to cope with the challenges caused by urbanisation. Against this background, the smart city narrative emerges as an integral part of solutions to urban problems, including human health.

Smart city was first introduced in the 1990s as a concept focused mainly on the application of information and communication technology (ICT) infrastructures within cities *(Albino et al., 2015)*. Some studies have attempted to define what a smart city entails (*Albino et al., 2015; Kummitha–Crutzen, 2017; Vishnivetskaya–Alexandrova, 2019)*. Although there is no universal definition in academia, a growing consensus is that smart city goes beyond constructing ICT infrastructures and developing new technologies. In recent years, human-centric approaches to smart city have gained attention *(Kummitha–Crutzen, 2017)*. Human- or people-centric smart city treats technologies as tools to service people and improve their health and wellbeing *(Crowley et al., 2016; Trencher–Karvonen, 2019)*. In turn, social, environmental and economic needs can stimulate the advancement and greater adoption of technologies.

Through a people-centric paradigm, smart city technologies improve the urban living experience and human wellbeing, but it is necessary to have a thorough understanding of the way smartness, city and health are interconnected. This study develops a conceptual framework to explain the relationships of these three concepts: smartness, city and health. It identifies key health determinants and widely applied smart technologies and conceptualises the term "city" from the perspective of smartness and urban health. Four cases of smart cities in Asia illustrate how the framework works: Shanghai in China, Kashiwa-no-ha in Japan, Songdo in Korea, and Singapore. Shanghai and Singapore are existing cities that implemented city-wide smart city projects and won the World Smart City Award in 2020 and 2018, respectively. Whereas Songdo is a newly developed business district built close to Incheon International Airport, Kashiwa-no-ha is a redeveloped campus town in Kashiwa city, near Tokyo – they are at district and town scales, respectively, and planned from scratch.

The conceptual framework helps to identify the current stage of development of smart city for a healthy future and reflects the technological implications of health determinants. The four cases provide empirical data for the conceptual framework, and these experiences in deploying technologies to promote urban health can provide lessons for other cities. This paper is structured as follows: Section 2 reviews studies on smartness, health and city which form the basis of the conceptual framework. Section 3 explains the framework by introducing four cases of smart cities in Asia. The final two sections discuss the findings and conclusions of the study.

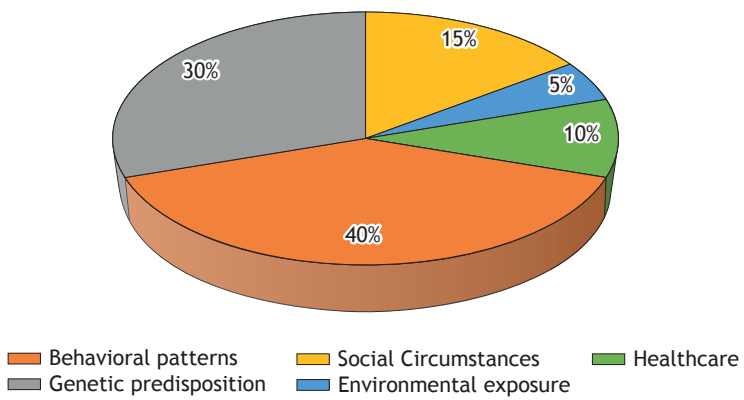
2. Literature review

By explicating the fundamental connections between smartness, city and human health, this study postulates a conceptual model of smart city for a healthy future. Key health determinants augmented by technologies in the urban contexts inform a smart city conceptual framework for healthy urban living.

2.1. Key determinants of health

A frequently cited study conducted by *McGinnis et al. (2002)* in the United States investigated the leading determinants of human health and quantified their impact on premature deaths, as shown in Figure 1. Behavioural patterns, social circumstances, environmental exposure and healthcare together account for 70% of premature deaths. Fortunately, these determinants can be improved by advanced technologies.

Figure 1. Proportional contribution to premature death



Source: Schroeder (2007)

(1) Healthy behaviours

Behavioural patterns account for 40% of premature deaths. Our daily choices, such as diet, physical activities, approach to safety and our strategies to cope with stresses, are important determinants of health *(McGinnis et al., 2002)*. The idea of applying advanced technologies to behavioural patterns is to make healthy (and safety conscious) behaviour an easy option by reducing the cost of information affecting choices. For examples, real-time data on energy consumption can inform users and guide their behaviours of energy consumption *(Trencher–Karvonen, 2019)*. However, most smart city projects currently focus on improving the physical environment and economic growth *(Alizadeh, 2017)*, and they largely neglect the benefits of promoting healthy behaviours by applying new technologies.

(2) Healthy social circumstances

Social circumstances contribute to 15% of premature deaths. According to *McGinnis et al. (2002)*, these include social cohesion, education, income disparity, housing, employment, crime and poverty. Existing smart city projects have started to address some of these dimensions, such as distance learning, smart homes and surveillance equipment for crime prevention, but there are still many underexplored social issues, such as social cohesion. These are the opportunities to create new technologies and identify new applications.

(3) Digital healthcare

Healthcare accounts for 10% of premature deaths. Better healthcare has contributed to the increase in life expectancy in recent decades and will probably contribute more, since technology is better able to satisfy the needs of healthcare in ageing societies *(McGinnis et al., 2002)*. Against this background, digital healthcare becomes an area of growing importance. It includes mobile health, medical AI and applications of advanced computing sciences in genomics, and big data *(Shin, 2019)*, among others.

Patient-generated health data are important inputs for identifying insights into the management of health conditions, particularly for chronic illnesses. Digital health can provide quantifiable and objective data for patients and doctors, resulting in an equal relationship between doctors and patients and their shared decision making *(Meskó et al., 2017)*.

(4) Healthful physical environment

Physical environment contributes to 5% of premature deaths. Smart city can provide digital solutions for achieving green city goals such as smart energy *(Lund et al., 2017)*, transport decarbonisation *(Zawieska–Pieriegud, 2018)* and real-time building energy management *(Francisco et al., 2020)*. Although environmental exposure contributes the least among all the leading determinants of health according to *McGinnis et al. (2002)*, most smart city projects focus on the physical environment. In a study on the collaboration between IBM and 130 cities worldwide, economic development, environment and transportation are the top three topics that interest city governments *(Alizadeh, 2017)*.

2.2. Smartness, health and city

This section introduces how smart technologies can be adopted in various places for promoting urban health and wellness.

(1) Promotion of healthy behaviours

Various urban spaces can be used to promote healthy behaviours by integrating smart technologies. For example, to promote physical activity in a community, the MySidewalk™ mobile platform was developed in the US to allow federal, state and local entities to collect and maintain geospatial data about sidewalks. The data types include the widths of sidewalk and sidewalk buffer, pedestrian or multipurpose sidewalk, sidewalk material, street name, closest cross section and maintaining right-of-way. The crowdsourced data help urban planners and policy-makers

to plan routes, place sidewalks, prioritise infrastructures, identify high traffic routes and the current conditions of sidewalks, and maintain them *(Erraguntla et al., 2017)*.

Apart from physical activity, healthy diet and food security are also critical. High-tech urban farms improve food and nutrition resilience *(Armanda et al., 2019)*. As Singapore relies heavily on food imports, its government is promoting high-tech urban farms to improve food and nutrition security. It has also implemented various programmes to inform consumers about food nutrition and promote healthy diets.

(2) Promotion of healthy social circumstances

Smart technologies can promote healthy social circumstances by digitalising and visualising information on culture, education, housing, crime, employment, etc. Some smart city projects digitalise or visualise information for folk-culture educational purpose. For example, mobile apps that integrate GPS, local cultural spots and walking trails can provide information for tourism, health promotion and education *(Lin et al., 2014)*. In addition, ICT is applied to prevent crime by enhancing participatory planning in Helsinki *(Chiodi, 2016)*, using mobile apps and GIS technology to indicate the perceived safety through a location-based approach. The central government of Finland has commissioned the development of Public Participation Geographic Information System for use by municipal governments throughout the country *(Brown–Kyttä, 2014)*. In Canada, GIS technology is also used to identify specific areas with hate crime and assist police to identify place-based policing strategies *(Dunlop et al., 2021)*.

As part of its Smart Nation initiatives, Singapore implemented HealthHub – a web portal and mobile app – that provides a one-stop online health information and services portal allowing users to access personal medical records, lab test results, dental health records, etc. Furthermore, it includes an extensive directory of healthcare services and lifestyle facilities and services

nationwide. Rewards are also given to encourage the social sharing of health promoting information on the portal.

(3) Promotion of digital healthcare

The COVID-19 pandemic highlights the importance of telehealth as patients and clinicians have to use digital tools to connect when in-person visits are difficult *(Torous et al., 2020)*. In this situation, digital solutions can ease the pressure of an already overburdened healthcare system *(Mohr et al., 2017)*. In addition, digital tools are also helpful for health data collection and relating the data to patients' living environment. This will enable researchers to investigate how the physical environment and daily activities affect patients' health. Results will be useful for better urban planning and design and nudging a healthier lifestyle. The data and analysis results can also be shared with patients and doctors to help them make informed decisions.

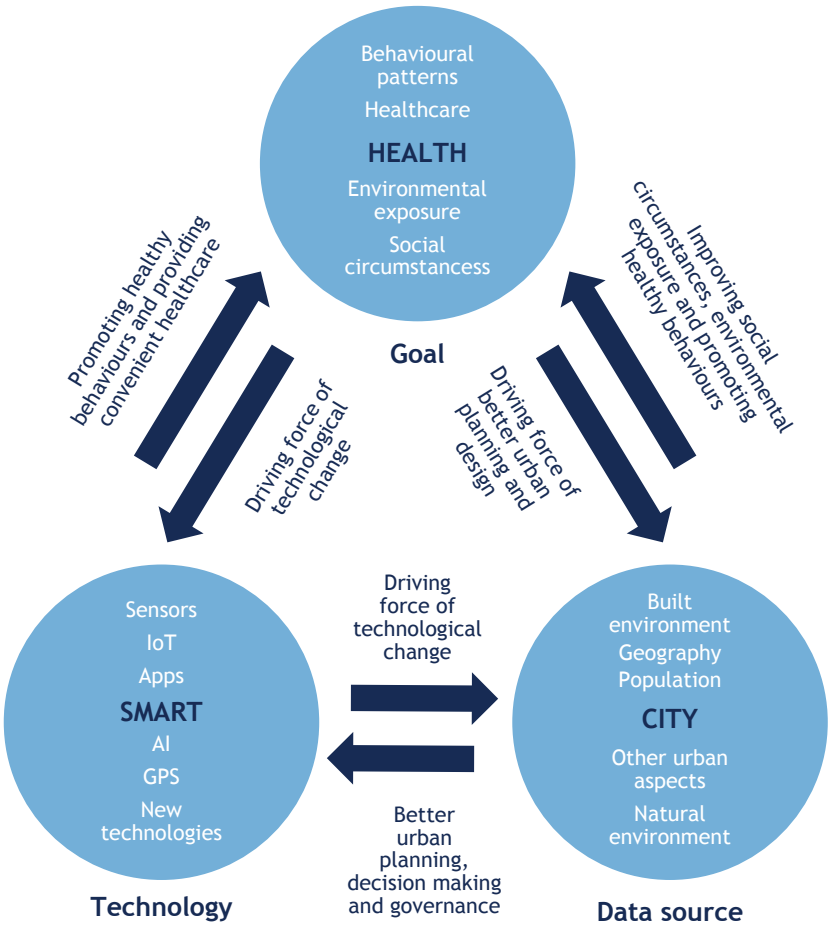
(4) Promotion of healthful environment

Many smart city projects deploy technologies aimed at improving the physical environment, such as air quality, water quality and reducing noise levels. These technologies enable the extraction and use of data from the physical environment to help with better urban planning and decision making. For example, IoT wireless communication technology provides smart solutions for real-time monitoring of water quality *(Geetha–Gouthami, 2016)*. The digital twin of a city provides planners and users an easier and more comprehensive way to simulate and illustrate urban issues in urban planning efforts, especially in the face of climate change *(Schrotter–Hürzeler, 2020)*. Smart technologies enable researchers to measure the physical environment and understand the complex nature of the city, both of which are essential for improving public health.

2.3. Conceptual model of smart city for a healthy future

As shown in Figure 2, the nexus of smartness, city and health illustrates the mutually constructive relationships. A city is a complex system of systems and a source of vast dynamic data including those related to the natural environment (e.g. air temperature, wind speed), built environment (e.g. road network, building stock), population (e.g. demographics, health profiles, activities) and geography (e.g. location, events) and the like. Smart technologies enable us to extract and use the data for better urban planning, decision making and governance, so that social circumstances and physical environment can be improved to promote healthy behaviours. Moreover, technological advancements facilitate the development of new digital tools to assist urban planning and design. In turn, the needs of human health provide feedback on city planning and design, which further drive the innovation of digital tools for assistance. Technologies in the "smart" pool will increase with more demands identified from the health and city domains, thereby driving technological invention and product innovation. Health-related technology products, such as apps for diet, menstruation, medication and exercise help to promote and maintain healthy behaviours, manage healthcare and even look after mental health. In turn, studies on app usage help to improve technology products and drive technological changes.

Figure 2. Conceptual model of smart city for a healthy future



Source: Own edition

3. Smart city experience in Asia

Smart city can make urban inhabitants healthier by constantly creating and applying advanced technologies to address the key health determinants. Worldwide, many countries have selected dense urban environments to pilot the development of smart

city. This section introduces four cases in Asia – Shanghai in China, Kashiwa-no-ha in Japan, Songdo in Korea and Singapore – in terms of how new smart technologies help to address health-related issues in the contexts of the different cities.

3.1. Shanghai in China

Shanghai has a land area of 6,340.5 km^2 with a population of more than 24 million. It is the commercial capital and city with the highest GDP in China *(Zhang, 2019)*. A municipality directly controlled by the central government, Shanghai's smart city initiatives began in 2010 with its economic transformation to become an innovation-driven economy, in line with a wider Chinese national agenda *(RFID World, 2012)*. The municipal government has issued several action plans and policies to drive the smart city vision, ranging from the creation of an information highway to the construction of single-function application system and the integration and innovation of applications *(People's Daily Online, 2020)*.

The directive "*Opinions on further accelerating the construction of smart city"* issued in 2020 highlights the key areas that Shanghai puts emphasis on, including smart living, smart economy, smart governance and smart public affairs. Digital solutions are advanced to address social, economic and environmental issues. In particular, smart health was first mentioned as one of the key aspects of smart living. In 2021, the municipal government announced the initiative "*Opinions on comprehensively advancing the digital transformation of Shanghai city"*, which marks the smart city strategy of the entire city, shifting from informatisation to digitalisation. *Chart 1* summarises the key smart city applications related to public health in Shanghai.

Chart 1. Smart technology applications in Shanghai (China)

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Physical environment	Traffic congestion and air pollution	Intelligent traffic light management (e.g. signal control, optimal traffic planning)	Real-time traffic information
		Integrated vehicle information system	Real-time vehicle arrival information
		Shanghai transportation data centre to exchange and share data	Planning and deployment of virtualisation platform, load balancing deployment, information security equipment deployment
		Public transportation supporting app	Real-time bus arrival information; bus code service
		Shared unmanned vehicles for pilot smart commuting	Online orders for a shared unmanned vehicle
		Parking lots sharing and utilisation information system	Parking lots availability
		Bus signal priority	Traffic lights, public transportation vehicles
	Traffic safety	Multifunctional electronic police	Identifying traffic violations
		Pedestrian crossing reminder system	Monitoring and warning of red-light running behaviour
	Lower energy consumption of industrial parks	Energy monitoring and data visualisation and management in smart industrial parks	Data on demand
	Environmental pollution	Building pollution source database, monitoring pollution, air quality forecast and early warning	Air and water pollution sources, enterprise files, data analysis for prediction and decision making
Behavioural patterns	Strategies to cope with pandemic	Health code displayed in WeChat and Alipay	Geolocational data and users' health status
	Diet	Smart agriculture, including IoT, WeChat platform, informatisation and big data to monitor price of agricultural products and improve agricultural productivity	Prices of agricultural products, production process, agricultural productivity and tailor-made training courses
		Food safety inspection, food information sharing across departments	Food information

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Social circumstances	Safety and security	Intelligent public security	Various sensing devices installed on roads, at intersections, in buildings and community
	Education informatisation	Shanghai education resource centre for promoting life-long learning of citizens; University resources sharing platform for students; Shanghai preschool education service platform	Library resources, courses (MOOC), kindergarten database, online courses, etc.
	Employment informatisation	Human Resource and Social Security Mobile Service Platform	Recruitment information, social insurance, talents programme, etc.
	Improving cultural service	Digitalisation of cultural resources	Digital library, cultural resources platform for information announcement, event reservations, venue reservations, information sharing, cultural maps, comments, customised recommendations, big data analysis and other functions
	Improving public sports services	Informatisation of public sports services	Public sports services such as stadium reservations, sports training and event registration
	Improving tourism services	Informatisation of tourism services	Weather forecast of scenic places, population flow monitoring system, etc.
	Weather warning	WeChat and other apps to provide warnings of extreme weather, flood control, river tide level, flight delays, etc.	Weather, tide level, flood, flights, etc.
	Housing facility management	Mobile app	Housing information search, housing maintenance, facility management billing, housing services, etc.

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Digital healthcare	Health management	Community smart health centre for self-inspection services through intelligent equipment, promoting risk warnings for key diseases	Individual health data
	Care of the elderly living alone	Smart meter to monitor health conditions of the elderly living alone	Elderly's water usage
	Efficient referral system	Informatisation of medical management among community clinics, district hospitals and city hospitals	Referral and appointment; prescription extensions; medical and cost history
	Chronic disease management	Health cloud platform to build databases on electronic medical record and health files	Residents' apps, doctors' apps
	Efficient data analysis of medical imaging	Internet of medical imaging across hospitals	Medical imaging data of ultrasound, endoscopy and pathology
	Elderly care	Developing elderly care information service system	Information on elderly care service institutions, government policies and related public affairs
	Information efficiency of the service for the disabled	Building a database for the informatisation of services for the disabled	Basic information on the disabled, employment security, assistive devices, subsidies, rehabilitation services, etc.

Sources: EO Intelligence (2019); Yan et al. (2020); Wang et al. (2019); Economic and Information Technology Commission of Shanghai Municipal People's Government (2017)

3.2. Kashiwa-no-ha in Japan

Smart city development in Japan has experienced a paradigm shift from technology-oriented to ecological- and social-oriented foci because of the earthquake in 2011 and the ensuing accident at the Fukushima Daiichi nuclear power plant *(Gornik, 2020)*. Japan is an advanced country facing four major issues: economic stagnation, global environmental problems, a rapidly-ageing society and resource/energy problems *(Mitsui Fudosan Co., 2014)*. Kashiwa-no-ha International Campus Town (hereinafter

Kashiwa-no-ha) is located in Kashiwa city. It was planned from scratch as an international academic town on the basis of academic, public and private partnership and is becoming a greenfield model for solution-oriented towns and a test bed of national industrial strength *(Gornik, 2020)*. Kashiwa-no-ha has a population of 10,000 and is projected to have 40,000 inhabitants in the planned area of 13 km^2 in 2030 when the whole development is completed.

Smart city projects in Kashiwa-no-ha have provided the township with both smart infrastructures and people-centric smart devices for promoting sustainability and healthy lifestyles. An optimum mix of centralised grid-based energy sources, distributed energy supplies and other forms of renewable energy and storage batteries is needed to replace nuclear power plants and provide a robust energy network that is able to withstand disasters *(Iwasa, 2012)*. The new energy system, which promotes electric bike and car sharing, supports a shift in residents' lifestyles. In particular, Kashiwa-no-ha has formed a long-term smart health agenda to address health and wellbeing issues through smart urbanisation. These range from sleep, diet and physical activities to socialising *(Trencher–Karvonen, 2019)*. To address the challenges of a super-aged society, the Japanese has explored innovative urban solutions in Kashiwa-no-ha such as integrating various seniors living-cum-care arrangements within the same development. *Chart 2* illustrates the current smart city projects in Kashiwa-no-ha that aim to promote sustainability and healthy lifestyles.

Chart 2. Smart technology applications in Kashiwa-no-ha (Japan)

Health determinants	Health-related Issues	Technological solutions	Data sources/tools
Physical environment	Lower CO2 production	Electric vehicle and motorcycle sharing	Traffic data, land availability for electric vehicle and motorcycle sharing station
		Electric vehicle power stations with disaster prevention boxes	Electric vehicle power stations
	Energy security	Renewable energy, high efficiency equipment and energy storage in building sectors	Energy consumption information of housing, hotel, office and commerce
		Demand response	Energy consumption data
		Task ambient lighting	
		Energy efficient navigation	
		Energy efficiency assessment services	
Behavioural patterns	Healthy lifestyle	Wearable ICT devices to generate, store and deliver lifestyle data	Sleeping, working, running, stepping on weighing scales, etc.
	Energy usage behaviour	Visualisation of energy consumption	Monitoring the usage of electricity, gas and water and displaying ranking
	Physical activity	Health data visualisation and performance-based financial rewards	ICT pedometer to record steps and ICT card to receive digital points as rewards
	Smart diary	Apps in smart phones or computers to record health data and linking to health database in the municipality	Weight, height, vaccine history, etc.
	Awareness of health	Digital medical equipment	Monitoring health conditions, e.g. muscle mass and distribution, brain and nerve health
Social circumstances	Education of child health diary	Storing digital data and enabling mutual learning across couples	Child diary
Digital healthcare	Increase efficiency in health practices	IoT (internet of thing) technology to measure waiting times	Automatically visualising patient movement flow
		IoT technology to deliver healthcare services via mobile devices	Mobile data e.g. health tips, health facility information

Sources: NSRI (2016); Iwasa (2012); Trencher-Karvonen (2018); Trencher-Karvonen (2019); Mitsui Fudosan Co. et al. (2019); Gornik (2020)

3.3. Songdo in Korea

Songdo International Business District (hereinafter Songdo), planned to be fully completed in 2020, is a greenfield smart city built from scratch on an area of about 6 km^2 reclaimed from the Yellow Sea *(Kshetri et al., 2014)*. The idea is to build a city of 65,000 residents and 300,000 workers near the Incheon international airport which allows for faster movement of people and goods *(DiNardo, 2013; Yigitcanlar et al., 2019)*. Smart city projects in Songdo started with the philosophy of providing a healthy, convenient and pleasant living environment for citizens. It adopts a top-down approach to carry out smart city projects on the basis of the strict and thorough plans *(Lee et al., 2016)*. The smart city model in Songdo comprises two parts, namely public services and private services. Public services aim to provide 24 services in 6 sectors, including prevention of crime and disaster, traffic, environment, facility management, and providing information for citizens. Private service sectors provide services associated with the home, shopping, learning, healthcare, finance and car transportation *(Lee et al., 2016)*. Although Songdo smart city is part of the nation's project, it is seen as less successful than expected *(Kshetri et al., 2014)*. This is reflected in the low occupancy rate of commercial offices, empty streets and shopping centres, and particularly as a case of top-down strategy without the involvement of all stakeholders *(Williamson, 2013; Yigitcanlar et al., 2019)*. *Chart 3* summarises the smart city applications in Songdo.

Chart 3. Smart technology applications in Songdo (Korea)

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Physical environment	Innovative waste management	Underground pneumatic trash pipe and central waste processing centre	Waste output
	Traffic congestion and safety	Wire-wireless communication infrastructure applied to existing traffic components, such as, vehicles, roads, etc.	Traffic data and transportation system data
	Integrated facility management	Sensors attached to on-site facilities	Irregularity of facilities
	Natural disaster and emergency prevention	Collecting, monitoring and broadcasting situations	Information on natural disasters and emergencies with explosions or fires
Behavioural patterns	Energy consumption behaviour	IoT installed in buildings to provide real-time info and smart application in cell phones to control electric devices	Energy consumption
Social circumstances	Crime prevention	Monitoring vehicle, abnormal behaviours and sounds with CCTVs and sound sensors	Real-time traffic data, images and sound
	Education	Real-time distance education and training, collaborative meetings and participation of guest speakers from geographically dispersed areas	NA
Digital healthcare	The elderly with Alzheimer's	Location-based technology	Location data
	Managing health conditions of the elderly living alone	Mobile health-sensor	Health status

Sources: Williamson (2013); Kshetri et al. (2014); Selinger - Kim (2015); Lee et al. (2016); Altenhofer et al. (2016)

3.4. Singapore

An island state of 728 km^2 and a population of 5.89 million, Singapore aims to build a smart nation comprising three pillars, namely smart economy, smart government and smart society.

Smart economy drives the economic growth of Singapore and is supported by smart government. Smart society ensures that all segments of society can benefit from digital technologies. Under the three pillars, six initiatives were created and supported by digital tools, apps and ICT infrastructures. The six initiatives include digital government services, strategic national projects, urban living, transport, health, and startups and businesses. From the perspective of smart city for a healthy future, the six initiatives cover healthy behaviours, healthy social circumstances, digital healthcare and a healthy physical environment. *Chart 4* summarises how the leading determinants of health are addressed by digital solutions in Singapore.

Chart 4. Smart technology applications in Singapore

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Physical environment	Water security and safety	Smart water meters	Residential water consumption
		Wastewater-based COVID-19 surveillance	Wastewater
		Online sensor to monitor drinking water quality	Drinking water
	Dengue control	Drones to survey dengue hotspots	Mosquito breeding habitats
	Location-specific alerts on environment	Apps to provide real-time information on weather, air quality and services around	Environmental information
	Sustainable living environment	Digital innovations in urban planning	Planning data, spatial information, real-time transportation
		Smart town in terms of smart planning, smart environment, smart estate, smart living and smart community	Real-time information on towns, precincts, buildings and natural environment; ICT infrastructures
		Dynamic 3D digital platform to include virtual experimentation, virtual test-bedding, planning and decision-making and research and development	Information from the internet and real-time dynamic data from Internet of Things (IoT) devices

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Physical environment	CO2 emissions from transportation	Efficient transport system supported by open data and analytics	Commuters' fare cards, hotspots, arrival times of buses, real-time location data of buses
		Intelligent transport system to provide information that helps drivers decide how to get to places	Gathering data on traffic flow, travelling times and road demand
		Integrated, real-time traffic information	Raw traffic data from the ground sensors and transforming the data into traffic information for planning and policy
		Intelligent transport system control centre to monitor traffic flow and manage incidents	Traffic conditions on expressways and road tunnels
		Green Link Determining system allowing vehicles to travel from one junction to another with minimal stops	Traffic flow, traffic signals, green time
		The Junction Electronic Eyes system	Traffic conditions at major junctions
		Parking guidance system to provide parking information of major commercial centres	Carpark availability, 29 roadside electronic information panels
		TrafficScan using GPS data to calculate the average speed of traffic	GPS data from taxis, vehicle speed
		Signalised pedestrian crossings to balance the safety of pedestrians and efficiency of other users	Crossing timing, green time, vehicle and pedestrians demand, volume of audio signals and noise levels of the environment
		Traffic Message Channel delivering real-time traffic information to motorists	Database of location codes, map, navigation systems, traffic information
	Traffic safety of the elderly and people with disabilities	Green Man+ allocating longer time at junctions for the elderly and people with disabilities for crossing roads	Traffic signals, concession cards, sensors, width of the crossing

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Behavioural patterns	Approach to tackling COVID-19	Suite of contact tracing and management tech	SafeEntry app, a digital check-in system; Trace Together app and Trace Together token using Bluetooth signals
		Informational websites and platforms	Key statistics and figures on the current pandemic situation; daily updates and information on COVID-19
		Digital services, such as smart thermal scanner and crowd levels monitoring of public spaces	Body temperature and population flow in public spaces
	Physical activity	Physical activity programme in mobile app	Tracking daily steps through smart wearables
	Diet	Healthy diet programme in mobile app	QR code on receipts
		High-tech urban farms	Automation; Artificial Intelligence
Social circumstances	Social and economic support for dealing with COVID-19	Setting up platforms to respond to citizens' needs	Citizens' needs
	Crime prevention	AI to stop crimes by employing pattern recognition	Images
	Public safety	Unmanned Aerial Vehicles (UAVs) monitoring outdoor activities	Public spaces
	Fire	Unmanned Aerial Vehicles, Red Rhino Robot	Fire conditions
	Mobility of the elderly and people with disabilities	Autonomous vehicles	Road network, users

Health determinants	Health-related issues	Technological solutions	Data sources/tools
Digital healthcare	Provision of healthcare	Assistive technology and robotics in healthcare	Health practice conditions
	Personal health information and services	Web portal and mobile app	Personal hospital and immunisation records, dental health records, lab test results, future medical appointments with various public healthcare institutions, details of medications and known side effects, reminder to take medication on time
	Healthcare needs	Video consultation, wearable sensors and remote monitoring by a therapist	Health data of patients
	Care of elderly living alone	Smart elderly alert system by placing sensors in flats to monitor the elderly's movements	The elderly's movements at home

Sources: Smart Nation and Digital Government Office (2020); Daswani-Tan (2019); Public Utilities Board (2021); National Environment Agency (2020); Land Transport and Authority (2021)

3.4.1. Test bed of smart city: National University of Singapore

In its national narrative, Singapore sees itself as a nation-in-making where many experiments are constantly conducted to pilot and derive the best-fit policies appropriate to its context. As such, Singapore is very much a gigantic urban living lab. Certain policy innovations and smart technologies were first piloted in selected districts such as the Punggol Northshore district, Yuhua, Jurong Lake District, One North, etc. and fine-tuned before their full rollout nationwide. In these test beds, smart technologies were introduced into homes and neighbourhoods with the aim of enhancing residents' daily life and municipal functions *(Woo, 2017)*. In 2015, 3,194 flats built in the early 1980s in Yuhua were selected to be a "living lab" to refine the smart nation solutions and improve the lives of some 9,000 residents. The smart devices and solutions deployed range from monitoring systems for seniors and utilities management systems in homes to smart municipal services systems (water, energy and waste) and community

noticeboards for optimising the Town Council's operations *(Today, 2015)*.

As the premier national-level university in the country, the National University of Singapore's (NUS) campus is also a significant test bed for piloting smart technologies and solutions. As mentioned in Sections 2.2 and 2.3 above, technologies can be used to extract data from the city arena and develop digital tools to improve daily lives and municipal operations, as well as to assist urban planning and design. As a test bed, NUS has piloted and adopted a series of new technologies to promote urban health and sustainability, and the lessons and solutions learnt can be shared with the country and other cities at a larger scale. It confronts many of the health-related issues that Singapore is facing, devises technologies to address those issues and offers the space-based scenarios to apply innovative technologies and solutions.

Global warming may lead to discomfort and decreased human productivity in extreme cases *(Leal Filho et al., 2016)*, while also indirectly threatening public health via the ambient temperature rise, food insecurity, mental illnesses and air pollution *(Watts et al., 2015)*. The exacerbation of health risks in Singapore's residents may be particularly severe given its already hot, humid tropical climate in the equatorial region. Where physical environment is concerned, NUS has a Sustainability and Climate Action Plan 2030 which contains three signature programmes, namely Cool NUS and Carbon Neutral Campus and Towards a Zero-Waste NUS.

The Cool NUS initiative aims to reduce ambient air temperature by up to 4°C by reducing solar gain and heat load through sustainable campus operations, planting trees and promoting car-lite and green transportation. This project deploys digital modelling tools to identify hotspots and determine the optimal mitigation solutions. The whole campus is a living lab and provides empirical data for data-driven analysis.

Carbon Neutral Campus is a programme that aims to provide renewable energy, energy management, carbon sequestration and carbon offsets through smart grids for on-site solar generation, smart meters for energy and water usage/minimise leakage, and smart sensors and data analytics to improve energy efficiency and indoor comfort at the building scale. For example, the NUS School of Design and Environment's Block 4 (SDE4) was the first building in Southeast Asia to be awarded the stringent Zero Energy Certification by the International Living Future Institute. The certification is based on actual performance and awarded to green buildings where 100% of its energy needs on a net annual basis is supplied by on-site renewable energy sources. It consists of design features that not only deliver user health and comfort in the tropical context, but are also meticulously programmed to be highly energy efficient. SDE4 employs an innovative hybrid cooling system to effectively manage the building's energy consumption, supplying 100% fresh pre-cooled air, albeit, at higher usage temperature and humidity levels than in a conventional system, and augments this with elevated air speed by ceiling fans. This feature reaped the full benefits during the COVID-19 pandemic when air recirculation in enclosed indoor spaces became a health concern. The building has also been awarded WELL Gold certification based on 10 categories, namely air, water, light, sound, thermal comfort, nourishment, movement, mind, community and materials. Following the success of this multiple awards-winning building, NUS is planning to use SDE4 as a design blue-print to progressively upgrade and develop up to 50 net-zero energy buildings by 2030.

Although NUS embarked on its Zero Waste journey in 2008 organically through a ground-up initiative by NUS's student environmental group (NUS SAVE) which reduced plastic bag use by over 70% and resulted in a three-fold increase in the recycling rate between 2012 and 2020, it aims to further double the campus recycling rate to 60% by 2025 and to achieve a 90% diversion rate by 2030. Launched in August 2020, this "Towards

a Zero-Waste NUS 2030 Action Plan" will transform university precincts into living labs where campus infrastructure are test beds for the rapid prototyping of zero-waste solutions, in collaboration with agency and corporate partners for eventual scale-up in Singapore. A host of solutions are being developed by students and staff, of which two notable ones involve design and technologies to enable behavioural feedback and change for both individuals and stakeholders. The redesign of recycling bins by industrial design students, which harnessed behavioural and user insights, reduced the contamination rate in recycling bins from about 60% to 27%. Another project "The WasteLess Smart Chutes" currently being developed and tested by students deployed technologies to allow hostel residents to automatically weigh the amount of wastes and recyclables they deposited in the rubbish chutes and track that through a mobile application.

In addition to solutions impacting the physical environment, measures are also being put in place to influence behavioural changes that can affect public health by promoting physical activities. To create an environment where walking is preferable, NUS launched the Yellow Ceiling Corridor Network (YCCN) to provide a more enjoyable way of in-campus commuting. The network is adorned with greenery and designed to be a pedestrian friendly active mobility system between different destinations in NUS. Besides protection from weather, it also provides barrier-free access to buildings. The YCCN consists of a range of design features and amenities – vending machines, canteens, snack bars and lifestyle hubs – that further encourage the use of this corridor. The corridor network is complemented by an internal bus service, which will be fully electrified by 2025, for longer distance travel. Students are also served by a mobile app that provides on-campus transportation information and that helps them plan a better route on rainy days.

During the COVID-19 pandemic, a mobile app named uNivUS was launched in late May 2020 to help staff and students declare

their daily body temperature readings, health status and travel history, and to track their movements on campus. NUS was then temporarily divided into 5 zones to control unnecessary movements for a period of about half a year as part of Singapore's "circuit-breaker" effort to curb the spread of infection. The app, which features a safety profile screen that users must show to attend physical classes, patronise canteens and facilities, as well as use the campus-wide internal buses, helps the university to mitigate potential risks and keep its academic community safe and healthy. A recent update to the app now includes crowd insight to alert users of the level of crowdedness in canteens, eateries and libraries.

NUS is also developing a comprehensive digital twin of the campus that contains 3D digital building models and geospatial digital platform invaluable for conducting environmental simulation and analysis. Among others, the digital twin can be used for different kinds of research – to monitor and analyse the campus environment, test scenarios of campus development, plan greenery, evaluate the effects of tree planting, calculate carbon sequestration of trees, identify hotspots, study the environmental impact of solar panels, etc. Use cases proliferate and can span multiple domains beyond that of the physical environment. The lessons learnt and solutions developed are evidence-based and can be shared or applied at a larger-scale to inform policies in Singapore.

4. Discussion

Different motivations and local contexts led the four smart cities to respond differently to the evolving digital revolution. While they all started with physical environment and infrastructure, their paths subsequently diverged.

Shanghai, as a megacity, spent several years to expand its smart city infrastructures and promote informatisation. Now it is transforming from informatisation to digitalisation and extending the applications to include the urban living experience.

In line with Japan's paradigm shift from one that focused on technology to one that includes environmental and social issues in its agenda, the guiding principles of Kashiwa-no-ha as a smart city, address issues beyond the physical settings to include climate change, ageing society and low economic growth. Specifically, it emphasises citizens' living experience and wellbeing *(Trencher–Karvonen, 2019)*.

Songdo is rather different from the other three cases. It was conceived as a new business district, built near an international airport that affords faster movement of goods and people. Most of its smart city projects focus on technology and the improvement of physical environment and infrastructures; this paradigm has not evolved substantially *(Mullins, 2017)*.

Being a city-state, Singapore's national goal as smart nation, which responds to the different and changing needs of its citizens, has to be inclusive. It thus mobilised a whole-of-government effort to explore digitalisation simultaneously across all sectors including housing, transportation, water, energy, healthcare and diet.

This study illustrates how the different cities deploy technologies to use data from various sources and develop digital tools to address pertinent health issues that they confronted on the one hand, and on the other, how health demands are the driving forces of technological invention and innovation in the application of digital tools.

(1) Physical environment

Most smart city projects aim to improve the physical environment for other obvious reasons – sustainability, liveability, civic pride, etc. – although in terms of health outcomes, it only directly

accounts for 5% of premature deaths. However, the physical environment does indirectly influence health through nudging behaviours. Hence, the importance of good urban planning and design of smart cities in avoiding unhealthful environments and averting unhealthy behaviours. Environmental exposure includes many aspects such as air, water and energy, and each of them have an impact on human health. Multiple technologies may serve an urban function; for example, Singapore and Shanghai use apps, traffic signals, unmanned aerial vehicles and GPS to improve traffic efficiency and reduce air pollution from traffic congestion. Providing an efficient, low-carbon and well-developed transportation system takes more efforts from cities than from smaller townships due to different traffic volumes and demographics.

(2) Behavioural patterns

Applying technologies to influence human behaviour is one of the key aspects of the people-centric smart city. Mobile apps are commonly used in the selected cities to track records, digitalise and visualise information on health and behaviours as the mobile phone is one of the essential items for daily living in contemporary societies. Compared with the physical environment, far fewer technologies have been applied to influence healthy behaviours although behavioural choices and patterns account for 40% of premature deaths – significantly higher than other health determinants. This indicates a potential future direction of an emerging market, product innovation and technological forecasting. Using technologies to change human behaviour is not as straightforward as transforming the physical environment. There are many influencing factors of human behaviour, such as cognition, motivation and individual abilities, as well as social and physical environments. Researchers and developers of technologies and products have to identify and address those influencing factors.

(3) Social circumstances

Another dimension that is commonly neglected by smart city projects is social circumstances. According to *McGinnis et al. (2002)*, social circumstances include social cohesion, education, income disparity, housing, employment, crime and poverty. However, only a few aspects have been addressed by current smart city projects and only a few technologies have been applied in the selected cases. Unlike the engineering problems that technologies deployed in the physical environment dimension usually deal with, the upstream issues in the social circumstances dimension that technologies need to tackle are socio-cultural and economic in nature. Researchers and developers of new technologies and products have to gain a deep understanding of such complex issues prior to addressing them. This calls for collaboration across disciplines, especially in environmental, engineering and social sciences. It is worthy of note that location-related technologies, such as GPS and GIS, are usually applied to social circumstances. They provide the place-based information according to the relationship between people and their environment, such as locational information of culture and tourism resources. Hence, the knowledge of human geography might be useful for product innovation, such as expanding the application of smart technologies to social circumstances.

(4) Digital healthcare

According to the studied cases, digital healthcare usually has three purposes: improving the efficiency of healthcare system, coping with issues of population ageing, and citizens' health management, including chronic disease management. These three purposes are big topics in themselves, each containing a large number of sub-topics. For example, seniors need more than just physical care: mental and cognitive care are equally important, especially for those living alone. In addition, there are various kinds of chronic diseases that need long-term self-care, but few

technologies in the selected cities are able to assist with chronic disease management. To serve the aforementioned objectives, sub-topics should be fully explored with a view of innovating more smart technologies and products for urban health and wellness.

5. Conclusions

Smart city is an evolving paradigm that is presently shifting from a technology-driven to a people-centric approach. Improving the urban living experience and promoting health and wellbeing are the driving forces of smart city development. Existing studies mainly focus on technologies and applications. Few of them integrate smartness, city and health. This study proposes a conceptual framework that explains the mutually constructive relationships among the three aspects. A city is a complex system of systems and a source of vast dynamic data emanating from the different but yet interrelated urban functional sub-systems.

Smart technologies enable policy makers and urban planners to extract and use data to improve human health. Technologies can also directly affect health and wellbeing by promoting or impeding healthy behaviours. They can also be deployed to provide digital healthcare to benefit urban inhabitants in general. Health determinants – the physical environment, behavioural patterns, social circumstances and healthcare – together with the vast sources of data embedded in the city and innovative technological applications can help transform smart cities to become people-centric smart cities.

Four cities in Asia were selected to empirically establish a conceptual model and provide insights of the three component concepts: smartness, city and health. The conceptual model helps to identify the current status of smart city for a healthy future and prospects the significance of an emerging need for further

technological transformations. The findings of the case studies show that the areas of behavioural patterns, social circumstances and digital healthcare are evidently underexplored. More smart technological invention and products innovation are needed to address the issues in those areas.

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Cooperation and Competition Among Tech Hubs Across Greater Eurasia in the Fourth Industrial Revolution

Glenn Diesen

Cooperation and competition in the Fourth Industrial Revolution are informed by the need to develop a "balance of dependence" through a swing power strategy. The new industrial revolution increasingly concentrates industrial power as digital giants take over industries that previously belonged exclusively to the physical world. The subsequent asymmetrical economic interdependence between states challenges the political autonomy of the more dependent side in a dyad. States can overcome excessive reliance on more powerful actors by enhancing technological sovereignty and diversifying their technological partnerships. Greater Eurasia provides a multipolar format that enables states to employ a swing power strategy to counter monopolies and mitigate excessive technological dependence and thus defend their political sovereignty.

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1. Introduction

What determines the extent to which states cooperate and compete over technological development? Economics is principally about relative gain, and states engage in cooperation and competition

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to skew the symmetry of dependence, as asymmetrical economic interdependence can be converted into political autonomy and influence.

States cooperate to enhance efficiency as an absolute gain and for collective strength against a third actor as a relative gain. Concurrently, states compete against both adversaries and allies over the high-skilled and high-value-added economic activities within global value chains. The division of labour forms a dynamic and wealthy core and a weaker and dependent periphery, which powerful states attempt to preserve, and weaker states aim to challenge.

Over the past years, it has become evident that digital platforms are characterised by monopolistic market power due to the high fixed costs and low variable costs. The concentration of power among a few social media platforms, such as Twitter and Facebook, has enabled communication technology companies to take advantage of excessive dependence by asserting political power. In the Fourth Industrial Revolution, digital technologies merge with the physical world, and the political influence of digital giants will subsequently grow further. The development of artificial intelligence enables digital technologies to automate and revolutionise transportation, production, agriculture, food preparation, medical industry, armies and almost every other industry.

The Fourth Industrial Revolution influences the conditions for cooperation and competition. Re-shoring caused by automation and the immense concentration of market power within technological leaders disrupts the international division of labour. Subsequently, the international system may become increasingly characterised by sovereign inequality as asymmetrical economic interdependence is converted into political capital. Great powers aim to use their digital platforms to increase dependence by other states, while rising powers will aspire for "technological sovereignty", which is achieved by a combination of technological autonomy and diversification of economic partners.

Technological cooperation across the Greater Eurasian region, which encompasses both Europe and Asia, is a manifestation of an emerging polycentric system of world order. This presents an opportunity for smaller and medium powers, as technologies are diffused faster under multipolarity. In a multipolar international system, smaller states can develop a certain degree of technological sovereignty by developing domestic platforms for critical industries and also diversify partnerships to reduce excessive dependency. Smaller and medium powers can employ a so-called swing power strategy to prevent the more powerful and advanced states from converting their technological/economic leadership into political influence. Strategic autonomy entails embracing a swing power strategy, which is defined as being "engaged in several regions but not permanently wedded to any of them" *(Buzan, 2005:193)*.

This paper first explores a geoeconomic theory that outlines the systemic incentives for cooperation and competition. Second, the geoeconomic significance of high-tech industries and industrial revolutions is assessed in terms of economic connectivity between states. Last, technology cooperation and competition in Greater Eurasia is a manifestation of a multipolar international system. It is concluded that states will increasingly pursue a swing power strategy to develop technological sovereignty as a condition to preserve political autonomy and influence.

2. Geoeconomic theory: Towards a "balance of dependence"

What makes states engage in technological and economic cooperation and competition? Geoeconomics assumes that political power derives from economic power rather than just military power. States have always recognised a key dilemma: cooperation and integration into the world economy are necessary for market efficiency, prosperity and influence, although the

growing dependence on foreign powers undermines economic and political autonomy *(Gilpin, 2011:80).*

States respond to this dilemma by skewing the symmetry of interdependent economic partnerships to maximise both autonomy and influence *(Hirschman, 1945)*. In an asymmetrical interdependent partnership, the economically powerful state is less dependent than the economically weak partner. Thus, the more powerful and less dependent state in a dyad can safeguard its autonomy and extract economic and political concessions from the weaker and more reliant state. Geoeconomics therefore entails intervening in the market to develop favourable symmetry in interdependent partnerships.

The international economic system gravitates towards a "balance of dependence", as the weaker and more dependent side has systemic incentives to develop its strategic industries and diversify economic partnerships to reduce reliance on the more powerful actor *(Diesen, 2017:14)*. The weaker and more dependent state is prepared to accept significant economic pain to obtain greater autonomy, while the stronger and less reliant state often fails to prevent a decoupling as it is distracted by other relationships *(Hirschman, 1978)*. Much like realist theory infers that the international system naturally gravitates towards a balance of power, geoeconomic theory expects the international economic system to move towards a "balance of dependence" in which neither side can extract excessive political concessions from others *(Diesen, 2017:14).*

Stability can alternatively be achieved when there is a profound concentration of technological and economic power under a benign hegemon. The ability of the benign hegemon to provide collective goods results in voluntary bandwagoning behind the hegemon, which reduces the hegemon's reliance on coercive means to prevent and deter decoupling from the asymmetrical interdependent partnership. Liberal international economic systems have therefore previously emerged when economic

power is concentrated in a hegemon as a result of an industrial revolution or major war. Case in point, the dominant position of the UK in the 19th century and the US in the 20th century incentivised the hegemon to rely on market forces to preserve their leading position *(Ruggie, 1982:381)*. Technological leadership is cemented when the mature industries (high quality, low cost) of the technological leader are in open and direct competition with the infant industries (low quality, high costs) of the developing states.

However, the conditions that enable a benign hegemon are temporary. The geoeconomic hegemon is confronted with a dilemma about how to respond to rising powers: Ascending states can be allowed to rise and thus disrupt the international distribution of power that underpins the hegemonic system, or economic coercion can be used to slow down the rise of future rivals, but then the leading state foregoes the status as a benign hegemon. Either way, rising powers will balance the hegemon and rivalry ensues *(Layne, 1993)*. The declining hegemon will thus eventually use its market power to marginalise rivals and coerce geoeconomic loyalty among allies.

The very unique conditions following the Second World War enabled the development of a liberal economic system. The Soviet Union and China as the two main adversaries of the US were both communist states largely decoupled from international markets. Meanwhile, the geoeconomic rivalry between the US and its allies was mitigated by security dependence and the need for solidarity due to the Cold War. With the collapse of communism, the main Eurasian adversaries of the US embrace economic statecraft while the US struggles to convert the security dependence of its allies into geoeconomic loyalty.

After the demise of communism, the world began to gravitate towards geoeconomics for competition: "Everyone, it appears, now agrees that the methods of commerce are displacing military methods – with disposable capital in lieu of firepower, civilian

innovation in lieu of military-technical advancement, and market penetration in lieu of garrisons and bases" *(Luttwak, 1990:17)*. Power competition is thus naturally organised around "productive efficiency, market control, trade surplus, strong currency, foreign exchange reserves, ownership of foreign companies, factories and technology" *(Huntington, 1993:73)*.

3. High-tech and industrial revolutions

High-tech industries are defined as "strategic industries" because they create asymmetrical dependence, which enhances both political autonomy and influence. All states are reliant on the supply of high-tech for economic efficiency, and there are technological limitations on the ability to establish technological autonomy and/or diversify suppliers. Technological leaders enjoy higher revenue as the monopolistic position prevents downward price pressure. Great powers will thus increasingly be characterised by "technological sovereignty" as excessive reliance on foreign technologies reduces autonomy and limits the potential for influence. Technological sovereignty is achieved through a combination of independent domestic technological platforms and diversifying economic partners to avoid excessive reliance on any one state or region.

Geoeconomics is to a large extent about manipulating the diffusion of technologies. States with the leading high-tech industries enjoy a monopolistic position in the market due to their first-mover advantage. The geoeconomic strategy of the technological leader is therefore to slow down the diffusion of technology to extend their first-mover advantage and prolong the monopolistic position in the market *(Lieberman–Montgomery, 1988)*. In modern times, the first-mover advantage is enhanced, for example, by developing trade agreements that extend and firmly enforce intellectual property rights. Furthermore, the leading states advocate free

trade and liberal international economic systems to saturate foreign markets to prevent the development of tech hubs in other states that may eventually become rivals.

In contrast, rising powers can aspire for "technological preparedness" in which they have the technological know-how and infrastructure/platforms to launch domestic spin-offs to enhance strategic autonomy. Technological followers can remain competitive by diverting some research and development costs towards implementation. Case in point, Russia is not leading digital innovations, yet the leading digital platforms in Russia are Russian-owned. The strategies of technological followers entail reducing the first-mover advantage of the technological leader by encouraging faster diffusion of technologies *(Rogers, 2010)*.

In a multipolar system with competition among technological leaders, rising powers can employ a swing power strategy to prioritise cooperation with the technological leaders that are the most willing to offer favourable conditions. The preferred condition for the technological follower entails joint ventures with majority share and transfer of the technology and know-how required for technological autonomy. Furthermore, the technological follower can use temporary subsidies and tariffs to support its infant industries until they mature and thus become capable of competing in international markets. Subsidies can be direct or indirect through education, government contracts, military-civilian cooperation, etc. Similarly, non-tariff barriers include bureaucratic hurdles, industrial and environmental policies, health and safety policies, or national security policies. In the Fourth Industrial Revolution, "everything" becomes a critical industry, as intrusive digital technologies become involved in all parts of the economy and society.

3.1. Cooperation and competition since the First Industrial Revolution

Once Britain established a leadership position in the First Industrial Revolution, it acted on systemic incentives to embrace free-market principles to cement the high-tech comparative advantages to create a favourable international division of labour. David Ricardo defined the liberal economic theory of *comparative advantage* as cementing British technological leadership: "It is this principle which determines that wine shall be made in France and Portugal, that corn shall be grown in America and Poland, and that hardware and other goods shall be manufactured in England" *(Ricardo, 1821:139)*. Subsequently, Britain developed a liberal international economic system by repealing the Corn Laws in 1843 as its agricultural industry was opened to the world, in return for saturating foreign markets with manufactured goods. Britain was concerned that without free trade, states such as Germany and the US would develop domestic manufacturing industries and thus eventually challenge British technological leadership *(Hilton, 1977: 280; McKeown, 1989)*.

The rising powers of the 19th century therefore recognised that nation-building and industrialisation were interconnected. In other words, fair trade was promoted as an alternative to free trade, as technological sovereignty in the form of manufacturing capabilities was deemed to be imperative to preserve political sovereignty. In the US, Alexander Hamilton advocated for economic nationalist policies in the form of the "American System of Manufacturers". Hamilton feared that the excessive economic and technological dependence on Britain would undermine the ability of the US to maintain its political independence *(Mott, 1997:22)*. Otto von Bismarck later also argued that free trade was the policy of the dominant, and Bismarck subsequently established tariffs in 1879 *(Mackinder, 1919:100)*. Peshine Smith, a foreign advisor to the Japanese Emperor in the 1870s, similarly sought to bring the "American System of Manufacturers" to Japan

to safeguard its national sovereignty *(Reinert–Daastøl, 2007:38).* In the late 19th century, these policies were also embraced by Russia under Sergey Witte which resulted in an economic boom. Friedrich List (1827:30) opined that the power competition between states make liberal economics an irresponsible policy:

As long as the division of the human race into independent nations exists, political economy will as often be at variance with cosmopolitan principles… a nation would act unwisely to endeavour to promote the welfare of the whole human race at the expense of its particular strength, welfare and independence.

List (1885:295-296) famously criticised British advocacy of free trade as an hegemonic norm to "kick away the ladder":

It is a very common clever device that when anyone has attained the summit of greatness, he kicks away the ladder by which he has climbed up, in order to deprive others of the means of climbing up after him. In this lies the secret of the cosmopolitical doctrine of Adam Smith, and of the cosmopolitical tendencies of his great contemporary William Pitt, and of all his successors in the British Government administrations.

The development of digital technologies in the third industrial revolution followed a similar path. The US government subsidised the development of digital leadership through large military contracts, and enabled publicly funded universities to patent and sell technological innovations *(Block, 2008)*. Once digital leadership was firmly established, the trade agreement in the 1980s and 1990s focused on extending and enforcing patent laws and intellectual property rights to slow down the diffusion of technologies *(Sell, 2003)*. The new international division of labour was cemented with trade agreements that resembled the repeal of the Corn Laws as US digital technologies could saturate foreign markets, while traditional US manufacturing was opened up to foreign competition and thus outsourced.

Over the past decades, China has pursued economic nationalist policies, similar to that of the US in the 19th century, to climb up global value chains and establish technological sovereignty. China is gradually establishing control over strategic industries and with the industrial policy *China 2025,* Beijing aims to establish technological leadership in artificial intelligence, robotics, and the other leading technologies associated with the Fourth Industrial Revolution.

4. The Fourth Industrial Revolution

The Fourth Industrial Revolution enhances the need for technological sovereignty as industrial power is increasingly concentrated in digital ecosystems that can be used for political power. The concentration of economic power causes a dual decoupling. The Fourth Industrial Revolution undermines the foundations of the liberal international economic system due to this dual decoupling. At the first level, the international division of labour among technological leaders falters, as states such as the US and China compete by repatriating supply chains and limiting market access. At the second level, automation results in disentangling the interdependence between the states in the capital-intensive core and low-tech human labour at the periphery.

The Fourth Industrial Revolution intensifies the "economies of scope" as digital platforms absorb and integrate seemingly unrelated industries. The economies of scope occur when it is less costly to combine two or more product lines or industries rather than producing them separately *(Panzar–Willig, 1981)*. The monopolies of digital giants, much like railways, also provide tangible advantages for consumers due to the integration of services and extensive market width. The comparative advantage of digital giants is often to "do everything", for example, the provider of a search engine has the technological infrastructure

to conquer seemingly unrelated markets such as e-commerce, autonomous cars, food delivery, payment systems, smart manufacturing, and even space exploration. The horizontal and vertical integration of industries and supply chains provides synergy effects to lower costs and heighten the quality of products, while the increased fixed costs of capital-intensive digital ecosystems function as an additional barrier for market access.

4.1. The first decoupling: Between technological leaders

There are multiple reasons to expect the breakdown of cooperation as defined by a liberal international economic system. The competition for technological leadership, primarily by the US and China, undermines an open economic system. Technological sovereignty in the Fourth Industrial Revolution is as important for political sovereignty as manufacturing was in the 19th century for nation-building. Parallel digital infrastructures are costly and inefficient, yet rivalry between states can cause major technological and economic setbacks as each side seeks to sabotage the other. Predictably, when the concentration of economic power diminishes, "the liberal order is expected to unravel and its regimes to become weaker, ultimately being replaced by mercantilist arrangements" where national sovereignty is elevated above market forces *(Ruggie, 1982:381)*.

China's economic nationalist policies consisting of subsidies and limited market access go against the principles of liberal economics. China is transitioning from its former development strategy by establishing a competitive advantage based on its huge market and access to data. China is also investing its vast trade surpluses made from manufacturing into subsidies for high-tech industries.

The US is also moving towards economic nationalism to shore up its technological power. Unlike during the Digital Revolution

in which the US government provided temporary support for Silicon Valley before pulling back, the Fourth Industrial Revolution will require prolonged large-scale support for domestic industries to remain competitive. Washington is increasingly providing direct and indirect support for US industries and coercing the rest of the world to link itself to US technologies and supply chains. Furthermore, as the rivalry with China intensifies, the relationship between state and corporations will become closer under the mantra that what is good for Silicon Valley should also be good for the US.

The US-China rivalry for 5G technology, as the neural system for many of the new emerging technologies, is a competition to preserve national autonomy for their own economies and societies, and create dependence by foreign powers. Washington attempts to limit the swing power strategy among allies by attempting to convert their security dependence into geoeconomic loyalty. However, the limited success results in both the US and China becoming increasingly prepared to use economic coercion against states, including allies, that do not grant them equal or favourable market access. Yet, the competition between the US and China also enables states such as Russia to employ a swing power strategy, for example by aligning itself closer with China when it experiences sanctions and other hostilities from the US.

Technological followers such as Russia and the EU aspire to enhance technological sovereignty in the new industrial revolution to maintain their political subjectivity. Russian exports of natural resources and imports of manufactured goods after the Cold War led to a de-industrialisation process and thus unfavourable asymmetrical interdependence with the West. Over the past years, Russia has attempted to reverse the so-called energy curse by using the revenue from energy resources to subsidise the development of high-tech industries to enhance technological sovereignty. The EU is also increasingly expressing

the need to strengthen the Digital Single Market to shore up its political autonomy and influence.

The term "splinternet" denotes the Balkanisation of the internet and the digital space. Beijing has sought to develop a parallel digital infrastructure to circumvent excessive dependence on the US-dominated infrastructure, patents and licenses *(Heilman et al., 2014)*. Russia is constructing a domestic digital ecosystem in which its national digital giants have a majority share. Furthermore, Russia is – much like China – developing a national Internet, or "RuNet", with all connections passing through government nodes. Artificial intelligence creates further incentives for technological sovereignty as it requires the collection of large quantities of data, which also becomes an issue of privacy and national security.

A technological security dilemma becomes evident as US actions further incentivise China to reduce reliance on US components. The US sanctions that aim to weaken Chinese tech giants such as ZTE and Huawei demonstrates the vulnerability of economic interdependence among the technological leaders. While China responds by developing its domestic semiconductor industry, the US pressures its allies such as Japan, South Korea and Taiwan not to assist China in this endeavour. Similarly, Beijing reduces its dependence on Google's Android system by replacing it with China's HongMeng operating system and/or by cooperating with Russia's Aurora operating system. The cooperation between Chinese and Russian tech hubs under the auspices of Eurasian integration is thus imperative to protect against US economic coercion.

4.2. The second decoupling: Between developed and developing states

Technological innovations have traditionally incentivised the development of an international division of labour consisting of ever-more complex supply chains. In contrast, the technological

innovations in the Fourth Industrial Revolution encourage the repatriation of global supply chains.

After decades of offshoring production and other value chain activities to low-wage and low-cost states as a competitive advantage, this trend appears to be slowing and even reversing as advanced economies can "reshore" production due to automation *(Diesen, 2021)*. Reshoring occurs as states with sophisticated technology and infrastructure can outcompete states who rely on low-wage labour as a comparative advantage. Reshoring disrupts the international division of labour established after the First Industrial Revolution. While previous advancements in transportation made geographical distances less relevant, the new technologies tend to favour local production with robotics, 3D printing, the Internet of Things, the Internet of Goods and other technologies associated with the Fourth Industrial Revolution.

The former export-based development model used by the Asian Tigers and China to gradually climb up global value chains will not be available to countries to the same extent. Case in point, approximately 56% of the entire workforce in Indonesia, the Philippines, Thailand, Vietnam and Cambodia are threatened by technological unemployment, due to the excessive reliance on low-skilled professions that are vulnerable to automated manufacturing *(Chang et al., 2016)*.

The significance of exports in GDP has been declining outside of Asia, which will likely continue due to the automation of manufacturing *(Rodrik, 2018)*. The export-based development strategy must be replaced to some extent with domestic or regional technological platforms to supply domestic or regional demand. As developing states have fewer benefits from access to markets in developed states, the developing economies must restrict the market access to encourage import substitution and techno-nationalism. The rapid growth among several African economies has largely been fuelled by domestic demand as opposed to exports *(Diao et al., 2017)*. Thus, low-wage states

can gain from protecting their domestic markets from being saturated by imports. Temporary subsidies and tariffs for selected strategic industries and financial infrastructure are imperative for developing states, which should seek collective bargaining power and economic integration with similar economies in their regions.

5. A "swing strategy" in a multipolar Greater Eurasia

Technological cooperation and competition across Greater Eurasia are the manifestation of the transition from a US-centric, liberal international economic system towards a multipolar system based on a balance of dependence. Competition does not contradict cooperation; rather competition to establish symmetry in relations is often a condition for a deep and durable partnership. The viability of the EU-US partnership and the Russia-China partnership depends on the smaller powers obtaining a certain degree of technological sovereignty and diversifying partnerships to avoid the US and China transitioning from cooperation based on "first among equals" to dominance.

China and Russia, as the principal adversaries of the US, are leading the effort to decouple from US strategic industries, transportation corridors and financial instruments to reduce their exposure. Furthermore, the failure of China and Russia to stay ahead during the First Industrial Revolution resulted in tragedies for both countries in the mid-19th century. China's defeat in the Opium Wars led to the Century of Humiliation, while Russia's humiliating defeat in the Crimean War resulted in a disruptive effort to rapidly catch up. Russia and China, as adversaries of the US that are not included in US-led security architecture, are especially under pressure to establish strategic autonomy by developing national industries and diversifying economic partnerships.

The EU also aspires for a greater degree of technological sovereignty. The EU has largely been an instrument for the Europeans to develop a more equitable partnership with the US under a common trans-Atlantic Region. During the Cold War, solidarity in the trans-Atlantic Region was necessary to balance the Soviet bloc, and after the Cold War solidarity has been the foundation for collective hegemony by accommodating the Europeans within the unipolar era. As the world transitions towards a multipolar distribution of power, the EU is under pressure to develop what Brussels refer to as "strategic autonomy" to assert "European sovereignty". This objective demands an independent foreign policy and a swing power strategy. However, the enduring dividing lines on the European continent obstruct technological cooperation with Russia, a limitation on the Europeans that the US is also attempting to expand by converting NATO into an anti-Chinese alliance as well.

There are also incentives for states within the EU, especially Hungary and Poland, to diversify their economic connectivity and technological partnerships. As power in the EU concentrates within Germany and the EU becomes less capable of delivering tangible goods, there is a growing reliance on political and economic pressure to conform. While the EU is an important instrument for collective bargaining power, the skewed balance of dependence within the EU enables the bloc to assert excessive economic and political pressures against its member states. Technological cooperation with states in Greater Eurasia thus becomes a strategy to improve the balance of dependence within the EU and thus push back against pressures from Washington, Brussels or Berlin.

6. Conclusion

The Fourth Industrial Revolution alters the incentives for cooperation and competition. Digital platforms concentrate economic and political power, which makes it pivotal for states to develop technological sovereignty and diversify their economic connectivity to prevent more powerful states from using asymmetrical interdependence to extract economic and political concessions.

Technological sovereignty entails incentives for territorialising technological ecosystems. China and Russia are already making formidable efforts to reduce geoeconomic reliance on US technologies. The US has similarly banned or restricted China's 5G networks and economic connectivity with Russia, and pressures the Europeans to follow its lead and commit loyalty to US geoeconomic leadership. The Europeans are subsequently divided between establishing an independent foreign policy and technology cooperation or retreating under US patronage to uphold trans-Atlantic solidarity.

The increased significance of technological sovereignty creates systemic incentives for states to develop a swing strategy to avoid excessive reliance on a single foreign actor and instead negotiate partnerships that increases the diffusion of technology. Tech hubs are subsequently enhancing their cooperation across the Greater Eurasian region to inoculate against technological leaders that are increasingly prepared to use economic coercion.

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Achieving Sustainable Development Goals in the Post-Pandemic New Normal: Technological Innovation, Competitiveness Enhancement, Social Digital Divide and the Coordinated Role of Governments

Khee Giap Tan

Globalization has brought tremendous economic benefits to many, but it has also led to the widening of income disparity and the worsening of social division as the fruits of trade and investment were not shared equitably amongst all stakeholders. If not fully empowered for the public at large, technological innovation – such as artificial intelligence, big data analytics and the internet of things – and the adverse implications engendered by the latest digitalization trends could exacerbate the problems already caused by globalization. Markets are not perfect and quick access to business information is vital for free and fair competition. Especially in the post-pandemic economic new normal, coordinated effort by governments – amongst and within both developed and developing economies – for inclusive integration remain paramount in particular in terms of providing social leverage via internet infrastructure building involving skills upgrades with life-long learning, ease of doing business and level-playing field market competition.

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1. Introductory notes: Updating and stocktaking the global big picture

The United Nations' Sustainable Development Goals (SDGs) are faced with unprecedented challenges. The SDG agenda – in particular the first twelve SDGs relating to public services action and the economic well-being of the public at large – is an action plan for people, the planet and prosperity which recognizes that eradicating poverty in all its forms is an indispensable requirement for sustainable development *(United Nations, 2019).*

The goals and targets of transforming the world under the 2030 agenda for sustainable development appear to hang in the balance, and this great collective journey – which pledged that no one will be left behind – is becoming more elusive than ever, at the national, regional and global level. The means of implementation for such goals and targets are growing ever gloomier in terms of financial resources, capacity building, risks pertaining to systemic issues, open trade and investment.

Retrospectively, it is important to ask whether the world is becoming more competitive in the efficient reallocation of resources by increasing open trade and investment? Should we question whether the sharing of the fruits of globalization has become more inequitable and is economic integration becoming less inclusive in the new economic normal of the post-pandemic era?

After the 2008-2009 global financial tsunami, the world economy has shifted away from synchronized global growth towards a synchronized global slowdown *(Tan, 2019).* Confronted with the recurrent waves of the COVID-19 pandemic and with deteriorating situations on the Asian, European and American continents, we suspect the worst is yet to come, as most governments around the world are distracted by the fight against the pandemic, and the

limited fiscal resources of governments are being further stressed, both in developed and developing economies.

Vital financial resources have been redirected away from economic development and infrastructure upgrades and committed to containing threats to human life and overcoming the capacity shortages in the healthcare sector caused by COVID-19. Lockdown measures in many cities and countries have artificially choked off demand and paralyzed production supply chains in heavily infected economies. The financial resources of many governments were further depleted to help small businesses which provide the bulk of employment to stay viable and to mitigate the problems of workers who lost their jobs.

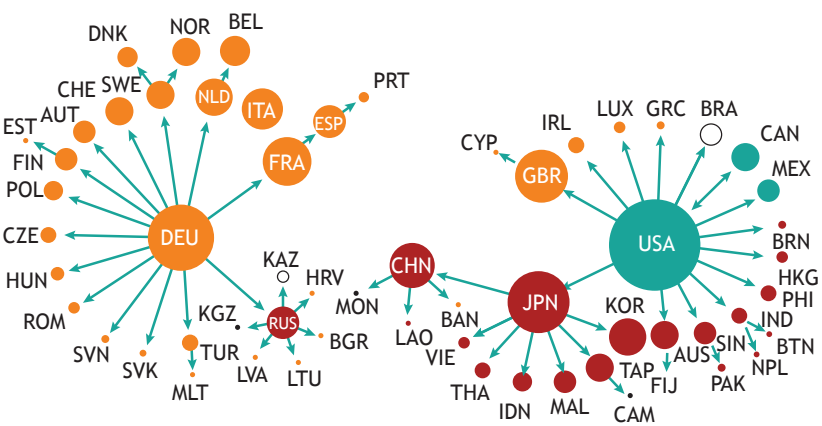
The painful prospect of rising unemployment may be worsened by rapid technological progress and digitization, which could potentially further amplify the danger of job displacement and a greater digital divide, if people are not well skilled or educated to make the best use of the latest technology. However, it does not mean that countries are powerless in the face of technology-driven globalization, as small open economies such as Singapore, Denmark, Belgium and the Netherlands have coped well with global technological progress *(Schwab et al., 2021)*.

The unequal distribution of the benefits of trade and investment amongst multi-national corporations (MNCs) and small and medium enterprises (SMEs) must be urgently addressed, as protectionism threatens to raise its ugly head again. Hence, coordination amongst governments needs to be more proactive and pragmatic, given the emerging market imperfections: the visible hand needs to be seen more than the invisible hand, especially with the ongoing restructuring of regional production value chains reallocation and the industrial restructuring caused by the US-China trade frictions and the coordinated Western efforts to contain China's rise . "No good outcome can arise from a conflict. It is vital for the US and China to strive to engage each

other, to head off a clash which would be disastrous for both sides, and the world" *(Lee, 2021)* .

It is important to note that more than two-thirds of the world trade occurs through global value chains (GVCs), in which production crosses at least one border, and typically several borders, before final assembly. The phenomenal growth in GVC-related trade has translated into significant economic growth in many countries across the globe over the last two decades, fueled by reductions in transportation and communication costs and declining trade barriers *(Degain et al., 2017).* GVC is very regional in nature and there were three centers, namely Germany, Japan with China as a satellite, and the USA in 2000 as shown in *Chart 1.*

Chart 1: Complex global value chain trade networks in 2000 (including all goods and services)

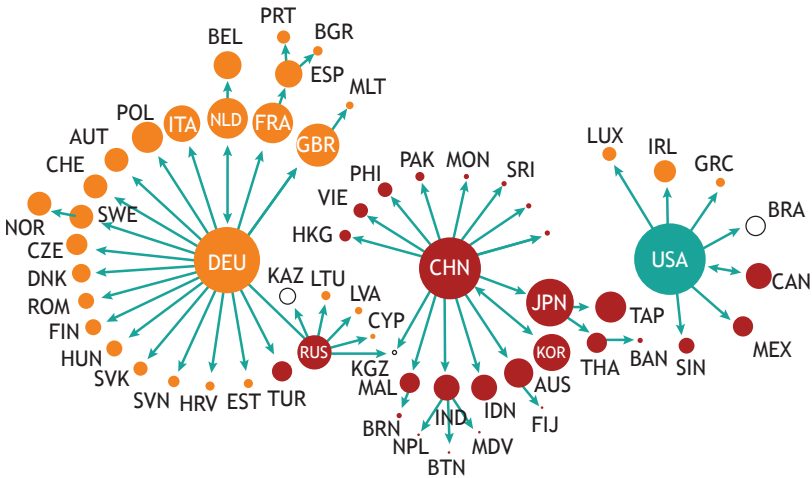


Source: World Trade Organization

By 2017, the three GVC centers were Germany, China now with Japan as a satellite, and the USA as shown in *Chart 2*. Interestingly, the economies of the Association of South East Asian Nations (ASEAN) had also shifted from being satellites of Japan and the USA to China by 2017, while India had similarly shifted from being a satellite of the USA and Japan in 2000 to being a satellite

of China by 2017. Note that in 2017, Singapore was the only Asian economy which was still linked more to the USA than to China.

Chart 2: Complex Global Value Chain Trade Networks in 2017
(including all goods and services)



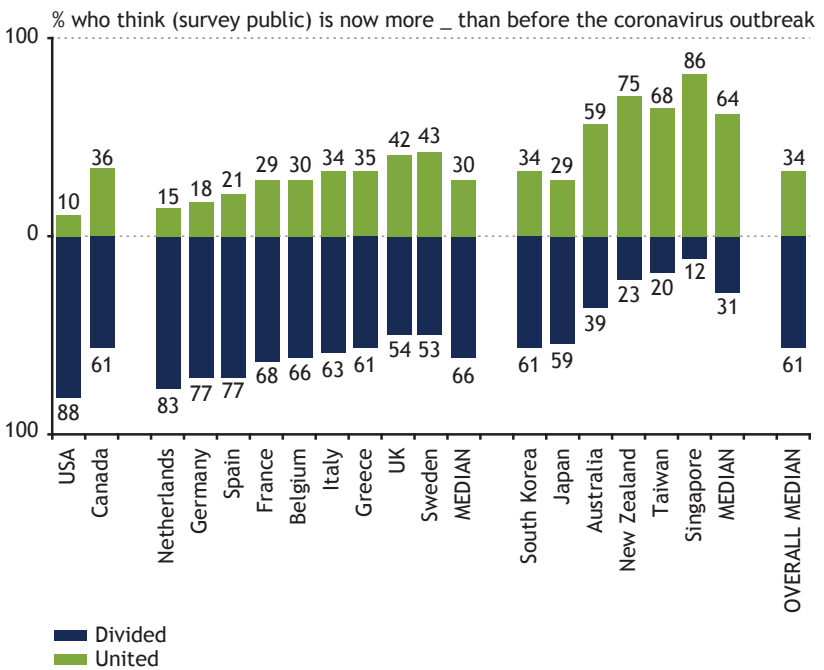
Source: World Trade Organization

Hence, in order to further deepen the regional inclusive economic and social integration, continued and coordinated efforts amongst countries such as expediting the development of long-overdue infrastructure bottlenecks in APEC economies – especially in Southeast Asia through the Belt and Road Initiative (BRI) – will be critical. We also need to strongly encourage China to lead reforms within the World Trade Organization (WTO) to ensure rule-based trading and investment world-wide with sustainable green development. Opposing unilateralism and containing protectionism and growing nationalism remain the paramount tasks going forward.

2. The role of the government in achieving greater competitiveness and inclusivity through technological innovation

Large industrialized nations in Europe and North America have seen their social compact between people, government and businesses weaken in recent decades, leading to divided societies and discontent about globalization, while many in the Asia Pacific region – with the exception of South Korea and Japan – see a stronger sense of national unity, as revealed in *Chart 3*.

Chart 3: Surveys Conducted on National Unity Across Continents



To ensure the coordinated role of governments in achieving greater inclusivity, we must thoroughly review and revisit the conceptual ideals of stakeholder capitalism, state capitalism and shareholder capitalism.

Shareholder Capitalism is found predominantly in the USA and in many countries in the West, while *State Capitalism* is championed by China and is gaining popularity in many other emerging markets. Both have led to more prosperous societies, but each has equally brought about more social, economic and environmental downsides. They have both led to rising inequality of income, wealth and opportunities, increased tensions between haves and have-nots, and above all, the degradation of the environment *(Schwab et al., 2021:171).*

Given the shortcomings in both of these systems, *Stakeholder Capitalism* is believed to be a better global system, in which the stakeholders in the economy and society are taken on board, companies optimize for more than just short-term profits, and governments are the guardians of equality of opportunity, a level-playing field in competition, and a fair contribution of and distribution to all stakeholders with regards to the sustainability and inclusivity of the system *(Schwab et al., 2021:172)*.

Singapore's Changi International Airport (CIA) is a case in point and offers a good illustration of the stakeholder model, which explains why CIA was not privatized to maximize returns for shareholders but rather corporatized instead, where the interests of all stakeholders related to the air hub including the economic impact of passengers arrivals versus cargo transportation, logistics networks, arrival of tourists and business individuals which affect the entire economy were considered holistically. CIA also provides synergies to the privatized government-linked Singapore International Airline, addresses the strategic defense capability of the nation and protects the quality if the living environment for surrounding residents. The corporatized

CIA enjoys high management competency and high-level administrative efficiency, free from government subsidies, and yet remains highly profitable which is not usually the case with most nationalized airports. CIA's planning and development decisions must always be viewed in the context of the entire economy as an air hub for Singapore's global connectivity and not just as an airport for narrowly undertaking the most profitable activities for shareholders.

As a model of stakeholder government, Singapore is an interesting case study on how the governing authorities plan to achieve economic competitiveness and social inclusion via technological innovations across ministries and make them accessible to the public at large. Digital connectivity, life-long skill upgrading and value creation have always been the central focus of Singapore's public policies and were further strengthened with the Smart Nation Strategy *(Smart Nation & Digital Government Office, 2020).* Since 1965, the government in power has launched pragmatic public service policy initiatives, such as a highly affordable housing scheme where 85% of the resident population have house ownership and the development of public education through six local universities with international academic excellence, as well as highly efficient subsidized healthcare and mass rapid transportation systems.

The Ministry of Manpower (MOM) focuses on overcoming skills gaps for new jobs to mitigate job losses for professionals, managers, executives, and technicians (PMETs), giving employers confidence with new hires and trainees. It operates several national schemes including Job Growth incentives, SG United Traineeship, Midcareer Pathway Programs and Professional Conversion Programs *(Workforce Singapore, 2020)*.

The Ministry of Finance (MOF) allocates fiscal supports for the Job Support Scheme, Wage Credit Scheme *(Inland Revenue Authority of Singapore, 2020),* Workfare Income Supplement, Progressive Wage

Policy, COVID-19 Support Grants and Workfare Special Payments to low-income earners to mitigate worsening income disparity. The Monetary Authority of Singapore (MAS) promotes Singapore as a regional hub for digital capital wealth management, digital banking and monitoring trading in cryptocurrencies for firms and retail investors.

The Ministry of Trade and Industry (MTI) actively initiates and participates in regional and bilateral free trade and digital economy agreements to improve trade connectivity and regional economic integration. The Ministry of Transportation (MOT) proactively seeks global connectivity and reactivates people-to-people connectivity through tourism bubbles, MICE and business travel.

The Ministry of Communications and Information (MCI) actively promotes e-government, the internet-of-things and initiatives towards building a smart nation through its statutory boards including the Infocomm Development Authority (IDA), the Info-Communication Media Development Authority (IMDA) and the Government Technology Agency (GTA).

The Ministry of Education (MOE) reviews all curriculum to ensure that the graduates of University, Polytechnics and Institute of Technical Education (ITE) are equipped for jobs by initiating Industrial Apprenticeship Programs, Multi-Disciplinary Approach and Life-Long Learning Programs and by moving away from being overly academic, with ITE as the jewel in Singapore's education system.

The MOE has four main strategies to equip students for the post-COVID-19 world in the fast-changing environment, which include: (i) Enhancing efforts to maximize opportunities for disadvantaged students by investing more to smooth out differences early in life, giving them full access to appropriate health, learning and developmental support; (ii) Ensuring that institutions have and will continue to build multiple pathways

for students to hone their strengths, as every child is unique and different approaches are needed to help them grow and learn; (iii) Ensuring that students develop attitudes and skills beyond book knowledge by continue to emphasize competitive advantage and human strengths; thus educators will focus on developing 21st century competencies including core values such as respect and resilience and skill sets such as critical thinking; and (iv) Pushing for more interdisciplinary learning to support career mobility and to better prepare Singaporeans; while subject specialization is still necessary, it is very important to nurture the ability to see the broader connections of things and work seamlessly across different disciplines.

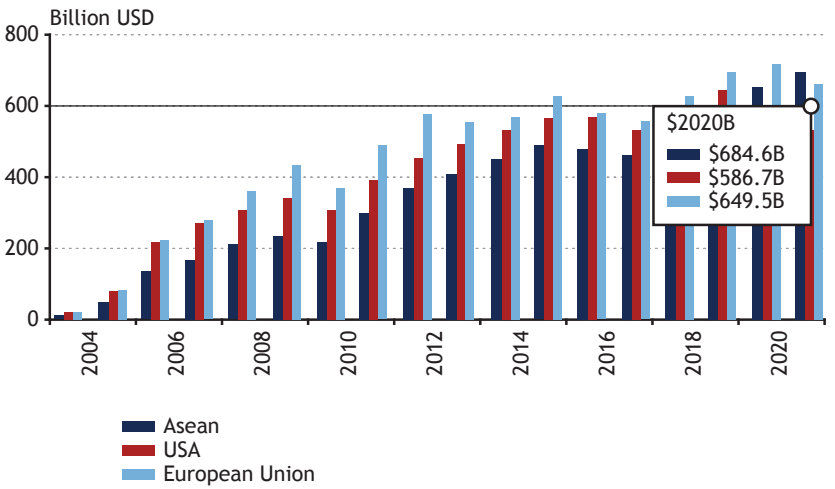
3. Efforts for greater regional cooperation and inclusive socio-economic integration amidst rapid digitalization

Under the guidance of the Asia-Pacific Economic Cooperation (APEC) Action Agenda on Advancing Economic, Financial and Social Inclusion, APEC economies have developed a holistic set of policies and measures to promote the multiple dimensions of economic inclusion and implemented relevant trade and investment initiatives and work plans (see *Tan, 2021*). Two pertinent questions to ask with regards to the potential challenges faced concern effective policy implementation and the resource constraints currently confronting governments, especially in the post-pandemic new economic normal. It is thus critical to discuss strengthening the government's role through pragmatic initiatives in the post-pandemic era for further economic integration and social inclusion in the new digitalized world.

2021 marked the 30th anniversary of establishing the ASEAN-China economic cooperation and another milestone was also recently achieved with the signing of the Regional Comprehensive

Economic Cooperation (RCEP) amongst the ASEAN 10+3 economies including China, Japan and Korea. Since 2020, ASEAN has become China's largest trading partner (*Global Times, 2021*), overtaking the USA and the European Union as shown in *Chart 4*.

Chart 4: South East Asian Nations overtake USA and European Union to become China's Top Trading Partner in 2020



However, several recent events pose serious challenges to development in the Asian region *(Tan, 2021)*. Firstly, the COVID-19 pandemic, which threatens the livelihood of people globally, including those in the Asia region. Secondly, the intensified trade frictions and animosity between the two largest economic powers, namely China and the USA, are cause for grave concern for ASEAN, as they have caused disruption in regional industrial production value chains. Thirdly, given the rapid progress in Big-tech and Fintech, how can ASEAN and China work together to overcome the challenges and exploit the opportunities posed by the digital economies in the new economic normal of the post-pandemic era?

First and foremost, we must ask ourselves the following questions: Are there concrete initiatives, in which innovative manners, and what should be the optimal approach so that ASEAN and

China can work closely together to further regional economic cooperation and maintain the stability of regional economic integration in the increasingly digitalized world?

ASEAN is an important backyard of China. The rise of China will be meaningless to her neighboring countries if there is no sharing of common prosperity through the division of labor and greater socio-political understanding. Promoting a closely coordinated ASEAN-CHINA economic nexus will be in the best interests of the two economic entities, which can be justified further by the geographical proximity, the rising middle classes and the huge market potential in ASEAN, which has a population equal to almost half that of China. It is thus important for the two largest powers in the world to know that ASEAN should not be forced and would not like to choose sides, as ASEAN prefers to work closely with both.

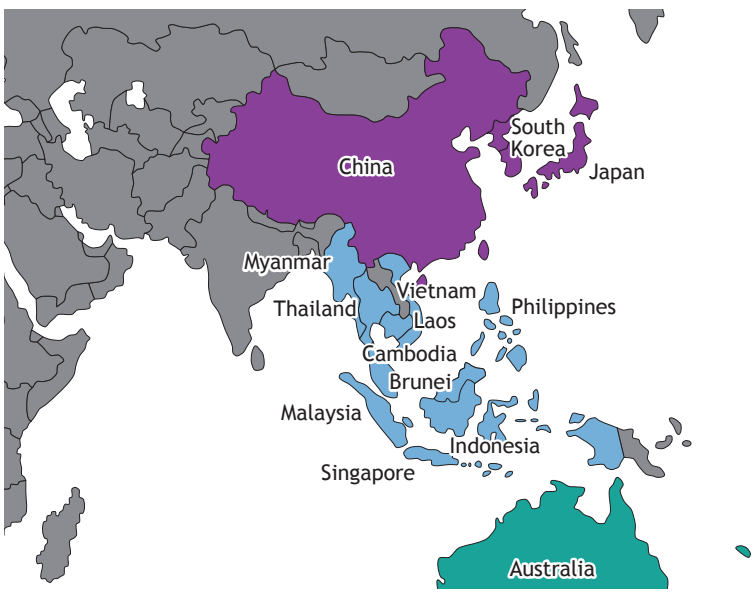
In the face of mounting geopolitical tensions, it is important for China to reassure its ASEAN neighbors with a good narrative on China's story of economic and social development by promoting our common destiny by way of closer cooperation and facilitating better understanding through people-to-people connectivity. China could adopt a harmonious and magnanimous attitude towards its ASEAN neighbors which has no economic, political or military threats, except some fishing ground issue with Indonesia and some territorial disputes in the South China Seas with some ASEAN members such as Vietnam, the Philippines, Brunei and Malaysia, which should be resolved through constructive dialogue. In recent years, the good progress in negotiations over Codes of Conduct has managed to lower the political temperature and climate, which are positive developments *(Viet, 2020).*

Infrastructure bottlenecks rank amongst the biggest challenges to ASEAN'S economic development. China's Belt and Road Initiative (BRI) with infrastructure projects and green financing should be welcome. The government of China and management of Chinese

companies, including state-owned enterprises (SOEs), can be further improved through attempts to understand local business practices and respect local cultural, religious, language and social norms, which are sometimes caught short. Initiating joint ventures with reputable indigenous companies, the localization of white-collar middle management and efforts to reduce exporting Chinese blue-collar workers abroad will be the three major challenges Chinese SOEs must learn to master.

For a win-win partnership, Singapore and China should work closely together to invest in a third country within ASEAN. Such cooperation would take into consideration China's advantages in terms of advanced technology, capital and economies of scale, along with Singapore's strong governance, financial innovation and long-standing working relationship with ASEAN governments with socio-cultural familiarity amongst local communities.

Chart 5: Regional Comprehensive Economic Partnership: The Fight Over the Asian Block



Source: ASEAN Secretariat

RCEP is based on the concept of ASEAN centrality *(Oba Mie, 2020)* and so it is more critical to ASEAN than any other regional trade pacts as illustrated in Chart 5. More foreign investment will be attracted through RCEP, and the multinational corporations of Japan, China, and South Korea will invest in ASEAN to avoid the tariffs of US-China trade frictions. This may lead ASEAN to attract more FDI, creating more jobs and expanding the middle-class *(Petri et al., 2020).* However, RCEP is concluded at a lower standard than the Continuing Progress for Trans-Pacific Partnership (CPTPP).

China has actively pursued the Free Trade Agreement for Asia-Pacific (FTAAP) since the 22nd APEC summit in Beijing in November 2014. 21 member countries adopted the "Beijing Roadmap for the Implementation of the FTAAP" and announced APEC's principled position on the FTAAP which aims to be the most comprehensive, inclusive, developed and high-quality agreement in the Asia-Pacific Region. RCEP and CPTPP should work in parallel as pathways to FTAAP.

Finally, rapid development in the digital economies must be facilitated and managed through Digital Economy Agreements (DEAs), such as those that Singapore is currently negotiating DEAs with South Korea and United Kingdom and has signed with Australia, Chile and New Zealand *(Ministry of Trade and Industry, 2020)*. As a front runner in Big-tech and Fintech, China would find ASEAN a lucrative market and Singapore as a useful bridge and platform for Fintech to serve the ASEAN region. Within the APEC economies, and especially in relation to ASEAN and China cooperation and economic integration, the following five areas of cooperation must go hand in hand, given the rapidly digitalized world:

(i) Sharing experiences amongst the APEC economies, especially by China, in relation to the handling of COVID-19, collaboration in research studies for the development of vaccines and sharing

them as public goods amongst developing ASEAN, which will strengthen people-to-people connectivity.

(ii) How to deploy the substantial savings of Asian economies to fund economic projects and green financing in Asia and ASEAN, especially in infrastructure development as exemplified by the BRI. Hence, the professional evaluation of infrastructure projects, sound systemic financial supervision and prudent public fund management are prerequisites, and the statutory board named as Infrastructure Asia set up in Singapore is available precisely for the purposes mentioned.

(iii) Asian Development Bank (ADB), Asia Infrastructure Investment Bank (AIIB) and the World Bank Group (WBG) should work closer to provide advanced executive training to senior officials from member economies for managing cross-border investment fund flows and efficient platforms for cashless payment system, which will be the next stage of financial development.

(iv) Sharing expertise and technology in smart city development in ASEAN as the pace of urbanization intensifies. It is potentially feasible for Singapore and China to share comprehensive urbanization solutions for emerging cities in developing APEC economies.

(v) Sharing experiences and social-economic programs for poverty reduction and modernizing agricultural activities through internet marketing and e-commerce by China to ASEAN would be useful in raising standard of living of developing APEC economies.

4. Building an inclusive Asia-Pacific community through digital and people-to-people connectivity

In terms of strengthening Asia-Pacific people-to-people connectivity by managing, researching and coping with the COVID-19 pandemic, economies should share experience and exchange views on how governments could better manage the threat of pandemic diseases. Health authorities in the various economies could foster joint research efforts in the search for vaccines. Countries which have good capability in handling the pandemic and the production of vaccines should help the developing economies which have been severely impacted by COVID-19 by enhancing medical care facilities, healthcare capacity and vaccination drives.

Singapore can take the lead in facilitating public policy exchanges and business knowledge sharing via digital platforms, which can constitute a useful public good for ASEAN and is now made more urgent as the momentum is increased by COVID-19. Providing basic mobile services and online facilities as public goods for home-bound education will be useful given the potential for future pandemic outbreaks. Strengthening online capacity across space and educational levels in ASEAN via a common education platform and teaching facilities will be an efficient way of capacity building.

Digitalization is creating new industries as well as transforming many existing ones, such as finance, advanced manufacturing and healthcare. Digitalization also offers businesses, both small and large, an effective means to reach global markets. Building on the Smart Nation Vision, countries can tap into the economic opportunities offered by the digital economy. To do so, we must promote the adoption of digital technologies across all sectors of the economy.

In addition, we must build strong capabilities in digital technologies, especially in data analytics and cybersecurity, which can be applied flexibly across sectors. Data will be an increasingly important source of comparative advantage, and our ability to use it productively in the economy must be improved. Three specific recommendations can be offered to support small and medium enterprises (SMEs):

Recommendation A: Help SMEs to adopt digital technologies

- SMEs form the bulk of our enterprises and should be assisted with the adoption of digital technologies. This can be done by providing expertise as well as financing support. We can also accelerate the pace of adoption of digital technologies among SMEs via national initiatives such as the Networked Trade Platform (2019) and the National Payments Council (2017).

Recommendation B: Build deep capabilities in data analytics and cybersecurity

- The Government should support the development of digital capabilities such as applied data analytics by establishing joint laboratories with industry players. Such partnerships can promote innovation and help train data scientists. The Government can also use National Service to develop deep, niche skills in cybersecurity among Full-Time National Servicemen, given the strategic importance of cybersecurity to the economy as well as national security.

Recommendation C: Harness data as an asset

- The Government should establish a dedicated program office to support enterprises in making the most of data as an asset. The office can provide industry-specific regulatory guidance and co-develop flagship data science projects that will have positive demonstrative effects on other enterprises.

5. Some concluding remarks: The proactive role of the government versus free and fair market competition

Currently, there are at least three broad challenges which are crucial to address:

As the waves of the COVID-19 pandemic continue to spread and rage through the world, and even after they subside, a new form of pandemic is to be expected in the future, as past experience has frequently shown. One painful lesson that many governments have learned this time, especially in countries where the number of victims has been unacceptably high, is the lack of coordination at national and international levels in term of cross-border pandemic controls and the production of vaccines as a public good which left much to be desired.

Mounting challenges are currently faced by global economies: it is not just the inequitable distribution of the fruits of globalization, but also the lack of digital infrastructure for quick access to market information that has led to an uneven playing field between MNCs and SMEs and exacerbated income disparity and job losses. This shortcoming seriously affects economic competitiveness with free and fair market competition.

Failure to empower new technologies for the public at large may lead to the threat of a wider digital divide and exacerbate income disparity in both developed and developing economies. Stakeholder capitalism, which is consistent with the United Nations SDGs' plan of action for people, planet and prosperity to achieve sustainable and green development, must be actively pursued over time.

Incidentally, all three of the broad challenges outlined above highlight the inertia of domestic governments and their lack of coordination at the international level. Public-private sector partnerships must be an

important way forward so that private tech companies are allowed to take the market lead with less regulation and red tape and improved ease of doing business. Labor market failure in terms of job skill mismatches must be addressed by governments through public policy initiatives in skills upgrading and life-long learning. Economic reforms to gravitate towards stakeholder capitalism require restructuring in order to balance stakeholders' interests through policy and remedy measures at the government level, along with supervision by related international agencies.

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Chapter 6

Education

Central Bank Activities Supporting Education and Research in Eurasia

Levente Horváth – Kristóf Lehmann

In the 21st century, finance, technology, innovation and education form the foundations of development, and it is an important role of the state to facilitate this. As economic development is closely linked to the creation of a knowledge-based society, science and education also affect the activities of central banks. The world's central banks support a wide range of educational activities and research, both internally and externally, in cooperation with various universities and think tank centres. The Magyar Nemzeti Bank is also at the forefront of this process, as it plays a key role in supporting Hungarian science and higher education through its various programmes and initiatives.

The aim of this paper is, on the one hand, to present the activities of Asian central banks, which are becoming increasingly important in the Eurasian era, regarding the countries that are considered most relevant to the topic. The second half of the paper focuses on the activities of the Magyar Nemzeti Bank as a case study, creating a basis for comparison with foreign central banks.

Journal of Economic Literature (JEL) codes: A20, E58, I20

Keywords: Eurasia, central banks, Magyar Nemzeti Bank, education, research

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1. Introduction

In the 21st century, finance, technology, innovation and education form the foundations of development, and it is an important role of the state to facilitate this. As economic development is closely linked to the creation of a knowledge-based society, science and education also affect the activities of central banks. The world's central banks support a wide range of educational activities and research, both internally and externally, in cooperation with various universities and think tank centres. One example is the German central bank, which has set up its own university, or the Chinese central bank, which has created a finance faculty at the best university in China. The Magyar Nemzeti Bank is also at the forefront of this process, as it plays a key role in supporting Hungarian science and higher education through its various programmes and initiatives. To understand the true significance of these central bank activities, it is worth taking a closer look at the work of foreign central banks, particularly their role in supporting education, science and culture. Since in the new Eurasian era the world's economic and political centre of gravity is shifting more and more to the East, and as a consequence the development of these regions functions as an example for Hungary, the analysis will focus on the Eurasian countries, and within them primarily on the Asian states. Of course, a comprehensive description of the central banks of the (super)continent is not possible for reasons of space alone, and thus the study only covers the countries considered most relevant. The second half of the paper focuses on the activities of the Magyar Nemzeti Bank as a case study, creating a basis for comparison with foreign central banks.

2. The role of Eurasian central banks in the academic world

2.1. East Asia

Of particular importance to the People's Bank of China's (PBoC) education and research activities is the PBC School of Finance (PBCSF) which was established on 29 March 2012 as a joint venture between Tsinghua University and the PBoC and is also a continuation of the research centre set up by the PBoC in the 1980s. Its mission is to provide top-class education and promote cutting-edge research in the financial sector, following the advanced education model of international finance programmes and business schools. It is committed to building a world-class platform in the areas of financial education and finance and of policy research. The school offers PhD, MSc and bachelor's degree programmes, and even a double degree can be obtained in the Finance MBA programme. With these programmes, it contributes to the training of China's high-level, innovative and globally competitive financial professionals. The joint effort of the PBoC and the PBCSF has led to the establishment of the National Institute of Financial Research at Tsinghua University (NIFR). The Tsinghua PBCSF China Finance Case Center focuses on the research and development of finance, and the TSINGHUA Financial Review provides a platform for the financial academy. The Institute for FinTech Research (THUIFR) was jointly established by the Tsinghua University's PBC School of Finance, the Institute for Interdisciplinary Information Sciences, the School of Software and the School of Law to enhance research on financial technology law, the financial sector and its integration (AI, big data, the science and technology of financial supervision, and the incubation of fintech start-ups). Tsinghua PBCSF also offers a Financial Media Scholarship Programme to enhance the professional competence of media professionals and promote

the development of financial media in China. Harnessing the educational and research resources of the parent university, Tsinghua, and the school's connections, Tsinghua PBCSF has become a world-class financial education institution and a leading centre for financial research *(Tsinghua PBCSF, 2021)*.

It is also worth mentioning the Digital Currency Research Institute, within the framework of which the Chinese fintech giants Ant Group and Tencent have concluded a cooperation agreement with the PBoC to digitalise the country's currency. The Institute is located in Beijing, but sub-centres have been opened in several cities *(China Banking News, 2021)*.

In Japan, the Bank of Japan (BOJ) conducts research on the economic and financial conditions, the financial system and financial markets in order to implement monetary policy and conduct business operations efficiently. It also conducts theoretical and empirical studies on fundamental financial and economic issues. To provide appropriate background for the bank's policies and business operations, medium and long-term studies are used.

Its most important institution is the Institute for Monetary and Economic Studies (IMES), which was established in October 1982 as an internal body of the Bank of Japan to mark the centenary of the Bank's founding. The IMES conducts a wide range of research on the theoretical, institutional and historical aspects of monetary and economic issues with a view to providing an appropriate background for monetary policy. It is an important tool for the exchange of views with academia at home and abroad, and collects and disseminates monetary and economic research to the public. The IMES has invited eminent Japanese and international scientists to take up consultancy and honorary advisory positions, which includes advising the director of IMES on the institute's research activities and information exchange with the academic community. Research at the IMES is carried out in the following areas: theoretical and empirical analysis of monetary and economic issues; legal, accounting and

central banking studies; information technology studies; and historical studies related to monetary and economic issues and numismatics. The IMES organises national and international conferences which are scheduled annually and bring together central bankers and researchers from international institutions and distinguished academics from different countries. The IMES also invites scientists and other experts to give occasional lectures and symposia at the institute *(IMES, 2021)*.

The Bank of Korea (BOK) also focuses mainly on research on economics and finance. The Economic Research Institute, the Bank of Korea's medium- and long-term research unit, was also established in this spirit. It contributes to the design and implementation of monetary policy through research on economic issues and the challenges ahead, while publishing high-quality studies and conducting research activities. By conducting cross-cutting research, the Institute supports the business operations and policy implementation of the Bank of Korea's key departments. It also acts as an advisor on government policy and focuses on developing exchanges and collaborative links with academia and other major research institutions. The Institute's main areas of research are strengthening the effectiveness of monetary policy, developing the financial system and industry, and providing the basis for the sustainable and stable growth of the Korean economy. The Institute publishes the related research results in a dedicated journal *(BOK, 2021)*.

2.2. South Asia

In the case of India, it is important to note that the Central Bank of India is a state bank, but not the central bank of India. Central bank duties are handled by the Reserve Bank of India (RBI), which was established in 1935 and is based in Mumbai. In the area of research support, an important role is played by the Development Research Group (DRG), established in November 1991 by the RBI Department of Economic and Policy Research (DEPR) to support

policy-oriented research that contributes strong analytical and empirical results to the topics of interest. Through the DRG, the RBI provides financial support to individual researchers/experts and universities/research institutes to facilitate theoretical and quantitative research and education/training in economics, banking, finance and other subjects of interest to the Bank.

In practice, the DRG supports research in a number of ways, e.g. by setting up professorial chairs at prestigious universities in India, and it has established the Corpus Funds to finance their teaching and research activities. It also supports the publication activities of non-profit research institutions. Supporting conferences, workshops and seminars is also part of its mission. The RBI provides financial support to professional bodies, research associations and universities/research institutes to organise seminars, conferences and workshops on topics relevant to the Bank. It also provides support for long-term research projects.

The RBI has also launched a scholarship scheme called the Scholarship Scheme for Faculty Members from Academic Institutions. This includes support for short-term research on monetary and financial economics, banking, real sector issues and areas of interest to the central bank. In principle, full-time faculty teachers in economics and/or finance at any UGC-recognised Indian university/college in India are eligible to apply *(Reserve Bank of India, 2020)*.

The Reserve Bank of India also plays an important role in education through the RBI Academy as its own training institution, which has been holding courses since 2016. Its main goal is to train central bank professionals in the following areas: macroeconomics, microeconomics, corporate finance, statistics, econometrics, information technology, risk management, financial markets, human resources, cyber security, DSGE modelling and Big Data. Partner educational institutions include the Indian Institutes of Management, the Indian Institutes of Technology, the Indian Statistical Institute, the Delhi School of Economics, the

South Asian University and the Shri Ram College of Commerce. They run special, tailor-made courses for RBI staff and work with partner organisations such as the Federal Reserve, IMF SARTTAC, ISACA and Oliver Wyman. The RBI Academy has a long-term plan to become a regional hub for capacity building among central banks in developing countries.

The State Bank of Pakistan was established in 1948 and is based in Karachi. Pakistan's central bank supports education and research in the country through several scholarship programmes. The SBP Merit Scholarship Scheme 2020-2021 has been announced for the children of SBP employees and is open to those who are studying at secondary or higher education level and have finished their studies with a minimum of B/60 percent in all years in any discipline *(State Bank of Pakistan, 2021a)*.

The Zahid Hussain Post-Doctoral Research Fellowship Program at the State Bank of Pakistan is an opportunity for researchers with a PhD in economics, as its main objective is to involve young researchers in the SBP's research activities in areas of global and national importance (during the fellowship the researchers work at the SBP's Research Department in Karachi).

The National Financial Literacy Program was launched on 12 January 2012 by the SBP with the goal of increasing financial literacy among low-income households and the young. To this end, the SBP is gradually building up its links with educational institutions to broaden financial education (*State Bank of Pakistan, 2021b*).

2.3. Russia and Central Asia

In 2012, the development of education and research was named as the second national strategic goal of the Russian Federation. The Ministry of Science and Higher Education of the Russian Federation has therefore developed a federal target programme to modernise the structural organisation of education and

research with the title "Research and development in the priority development areas of Russia's scientific and technological complex for 2014-2020" (*Кубанский Государственный Технологический Университет, 2014*). As part of the new project, the existing research system was restructured and ongoing reorganisation has been launched.

In 2014, the leadership of the Central Bank of the Russian Federation (Bank of Russia) decided to become a sponsor of the programme, which identifies strategically important areas for education, such as the military industry, medicine, biochemistry, IT and humanities. The Bank of Russia currently plays a major role in financing more than 100 universities in Russia. With its support, it has given universities and university-based research and development centres a national strategic role. One of the fundamental changes has been that, thanks to the Bank of Russia's support, Russian students and researchers (MSc students, PhD students and PhD holders) have had greater opportunities to study abroad, mainly in Asia (*Министерство Науки и Высшего Образования Российской Федерации, 2021*).

With the support of the Bank of Russia, a "Grant from the Government of the Russian Federation to foreign citizens enrolled in bachelor's, specialised and master's programmes in Russian educational institutions" programme has also been launched, under which foreign students can study Russian language and literature, history as well as any engineering and IT courses at Russian universities, free of charge or with scholarships. This programme is also announced every year in Hungary, where the Russian Ministry of Education provides scholarship courses for Hungarian citizens (*Russian Cultural Centre, 2021*).

Currently, the programme "Research and development in the priority development areas of Russia's scientific and technological complex for 2014-2020" is in its final phase. The new education development programme will be a longer-term programme called

"Priority 2030" (*Министерство Науки и Высшего Образования Российской Федерации, 2021*).

The Central Asian countries (Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan) clearly see the future in catching up in education, training, technological development and science.

One common feature of education policy in the region is the emergence of the role of national banks in education. These mainly consist of financial and technical assistance, complementary funding from the Central Asian states to the ministries of education and their related institutions. In the first decade of the 21st century, national banks in Central Asia started to invest in higher education. In this spirit, the Central Asian University was created in 2000. It was the first university in the region to be established solely with the help of national and development banks. Its memorandum of association was signed by the presidents of the Kyrgyz Republic, Tajikistan and Kazakhstan. The aim of establishing the university was to create a knowledge hub that could continue to thrive in the most underdeveloped regions of Central Asia. As a university focusing on the development of mountain communities, the University of Central Asia offers economic training under national bank programmes, together with the universities of Naryn (Kyrgyzstan) and Khorog (Tajikistan), located at the foot of the Tien Shan and the Pamir Mountains respectively, which will contribute to the economic development of the region. The campuses of the University of Central Asia have been purposefully selected along the lines of the "Belt and Road Initiative" to make innovation and the flow of technology even easier for students. In addition, international programmes (Erasmus+, MIND, etc.) enable students to take part in study trips abroad and bring the knowledge they have acquired back to their home country (*Иссык-Кульский государственный университет им. К.Тыныстанова, 2019*).

The Vocational Education and Training in Central Asia project, the largest education and training programme in the region, was established in early 2019 (*Университете Центральной Азии, 2020*). The aim of the project is to find and train the right workforce for the food industry in Central Asia, which is essential to make the economy competitive. The key feature of the project is that it is a joint venture involving Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan, and the financial conditions for the project are jointly provided by the national banks of the countries. The Vocational Education and Training in Central Asia programme supports vocational training in the food production sector in the participating partner countries. The project aims to train professionals for the food industry, building on the experience gained in the region, using trained teachers and professionals and developed and improved curricula.

Uzbekistan is one of the countries in the region where the role of national banks in research and development is becoming more prominent. Over the past few years, the National Bank of Uzbekistan has been working within the framework of the "Free Economic and Small Industry Zone" project to implement all economic stimulus investments that can bring the country to the forefront of Eurasia (*Центральном банке Республики Узбекистан, 2018*). Most of the projects in the programme are in the fields of renewable energy and education development.

From a Hungarian perspective, it is important that Uzbekistan plans to completely replace imports of seed potatoes by 2024. The establishment of the Uzbek-Hungarian Potato Research Centre is also included in the above-mentioned programme and is a priority project. Of the countries in the region, Uzbekistan is the most open and advanced in terms of support for young people, research and cooperation with other countries. Thanks to the work of the National Bank of Uzbekistan (which, unlike other countries in the region, mainly draws on foreign examples for funding), the country is a leader in research funding in Eurasia.

The National Bank of Tajikistan, as part of its mandate as the country's central bank, has recently introduced an education support programme as an economic and research project. In 2016, the Bank's management (with the support of the World Bank) developed a national action plan, called the Strategic Priorities Action Plan, which will enable the National Bank of Tajikistan to play an active role in restructuring the country's education system and in developing support for innovation, research and development. As part of the Strategic Priorities Action Plan, for the first time universities and research centres were taken out of state control and placed under the supervision of another body (National Bank of Tajikistan). As part of the project, expectations are for education reforms to be properly implemented, and for research networks to be integrated into international life. The priority objective is to connect to Chinese scientific and research networks.

Following the Covid-19 outbreak, the National Bank of the Kyrgyz Republic launched the "Young Professionals" programme for university graduates and young professionals in economic and other fields (*Ачкабар, 2018*). The aim of the programme is to create conditions and opportunities for young skilled workers to enter the banking profession directly, to enter into the work process of the country's central bank, and to put young graduates on a career path of research, providing them with suitable financial conditions. The Kyrgyz National Bank also aims to establish research centres.

2.4. Middle East

The Central Bank of Egypt established the Egyptian Banking Institute in 1991. It has a Research and Awareness department, which organises seminars, conferences and roundtable discussions with experts from the banking and finance sector. International experts are also invited to share their global experience on issues

of particular relevance to the banking sector. Papers are also published, which can be grouped as follows:

- Financial Information: Publication series to raise public awareness of modern banking and financial conditions;
- Specialized Research Papers: These cover cutting-edge financial and banking topics that are reviewed or evaluated by recognised professionals and academic experts;
- EBI Magazine: The magazine is published on a quarterly basis and focuses on the activities of Egyptian banks. It shares the ideas and thoughts of the senior management of banks on recent trends in the sector;
- Financial literacy booklets: These publications regularly cover key financial issues, which are discussed in a simple way, targeting young people, as the primary aim is to raise young people's financial awareness. An annual research competition is also organised to encourage young researchers in the banking sector to present their ideas on topics related to the financial and banking sector *(Central Bank of Egypt, 2021)*.

The aim of the Central Bank of the Republic of Turkey (CBRT) is to reach out to a wider audience through economic education programmes, an activity they refer to as "Economics for All". Economics for All aims to raise awareness by offering a variety of content on the economy and the central bank. To this end, CBRT produces publications for different target groups (available only in Turkish). In addition, conferences and events are organised. The title of the 2021 conference was "43rd Meeting of the Central Banks Governors' Club of the Central Asia, Black Sea Region and Balkan Countries" *(Turkiye Cumhuriyet Merkez Bankasi, 2021)*.

Saudi Arabia's AlAhli Bank merged with SAMBA on 1 April 2021 to form the Saudi Central Bank. The institution's education programme aims to support education and offer students scientific and practical knowledge through three programmes:

the AlAhli PC Labs Program, the AlAhli Educational Development Program and the AlAhli Endowed Chairs Program. Thanks to the first programme, 24 computer laboratories have been built on 14 campuses in 10 cities in the Kingdom. Under the second programme, talented students are supported and their access to universities is facilitated. The third programme plays a key role in expanding knowledge and developing thinking in scientific research. The programme is funded by individuals, institutions and companies, and supervised by professors to achieve and support the highest standards of scientific education and research (البنك الاهلي السعودي, ٢٠٢١).

2.5. Southeast Asia

In Indonesia, the role of the central bank is played by Bank Indonesia, which was established in 1953. The Bank's strategic objectives include "building competent human resources by supporting a knowledge-based work culture" (*Bank Indonesia, 2021*). The central bank plays a key role in higher education and research.

In 2004, the Indonesia Banking School (IBS) was established as a higher education institution by the Indonesian Banking Development Foundation (YPPI), a foundation of Bank Indonesia. The latter is responsible for human resource development in finance and banking in the country. The Foundation also functions as an educational and training institution for financial organisations and has proven its effectiveness over the decades. IBS offers formal education programmes for students in bachelor's and postgraduate training. There are three programmes of study in the bachelor's programme (BA), namely accounting, management, and Islam and banking management. For postgraduate students the Master of Management Programme (MM) has been launched. This two-level course (SE and MM) provides a competitive diploma, particularly in the fields of finance, banking and business. The Indonesia Banking School

has the full support of Bank Indonesia (BI) and the Financial Institution Authority (OJK), as evidenced by the fact that the latter's leaders have been appointed to the IBS Board of Curators *(Indonesia Banking School, 2021).*

To implement its mandate, Bank Indonesia has established partnerships with a number of universities across the country. To date, BI has signed Memoranda of Understanding with 81 universities, covering cooperation in the areas of central banking education, central banking research, management and community service. The Indonesian central bank offers a number of scholarship opportunities for students across the country, mainly in the field of science education at partner universities *(Institut Teknologi Sepuluh Nopember, 2021).*

To facilitate cooperation between the central bank and universities, SPEKTRO was established in 2017 as a national Knowledge Management System, an interactive knowledge exchange media platform between Bank Indonesia and universities that integrates local knowledge into central bank education, while also providing input to promote BI activities. The latter's stated ambition is to become a world leader in teaching, learning and research.

Malaysia's central bank, Bank Negara Malaysia, established in 1959, also plays a prominent role in supporting Malaysian higher education, notably thanks to the Asia School of Business (ASB) established in 2015 in partnership with the MIT Sloan School of Management. ASB aims to become Asia's leading school of management. The high level of professionalism is guaranteed by the partnership with MIT in the US. Its MBA course has also been awarded with the title of "The Most Innovative MBA" in the world. In the institution, MBA full-time and Working Professionals degree programmes are operated. Launched in 2021, the Master of Central Banking (MCB) education programme focuses on Asian and emerging markets.

The Iclif Executive Education Center (Iclif) was founded in 2003 by Bank Negara Malaysia as an Asia-based non-profit organisation dedicated to the strengthening of leadership and governance skills in the Malaysian financial sector. In 2020, Iclif merged with ASB and now offers courses in finance and management for managers *(Asia School of Business, 2021)*.

The Malaysian central bank offers scholarship programmes to support young people studying in the areas of economics, accounting, finance, actuarial science, mathematics, statistics, data science, law and computer science at the best universities in the country. The Kijang Scholarship supports participation in undergraduate programmes at colleges before university. The Undergraduate Scholarship is for students studying in bachelor's programmes, while the Postgraduate Scholarship is for MA and PhD students. *(Bank Negara Malaysia, 2021)*.

In Singapore, the Monetary Authority of Singapore was established 50 years ago in 1971 to serve as the central bank. The institution has played a key role in the country's unique development and continues to be a major promoter of excellence in education and innovation. It is in this spirit that the Asian Institute of Digital Finance (AIDF) was established within the National University of Singapore (NUS), jointly founded in 2020 by the Monetary Authority of Singapore (MAS), the National Research Foundation (NRF) and NUS (*Monetary Authority of Singapore, 2021a*). With a focus on FinTech, the AIDF conducts research on the following topics: AI and Smart Decision Analytics, Trusted Financial IT and Infrastructure Deep Credit Analytics Lab and Whitespace Research Projects/Initiatives. In terms of education, the Institute offers MA and PhD courses in Digital Financial Technology (Singapore's first PhD programme in the area of FinTech) and scholarships for the most talented students. It also provides additional stand-alone courses and specialised training opportunities *(NUS, 2021)*.

The Monetary Authority of Singapore also supports students in higher education with direct scholarships. Secondary school students and students participating in BA or MA programmes are all eligible to apply for scholarships – for the latter with the exception of Medicine, Dentistry and Architecture – which are open to students studying at any university in the country or abroad *(Monetary Authority of Singapore, 2021b)*.

The Financial Specialist Scholarship (FSS) programme offers postgraduate training for people working in the financial services sector. Organisationally, it is part of the Institute of Banking and Finance Singapore (IBF), a non-profit organisation established in 1974 to promote knowledge of the financial sector.

For professionals in the fields of financial risk management, financial engineering and economics who wish to work in universities and research institutes in Singapore, the Monetary Authority of Singapore launched the Doctorate Scholarship Programme (DSP) in 2007. Scholarship-based PhD training is also linked to initiatives such as the Financial Training Scheme and the Financial Industry Competency Standards, demonstrating the close partnership between industry and government *(Monetary Authority of Singapore, 2021c)*

3. Case study: The role of the Magyar Nemzeti Bank in the academic world

In line with the objectives set out in its Mission Statement and Corporate Social Responsibility Strategy, the Magyar Nemzeti Bank (MNB) continuously launches and supports initiatives to raise and improve the quality of higher education in order to contribute to the public good, social cohesion and overall financial awareness. Since 2013, the "Pallas Athene Public Thinking Programme" has created a new opportunity to expand these activities and set ambitious goals. The educational initiatives

launched and coordinated by the central bank itself and through its foundations, in cooperation with prestigious domestic and foreign higher education institutions, research centres and think tanks, place particular emphasis on developing talent, fostering scientific dialogue and supporting scientific research to further strengthen quality higher education and international scientific cooperation *(Magyar Nemzeti Bank, 2014)*.

3.1.1. MNB Institute

The Magyar Nemzeti Bank and the Corvinus University of Budapest signed a cooperation agreement in 2015. One of the results of this was the establishment of the MNB Department at the Faculty of Economics of the Corvinus University of Budapest, which supported the University's economics education in a variety of ways *(Magyar Nemzeti Bank, 2015)*. One of the most significant results of the joint efforts was the creation of the specialisation in Central Bank Analysis, which was offered to students of the Master in Economic Analysis Course (MA) at the Faculty of Economics.[55] From the summer of 2020, the MNB Department continued to operate as an independent institute, the MNB Institute. One of the most important pillars of the cooperation is the Master in Economic Analysis course in Hungarian and English, the comprehensive reform of which started in January 2020. In addition to the Institute's lecturers, the transfer of a wide range of knowledge is facilitated by the senior managers of the MNB, experienced professionals and a number of academic and central bank experts from abroad joining in the education, which is unique in the Hungarian higher education in economics.

In addition to theoretical knowledge, the course also focuses on practical applications, so that students can see what experience-based education is like. One of the unique elements of the course was the creation of a specialisation in Central Bank Analysis,

[55] Based on a cooperation agreement signed in 2015 between the MNB and the Corvinus University of Budapest.

which enables students to deepen their knowledge of econometrics and macroeconomics, and to complement this with financial and economic policy knowledge.

3.2.2. GEO Institute

Another priority area of cooperation between the Magyar Nemzeti Bank and the Corvinus University of Budapest is related to the Faculty of Social Sciences and International Relations. The Institute of Economic Geography, Geo-Economics and Sustainable Development was established in 2015 on the basis of previous departments to focus on regional, urban and global aspects of the economy, geopolitical change and sustainable development.[56] The geographical focus of the Institute's activities is on Asian relations (e.g. the New Silk Road) and Hungary's relations with the European Union. As a result of this cooperation, a renewed master's programme and two new specialisations for undergraduate students have become available. In the framework of the cooperation, the master's degree in Regional and Environmental Economics was renewed and relaunched, specialising mainly in geostrategy, development policy and policy planning. For visiting lecturers and students, the Geo-Lectures series is worth mentioning, which promotes receptiveness to and discussion of geographical and geopolitical economic issues *(Origo, 2020)*. The cooperation also supports research in economic sociology, curriculum developments serving internationalisation and research at the Faculty. With the professional support of the MNB, a new doctoral programme in geopolitics has also been launched in English at the Corvinus University of Budapest's Multidisciplinary Doctoral School of International Relations. Students were awarded scholarships based on their academic achievements and research work.

[56] Based on a cooperation agreement signed in 2015 between the MNB and the Corvinus University of Budapest.

3.2.3. MBA programme offering a Fudan-Corvinus dual degree

With the professional support of the Magyar Nemzeti Bank and the cooperation of two leading higher education institutions, the Fudan University of China and the Corvinus University of Budapest, the first Chinese-Central European dual business degree programme was established in 2018 (*Magyar Nemzeti Bank, 2019*). The training provides a unique regional insight through a presentation of key leadership trends. Upon successful completion of the course, participants can obtain a master's degree in finance (MSc) from the Fudan University and a master's degree in business administration (MBA) from the Corvinus University of Budapest. In an era of globalisation and a multi-polar world economy, to become a good leader and face the most important economic and geopolitical challenges, one needs to know the business cultures of both the East and the West.

As a result, the expectations of present and especially future leaders have broadened, and the ability to build a network of contacts with leaders, civil servants and decision-makers in other regions has become a key aspect, in addition to general leadership skills. For both Central Europe and the European Union, it is increasingly important to deepen cooperation with China and to understand how the Chinese and Asian economies work and develop. The "Belt and Road Initiative" and the "China-Central and Eastern Europe 16+1" programme provide an excellent opportunity for further cooperation between countries and the development of possible new links on the "21st Century New Silk Road" (*Magyar Nemzeti Bank, 2020*). The MBA programme, including the knowledge imparted by the programme's Western and Eastern lecturers, provides useful guidance in the new multi-polar economic environment. In addition to leading speakers from the two universities, the programme is supported by guest speakers from the Magyar Nemzeti Bank and regionally renowned companies.

The cooperation between the MNB and the Corvinus University of Budapest has achieved excellent results in a number of areas between 2015 and 2021 which were previously unimaginable in Hungarian higher education in economics. Based on these experiences, the MNB reviewed its education strategy in the first half of 2021, as a result of which it declared its cooperation with the Corvinus University of Budapest successful and thus completed *(MTI, 2021)*. In the new, foundation-based higher education system in Hungary, the MNB needed to rethink its role, and after more than six years of successful cooperation, the two institutions are now parting ways *(Portfolio, 2021)*.

3.2.4. Dual programme with John von Neumann University

John von Neumann University – one of the newest universities in Hungary – was founded in 2016 as the successor of the Kecskemét and Szolnok colleges. It has been a major educational centre in the Southern Great Plain region for decades. The MNB established a cooperation with the University's predecessor *(John von Neumann University, 2021)* with the aim of creating a high quality educational institution with international recognition *(Magyar Nemzeti Bank, 2020)*. With the professional support of the central bank, the students of the Bachelor of Business Administration and Management, Bachelor of International Business Administration and Bachelor of Finance and Accounting courses can now participate in the dual programme between the central bank and the university. As a pioneer in the country and in close cooperation with companies in the region, the University has launched a dual training programme based on the German model. In addition to a number of companies offering training opportunities to students, the Magyar Nemzeti Bank also participates in this practice-oriented programme. The programme was renewed by the two institutions in the first semester of 2021 in order to provide better support to students in their work.

3.2.5. MNB Excellence Scholarship

Every year, the Magyar Nemzeti Bank supports more than 400 higher education students through the Excellence Scholarship Programme, in which nearly 30 higher education institutions participate. The scholarship programme started in 2016 and is open to talented Hungarian and foreign undergraduate and master's students in economics *(Magyar Nemzeti Bank, 2021a, 2021b)*.

3.2.6. Money Compass Foundation

Established in 2008 at the initiative of the Magyar Nemzeti Bank, the Money Compass Foundation helps people in various age groups successfully manage everyday finances through various educational programmes and awareness-raising initiatives. The Foundation plays a flagship role in the central bank's youth financial education activities. The backbone of its programmes is the intensive school textbook and content development and teacher training programmes which are integrally linked to the ongoing modernisation of public education curricula. In recent years, thanks to the professional and financial support of the MNB, a number of successful programmes have been implemented by the Foundation to promote financial and economic education in public education. Outstanding among these is the publication of accredited financial and economics textbooks for secondary and primary schools, which reach around 130,000 students *(Pénziránytű, 2021)*.

There are examples of similar organisational units both internationally and domestically *(Lentner et al., 2017)*. Looking at the central banks, the Bundesbank (the German central bank) has set up and maintains its own university, while the French central bank supports education in several universities, some of them at all undergraduate, master's and doctoral levels. A similar collaboration exists between the Bank of England (the UK central bank) and the University of Warwick Law School and Warwick Business School, which also offer a master's degree in central banking. If we look at specific examples in Hungary, we

can mention the Audi Department in Győr (Széchenyi István University; Department of Internal Combustion Engines), the Bosch Department at the University of Miskolc or the MOL Department at the Pannon University in Veszprém. In all of these cases, the companies can integrate a high level of practical and theoretical expertise specific to the field in question into the university education, while they can also provide the training of experts for themselves. On the whole, it is not at all unusual and, based on both international and domestic examples, such partnerships can work effectively for both parties.

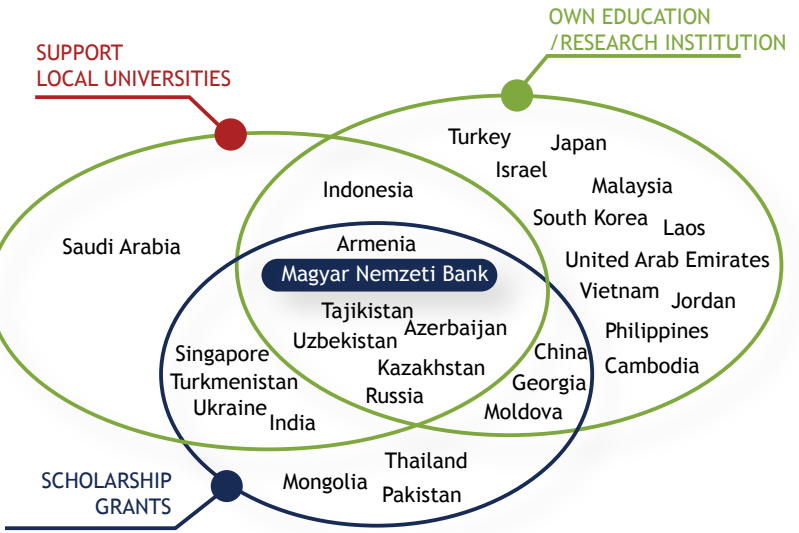
4. Conclusion

Looking at the education and research activities of central banks in different regions of Eurasia, it can be seen that since the 2010s central banks have been increasingly focusing on supporting higher education institutions, while also offering scholarships to motivate students to pursue their studies. To this end, some central banks are even setting up their own educational or research institutions. On the one hand, they can support teaching and university research activities, and on the other, they can train their own human resources. The Magyar Nemzeti Bank joined this growing trend in time, in 2013, and, like other central banks in other countries, is engaged in a wide range of education and research activities.

Overall, we can divide central banks into three groups in terms of support for education *(Figure 1).*

- Scholarship grants,
- University cooperations,
- Setting up own educational institution.

Figure 1. Education and research activities of central banks in the Eurasian region



Source: authors' compilation based on the research results

It can be seen that most Eurasian central banks have set up their own education and research institutions to gain an even greater insight into financial, economic and closely related geopolitical changes in a globalised world, in order to develop the most appropriate monetary policies in their countries.

They also believe it is important to encourage and train university students – or even primary and secondary school students – so that they have a suitable, informed grasp of economics when they start their careers after completing their higher education.

In addition, the central banks also provide a great deal of support to local universities to set up new research and training courses in joint cooperation.

These grants help countries to develop their higher education institutions and make them more competitive.

We can conclude that the education and research activities of the Magyar Nemzeti Bank are also outstanding at the international level, and it ranks among the leading central banks in Eurasia, because, as shown in *Figure 1,* the MNB is in the middle intersection of the three sets, i.e. it supports Hungarian universities, has established its own educational institution in the framework of the MNB Institute and the GEO Institute, and supports Hungarian young people with numerous scholarships. Not only did the MNB join the trend of central banks' support for education in time, since then it has become a model for many foreign institutions to follow in the future.

With the emergence of a new multi-polar world order, in which financial and economic measures are becoming increasingly important, it is crucial that labour supply is well trained and that central banks and economic institutions have a good understanding of the economic and financial implications of certain geopolitical events through research, so that they can respond appropriately to the challenges and opportunities of the Eurasian era.

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Chinese University-Affiliated Think Tanks and Cooperation with European Counterparts

Zongxian Feng

Based on the development and change of think tanks in China, this paper introduces the advantages and problems of university-affiliated think tanks in China in the current development phase. Combined with the Global Go To Think Tank Index Report, this paper compares the development status of think tanks in China and Europe, and points out their respective characteristics. This paper also introduces and analyses exchanges between think tanks in China and Europe, especially the form and content of cooperation of university-affiliated think tanks. Finally, this paper puts forward the prospects and suggestions of cooperation opportunities between Chinese think tanks and European think tanks in the post-pandemic era.

Journal of Economic Literature (JEL) codes: E44, E58, G21

Keywords: university-affiliated think tank, European think tank, post-pandemic era, cooperation and development

1. Introduction

The phrase "think tank" comes from the West. It refers to a research institution that provides the best strategic solution for policymakers and policymaking bodies based on investigation,

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research, analysis and demonstration from economic, political and social aspects. In modern society, think tanks are organisations of public policy research, analysis, and engagement, generating policy-oriented research, analysis and advice on domestic and international issues, thereby enabling policymakers and the public to make informed public policy decisions. These institutions serve the public interest by bridging academic and policymaking communities as well as states and civil society.

University-affiliated think tanks play an important role in strategic research, policy advice, talent cultivation, and public opinion guidance. In the face of the current domestic and international environment and development trends, the building of university-affiliated think tanks in China is becoming increasingly important and urgent. Against such a distinct historical background, university-affiliated think tanks in China also face unique development opportunities. However, their related functions have not been fully developed. As an important part of China's think tanks, university-affiliated think tanks must be introduced in the context of China's historical and current reality to provide people with a deeper understanding. Meanwhile, in the era of globalisation, think tanks in China are actively concerned with international issues in addition to national economic, cultural and social issues, and increasingly attract global attention, which further requires positioning in a global context for a more comprehensive understanding. China and European countries have historically enjoyed close economic and cultural relations that have deepened and become more extensive in modern times.

With the development and background of Chinese think tanks, this paper elaborates the advantages and challenges of university-affiliated think tanks in the current development phase. It compares Chinese and European think tanks based on their respective development. The forms and content of cooperation between university-affiliated think tanks in China and Europe are also introduced and discussed. On this basis, the paper suggests

prospects for cooperation between Chinese think tanks and European think tanks, and offers targeted advice.

2. Historical development of think tanks in China

Modern think tanks have existed for merely a century. But in a broad sense, think tanks have a longer history. There were numerous concepts and practices related to "think tanks" in ancient China.

2.1. Think tanks in ancient China

Think tanks have existed in all Chinese dynasties. In ancient times, there were aides and advisors working for top officials, which was a form of think tank. Xia and Shang dynasty vassals and Zhou dynasty titled officials may be regarded as early forms of aides and advisors. In ancient China's Spring and Autumn period, and the Warring States period, the system of keeping skilled scholars was established in vassal states. For example, during the Warring States period, Wei Wuji from the State of Wei, Tian Wen from the State of Qi, Zhao Sheng from the State of Zhao, and Huang Xie from the State of Chu, each maintained 3,000 skilled scholars, including the "think tank" composed of strategists. These scholars put forward national governance strategies through debates and arguments. State of Qi rulers treated these scholars with respect and allowed them to "talk about state affairs without taking office". Consequently, schools set up by local governments had two purposes: education and think tanks. Many contemporary scholars had the same salary as mid-level officials *(Chen, 2017)*.

Established in the Qin dynasty, the scholar-advising system was followed and improved during the Han dynasty. According to the *History of the Han Dynasty*, the prerequisite for becoming a scholar-adviser was to "be erudite and well-informed" and the

responsibility of a scholar-adviser was to "participate in political discussions and assist decision-making". Normally, the imperial court would have a "think tank" composed of a dozen scholar-advisers, and such a "think tank" already took on a considerable scale. In the Han dynasty, there were aides and advisers for top officials, and *Zhangshi* (secretary-general), *Canjun* (military adviser), and *Zhubu* (clerk) appeared later and were military staff officers. After the imperial examination system was introduced in the Sui and Tang dynasties, most intellectuals who did not pass the imperial examination would find a job in advisory institutions. In the middle and late Ming dynasty, private advisers emerged. In general, the purpose of think tanks in ancient China was to stabilise feudal rule and maintain the majesty of imperial power. In short, think tanks existed to assist the emperor in governing the state and advising on how to defeat enemies (*Zhu–Jiang, 2016*).

2.2. New-type think tanks with Chinese characteristics

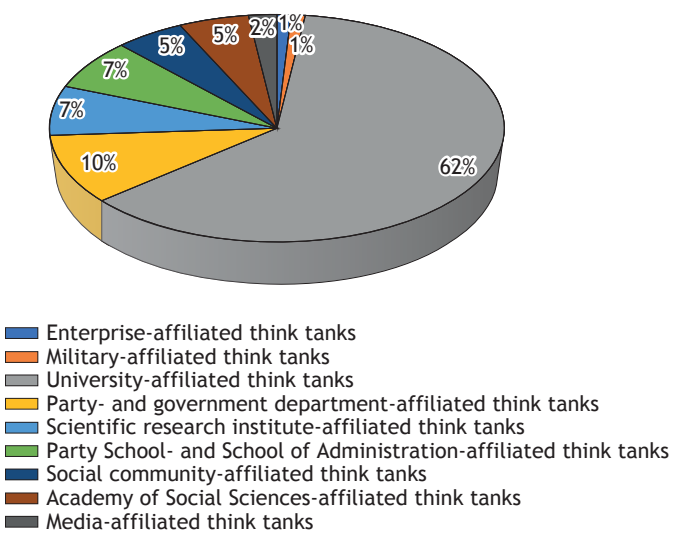
Modern think tanks are professional research institutions centred on public interest and social responsibility as the criterion.

A new-type think tank with Chinese characteristics is a non-profit research and consulting institution focusing on strategic issues and public policies and aiming to serve the scientific, democratic, and legal decision-making of the Party and the government. A new-type think tank should: (1) be a relatively stable research institution that abides by national laws and regulations and operates normally; (2) focus on specific research fields such as decision-making and consultation with distinctive characteristics, have long-term concerns and produce research results; (3) employ representative figures with certain influence in particular fields, and full-time researchers; (4) have secure and sustainable funding sources; (5) have access to multi-level academic exchange platforms and channels of achieving commercialisation; (6) have a fully functional information collection and analysis system; (7) have a sound managerial structure and Articles of Association;

and (8) have an environment to enable international cooperation and exchanges (*Xinhua News Agency, 2015*).

There are several classification standards of think tanks. Based on the constitutors, think tanks can be classified as government-affiliated, non-government-affiliated, and university-affiliated. According to the 2018 CTTI Think Tanks Development Report[57], by late 2018 the 706 think tanks included by CTTI can be placed in nine categories – university-affiliated (441), political party- and government-affiliated (69), Academy of Social Sciences-affiliated (51), Party School- and School of Administration-affiliated (48), social community-affiliated (36), scientific research institute-affiliated (34), media-affiliated (13), enterprise-affiliated (8), and military-affiliated (6).

Figure 1: Proportion of different types of CTTI think tank (2018)



Source: 2018 CTTI Think Tank Development Report

[57] Chinese Think Tank Index (CTTI) is an institute for collecting, sorting, authenticating, preserving, retrieving and utilising the data of Chinese think tanks.

2.3. Development positioning and characteristics of university-affiliated think tanks in China

Since the 18th CPC National Congress, building think tanks has become a national strategy. In 2014, the Ministry of Education issued the Plan to Promote the Building of New-type University-Affiliated Think Tanks with Chinese Characteristics, clearly indicating the positioning, objectives and approaches of establishing university-affiliated think tanks, as well as the requirements for talent training, platform construction, mechanism setup, and assurance development. Some scholars suggested that university-affiliated think tank research results can help the government make more scientific, democratic, and law-based decisions, and further stressed that the real value of university-affiliated think tanks lies in advising the government on decision-making, evaluating policy effects, and guiding public opinion. University-affiliated think tanks also help make the government decision-making process more transparent and broaden the channels for intellectual elites in universities to participate in and discuss politics (*Wen, 2015*). In the new era, the building and development of new-type university-affiliated think tanks with Chinese characteristics is a concrete embodiment of university-affiliated think tanks strengthening the national governance system as well as social and economic development.

University-affiliated think tanks are an important part of think tanks. For example, 75% of the 1828 think tanks in the United States are university-affiliated. Serving society is a major responsibility and mission of colleges and universities. Colleges and universities have become an important base for building new-type think tanks because of their relative independence, and their value is further recognised by the government. In terms of the historical conditions of establishment and work content, think tanks can be classified under three types: (1) academic, which generally hire scholars as researchers, focusing on specific fields and carrying out sustained, forward-looking policy research;

(2) contractual, established to meet government requirements to improve its research level of decision-making and policy analysis ability. They generally carry out research on projects assigned by the government and have an obvious technical and administrative style; and (3) opinion-guiding, which often have varying degrees of ideological tendencies, and promote and advocate certain policies and ideas with excellent promotional skills and eloquence. As an important part of new-type think tanks with Chinese characteristics, university-affiliated think tanks play a prominent role in modernising China's governance system and capacity.

Table 1. Research fields of Chinese think tanks and proportion of university-affiliated think tanks

Research field	Number among all think tanks	Proportion of all think tanks	Number of university-affiliated think tanks	Proportion of university-affiliated think tanks	Proportion of university-affiliated think tanks in one field
Industrial policy	187	25.62%	113	23.99%	60.43%
Financial policy	149	20.41%	85	18.05%	57.05%
Cultural policy	128	17.53%	76	16.14%	59.38%
Foreign policy	96	13.15%	71	15.07%	73.96%
Fiscal policy	120	16.44%	64	13.59%	53.33%
Other	77	10.55%	56	11.89%	72.73%
Marketing policy	100	13.70%	53	11.25%	53.00%
Security policy	64	8.77%	52	11.04%	81.25%
Social advancement and policy	71	9.73%	52	11.04%	73.24%
Environmental policy	73	10.00%	47	9.98%	64.38%
Judicial policy	67	9.18%	46	9.77%	68.66%
Higher education policy	54	7.40%	45	9.55%	83.33%
Resource policy	73	10.00%	43	9.13%	58.90%
Foreign trade policy	68	9.32%	41	8.70%	60.29%
Agricultural policy	70	9.59%	36	7.64%	51.43%
Social security policy	79	10.82%	36	7.64%	45.57%
Ethnic policy	50	6.85%	35	7.43%	70.00%
Population policy	58	7.95%	32	6.79%	55.17%

Research field	Number among all think tanks	Proportion of all think tanks	Number of university-affiliated think tanks	Proportion of university-affiliated think tanks	Proportion of university-affiliated think tanks in one field
Science and technology policy	74	10.14%	32	6.79%	43.24%
Internet management policy	49	6.71%	29	6.16%	59.18%
Energy policy	45	6.16%	28	5.94%	62.22%
Urban and rural development policy	56	7.67%	28	5.94%	50.00%
Religious policy	40	5.48%	25	5.31%	62.50%
Consumption policy	43	5.89%	25	5.31%	58.14%
Network security policy	38	5.21%	24	5.10%	63.16%
Employment policy	52	7.12%	23	4.88%	44.23%
Fundamental education policy	33	4.52%	22	4.67%	66.67%
Industrial policy	40	5.48%	20	4.25%	50.00%
Labour policy	36	4.93%	20	4.25%	55.56%
Service industry policy	45	6.16%	20	4.25%	44.44%
Ideological policy	59	8.08%	20	4.25%	33.90%
Medical and health policy	36	4.93%	19	4.03%	52.78%
Transportation policy	24	3.29%	17	3.61%	70.83%
Marine policy	29	3.97%	15	3.18%	51.72%
Housing policy	30	4.11%	14	2.97%	46.67%
Civil affairs policy	27	3.70%	14	2.97%	51.85%
Party development policy	58	7.95%	13	2.76%	22.41%
High-end manufacturing policy	33	4.52%	12	2.55%	36.36%
News Policy	22	3.01%	12	2.55%	54.55%
National defence policy	21	2.88%	11	2.34%	52.38%
Forestry policy	18	2.47%	10	2.12%	55.56%
Military policy	15	2.05%	8	1.70%	53.33%
Food Policy	11	1.51%	8	1.70%	72.73%
Personnel policy	14	1.92%	7	1.49%	50.00%
Radio and television policy	11	1.51%	7	1.49%	63.64%
Supervision policy	8	1.10%	6	1.27%	75.00%

Research field	Number among all think tanks	Proportion of all think tanks	Number of university-affiliated think tanks	Proportion of university-affiliated think tanks	Proportion of university-affiliated think tanks in one field
Policies on Hong Kong, Macao, and Taiwan	10	1.37%	6	1.27%	60.00%
Publishing policy	11	1.51%	6	1.27%	54.55%
Health policy	11	1.51%	5	1.06%	45.45%
Audit policy	8	1.10%	4	0.85%	50.00%
Public security policy	6	0.82%	4	0.85%	66.67%
Water conservancy policy	9	1.23%	3	0.64%	33.33%
Drug policy	6	0.82%	3	0.64%	50.00%
The United Front policy	8	1.10%	2	0.42%	25.00%

Note: Since some think tanks have multiple research fields, the direct sum will exceed 100%.

Source: 2020 CTTI Think Tank Development Report

The table shows that industrial policy, financial policy, cultural policy, foreign policy and fiscal policy account for the majority of university-affiliated think tanks. University-affiliated think tanks are in the leading position in security policy and higher education policy.

Chinese university-affiliated think tanks have significant advantages in policy research. Firstly, more than 80% of social science researchers and nearly half of the academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering work in universities. Most colleges and universities have a considerable number of Doctoral candidates and Master's degree candidates. Therefore, the talent support of university-affiliated think tanks is unmatched by other institutions or departments. Secondly, colleges and universities have complete disciplines, and inter-disciplines between natural sciences and social sciences, which encourage comprehensive judgments. Thirdly, colleges and universities have complete facilities and strong capabilities for basic research that can explore theoretical

depth and improve decision-making capability *(Wang–Sun, 2019)*. In addition, colleges and universities can establish more extensive contacts with universities and research institutions at home and abroad, which expands the vision for building think tanks and is conducive to establishing an international academic network. According to the 2020 CTTI Think Tank Development Report, as of March 2020, CTTI comprised 836 think tanks, including 541 university-affiliated think tanks, accounting for 65% of the total number of think tanks. These 541 think tanks are affiliated with 166 universities. Furthermore, 92 universities have more than 2 think tanks included in the CTTI, accounting for 55% of the total number of university-affiliated think tanks. 471 think tanks belong to universities with two or more think tanks, accounting for about 87% of the total number of CTTI-listed university-affiliated think tanks (*CTTI Think Tank Development Report, 2020*).

3. Comparison and cooperation between think tanks in China and Europe

3.1. Comparison between think tanks in China and Europe based on the Global Go To Think Tank Index Report

On 28 January 2021, the 2020 Global Go To Think Tank Index Report[58], led by James G. McGann, director of the Think Tank and Civil Societies Program (TTCSP) at the University of Pennsylvania, was officially released. A comparison of the current situation of think tanks in China and Europe is made on the basis of this report.

[58]Global Go To Think Tank Index Report, released by the Think Tank and Civil Societies Program (TTCSP) at the University of Pennsylvania, is an authoritative report on the ranking of worldwide think tanks. The first edition of the report was released in 2006. The 2020 edition marks the 15th edition of the report.

1) Think tanks in Asia covered in the report include: (1) Central Asia and the Caucasus: Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan; (2) China, India, Japan, and South Korea; (3) Southeast Asia and the Pacific; Bangladesh, Bhutan, Brunei, Cambodia, Indonesia, Laos, Macao, Malaysia, Maldives, Mongolia, Nepal, North Korea, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and Vietnam.

2) Think tanks in Europe covered in the report include: (1) Central and Eastern Europe: Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Finland, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia and Ukraine. (2) Western Europe: Andorra, Austria, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, the Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, the United Kingdom and Vatican City.

In terms of global distribution of think tanks by region, the report shows that in 2020, among the 1175 think tanks listed in the TTCSP global think tank database, Asia surpassed Europe, which has always ranked first with the largest number of think tanks (a total of 3389 (30.3%). The number of think tanks in Europe and North America also increased compared to the previous year, with 2932 (26.2%) and 2397 (21.4%), respectively. Meanwhile, the number of think tanks in Central and South America, sub-Saharan Africa, the Middle East and North Africa also increased over the last year, with 1179 (10.6%), 679 (6.1%), and 599 (5.4%), respectively.

In terms of global distribution of think tanks by country, the United States took an invincible lead with 2203, having the largest number of think tanks in the world. China ranked second with 1413 think tanks, and India ranked third with 612, followed by the United Kingdom with 515. Since the United Kingdom was

a representative in the development of think tanks in Europe, its research targets were Europe-related and its evaluation impact mainly stays in Europe.

3.2. Types of think tank by area of research and new trends

According to the report, eight Chinese think tanks, including China Institutes of Contemporary International Relations, the Chinese Academy of Social Sciences, the Carnegie-Tsinghua Center for Global Policy, the Development Research Center of the State Council, the China Institute of International Studies, the Center for China & Globalization (CCG), the International Institute for Strategic Studies (IISS) of Peking University, and the Shanghai Institutes for International Studies, have been listed in the Top 100 Think Tanks Worldwide for three consecutive years.

The 2020 report lists 15 top think tanks by area of research, including: Top Defence and National Security Think Tanks, Top Domestic Economic Policy Think Tanks, Top Education Policy Think Tanks, Top Energy and Resource Policy Think Tanks, Top Environment Policy Think Tanks, Top Foreign Policy and International Affairs Think Tanks, Top Domestic Health Policy Think Tanks, Top Global Health Policy Think Tanks, Top International Development Policy Think Tanks, Top International Economic Policy Think Tanks, Top Science and Technology Policy Think Tanks, Top Social Policy Think Tanks, Top Food Security Think Tanks, Top Water Security Think Tanks, and various other research areas. A number of Chinese think tanks have been included in the above-mentioned lists.

In terms of special achievements, the report included many areas such as policy research, communication, innovative management and cooperation methods, including: Best Advocacy Campaign, Best Government-Affiliated Think Tanks, Best Institutional Collaboration Involving Two or More Think Tanks, Best Managed Think Tanks, Best New Idea or Paradigm Developed by a Think

Tank, Best New Think Tanks, Best Think Tank Conference, Best Think Tank Network, Best Think Tanks with a Political Party Affiliation, Best Trans-disciplinary Research Think Tanks, Best University-Affiliated Think Tanks, Best Use of Social Media and Networks, Think Tanks to Watch, Think Tanks with the Best External Relations/Public Engagement Program, Think Tanks with the Best Use of the Internet, Best Use of Media (Print or Electronic), Think Tanks with the Most Innovative Policy Ideas/Proposals, Think Tanks with the Most Significant Impact on Public Policy, Think Tanks with Outstanding Policy-Oriented Research Programs, Best Independent Think Tanks, Top Think Tanks with Annual Operating Budgets of Less Than USD 5 Million, Best Quality Assurance and Integrity Policies and Procedures, Best Regional Research Centers (Free Standing), Best Regional Studies Centers (University-Affiliated) for 2016-2019, and Best AI Policy and Strategy Think Tanks. Some Chinese think tanks have been included in the above-mentioned lists. China's think tanks are gradually increasing their international impact and recognition. Notably, because of COVID-19's enormous impact on global public health and economic development, TTCSP has decided to have an additional Best Policy and Institutional Response to COVID-19 this year.

Europe think tanks are an important part of the global think tank system. They rank second only to the United States in number, specialised areas and index evaluation. These think tanks play an important role in promoting government decision-making, guiding public opinion in Europe and the world, and influencing the international political landscape. There are many European think tanks, including supernational think tanks serving the entire EU community and national think tanks serving their own governments. According to statistics of the 2019 Global Go To Think Tank Index Report, European think tanks account for 26.9% of global think tanks. Four think tanks in Europe are in the top ten think tanks worldwide. Under the third-party think tank

evaluation system adopted by the UK, various social organisations in different areas are the main targets of think tank evaluation. Professional third-party think tank research institutions have sufficient time and relatively fair and objective methods to evaluate think tanks. They can subdivide all evaluation targets and items and provide a scientific objective evaluation based on the concept of "benefiting the decision maker" (*Tan et al., 2017*).

The three common points of enabling political environment, strong financial support and independent commercial operation can be found by reviewing the development of think tanks in Europe and the United States. The speed and scale of development of new-type think tanks with Chinese characteristics have steadily improved, however, the overall development layout and quality of think tanks is unbalanced.

In terms of the development limits of think tanks with Chinese characteristics (including university-affiliated think tanks), the external influence of government-affiliated think tanks lacks influence because they are under the inevitable influence of the Chinese system. And they should have more exchanges with their international counterparts. The unsound supporting policy system has hampered the development of nongovernment-affiliated think tanks whose normal operation is difficult to maintain due to limited access to funds. The quasi-governmental think tanks lack the overall thinking of development strategy, and their selected projects make it difficult to produce achievements for further promotion and application (*Zhan–Zhang, 2017*).

There are many types of university-affiliated think tank in China, they are unevenly distributed, their influence is not strong enough, and their voice in research and formulation of national public policies is not loud enough. This is why their role is less important than government-affiliated think tanks. The operation mechanism of university-affiliated think tanks is rigid and highly dependent. They lack autonomy in the humanities, financial

funds and material supply, and their operation mechanism lacks flexibility compared to nongovernment-affiliated think tanks (*Zhu–Jiang, 2016*). For example, European and American think tanks often post fresh comments on political affairs and social focus on their websites' front pages, which are intuitively displayed with large pictures and small fonts that makes them reader-friendly. Some think tanks in Europe and America have set up several global international branches, demonstrating an international arrangement. In contrast, the front pages of think tank websites, especially university-affiliated ones in China, mainly focus on school news about meetings and forums. The title, text, and pictures lack appeal.

3.3. Cooperation between university-affiliated think tanks in China and Europe

Think tanks, especially high-end think tanks in Europe focusing on international relations and the macro-economy have shown a strong interest in cooperating with high-end think tanks in China. Some European think tanks believe there are at least three advantages in cooperating with Chinese high-end think tanks because Chinese high-end think tanks (1) are familiar with China's national conditions; (2) have strong connections in political and business sectors, and (3) extensively influence Chinese society. Strengthened cooperation not only promotes academic exchanges and mutual understanding, but also helps increase the international impact of think tanks in both China and Europe (*Research Group of Academy of Macroeconomic Research, 2020*).

1) Intergovernmental cooperation to promote European studies in China

In May 1996, the Chinese government and the European Commission signed the EU-China Higher Education Cooperation Project (ECHECP) with the overall goal of promoting greater interest and further understanding of the EU in China. Specific objectives include: (1) Strengthen European studies in China. The short-term goal is to improve the working conditions of experts of European studies in Chinese universities, research institutions and government departments. The medium and long-term goal is to enhance the capacity of the universities, research institutions and government departments in teaching, awarding degrees, and scientific research in the area of European studies to expand China's team of experts in European studies. (2) Team of experts in language-based European studies. (3) Studies in European government administrative management and applied humanities. The European studies defined by the project refer to studies on social sciences, applied humanities, law, history, economics, and politics related to the European Union in a broad sense. In a narrow sense, it includes: (1) European Community Law (the EU Constitution, and public and private laws); (2) European economics (market integration, economic and monetary union, foreign trade, etc.); (3) the EU system of government and politics (institutional system, decision-making process, political infrastructure including political parties, interest groups and elections of the European community / EU); (4) European policies (including all functions of the three pillars of the European Union: a) agriculture, citizens, competition, environment, consumer protection, social affairs, research and technology, regional policies, and other aspects of the European community; b) a common policy of foreign affairs and security; c) judicial and domestic affairs. (5) history of European integration (since the late 1940s); (6) the theory, political thought, and

movement of European integration. The first six institutions of European studies approved by the state are: the Centre for European Studies at Renmin University of China, the Centre for European Studies at Fudan University, the Centre for European Studies at Sichuan University, the Centre for European Studies at Nankai University, the Centre for European Studies at Wuhan University, and the Institute of European Studies of the Chinese Academy of Social Sciences. Most of these institutions have been designated key research bases of humanities and social sciences established by the Ministry of Education of China.

2) The European Think-tank Network on China (ETNC)

The European Think-tank Network on China (ETNC) is a gathering of China experts from a selection of European research institutes. It is devoted to the policy-oriented study of Chinese foreign policy and relations between China and European countries, as well as China and the EU. As an alliance organisation, the ETNC includes dozens of think tanks from several European countries that pay close attention to China-related topics. It facilitates regular exchanges among participating researchers with a view to deepening the understanding of European policy. The network's discussions and analyses take a decidedly 'bottom-up' approach, accounting for the various aspects of bilateral relations between European countries and China, and the points of convergence and divergence among EU Member States in order to examine EU-China relations in a realistic and comprehensive way.

Table 2. List of institutions contributing to the ETNC

No.	Name	Country	No.	Name	Country
1	Austrian Institute for European and Security Policy (AIES)	Austria	11	Latvian Institute of International Affairs (LIIA)	Latvia
2	Egmont Royal Institute for International Relations	Belgium	12	The Netherlands Institute of International Relations, 'Clingendael'	The Netherlands
3	Institute of International Relations (IIR)	Czech Republic	13	Norwegian Institute of International Affairs (NUPI)	Norway
4	Danish Institute for International Studies (DIIS)	Denmark	14	Polish Institute of International Affairs (PISM)	Poland
5	Finnish Institute for International Affairs (FIIA)	Finland	15	University of Aveiro	Portugal
6	French Institute of International Relations (Ifri)	France	16	Central European Institute of Asian Studies (CEIAS)	Slovakia
7	Mercator Institute for China Studies (MERICS)	Germany	17	Elcano Royal Institute	Spain
8	Institute of International Economic Relations (IIER)	Greece	18	The Swedish Institute of International Affairs (UI)	Sweden
9	Corvinus University of Budapest	Hungary	19	Swiss Forum on Foreign Policy (Foraus)	Switzerland
10	Istituto Affari Internazionali (IAI)	Italy	20	The Royal Institute of International Affairs, Chatham House	United Kingdom

Source: https://www.ifri.org/en/european-think-tank-network-china-etnc

The ETNC continuously publishes annual reports, reflecting the results of its annual meetings. ETNC reports are as follows:

(1) Mapping Europe-China Relations: A bottom-up approach (November 2015)

(2) Europe and China's New Silk Roads (December 2016)

(3) Chinese Investment in Europe: A country-level approach (December 2017)

(4) Political Values in Europe-China Relations (December 2018)

(5) Europe in the Face of US-China Rivalry (January 2020)

(6) Covid-19 and Europe-China Relations (April 2020)

(7) China's Soft Power in Europe: Falling on hard times (April 2021)

3) China-Central and Eastern European Countries (CEEC) Exchange and Cooperation Network of Think Tanks

The Suzhou Guidelines for Cooperation between China and Central and Eastern European Countries, an official intergovernmental document proposed by Chinese Premier Li Keqiang and signed by the prime ministers of China and CEEC, clearly states that "projects set up under the 16+1 Think Tank Exchange and Cooperation Network (later changed to 17+1) with the Chinese Academy of Social Sciences taking the lead are welcomed". The network is a new mechanism and high-end platform for the building of think tanks with Chinese characteristics. It is an exchange and cooperation network of think tanks jointly participated in by think tanks from 18 countries. Over the years, the network has provided its services to several visits paid by Chinese President Xi Jinping to Central and Eastern European countries, and directly served the 17+1 Annual Summit of Heads of Government. It is also responsible for hosting the annual China – CEEC High-Level Symposium of Think Tanks. The China-CEEC Exchange and Cooperation Network of Think Tanks was classified as a specialised think tank of the Chinese Academy of Social Sciences in 2016 and is one of the most internationalised think tanks of the Chinese Academy of Social Sciences. The network adheres to the principle of contribution and shared benefit, draws strength from domestic research institutions, promotes exchange and communication between domestic

research institutions and CEEC think tanks, consolidates the intellectual foundation of China-CEEC cooperation and facilitates research in China and CEEC.

4) European centres for China studies jointly established by Fudan University and European universities

In 2013, the Fudan-European Centre for China Studies at the University of Copenhagen was established. It promotes cutting-edge and policy-oriented research including welfare states and social policy, innovation in the social sciences and citizen participation, and economic models and sustainable development according to China's current development key agenda. Fudan University and the University of Oslo signed a cooperation agreement on jointly establishing the Fudan-European Centre for China Studies at the University of Oslo on 26 February 2021. This is an important bridge and overseas platform to promote academic cooperation and knowledge sharing between China and Europe. In the future, the two sides will continue promoting interdisciplinary cooperation and exchange between the two universities and between China and Europe in many areas, such as the environment, health, governance, and transnational research through this platform.

5) Cooperation of the University Alliance of the Silk Road (UASR) and its sub-alliances

On 22 January 2015, Xi'an Jiaotong University initiated the establishment of the University Alliance of the Silk Road. On 22 May 2015, the alliance was officially established and the Xi'an Declaration was issued. According to the resolution of Alliance Council, Xi'an Jiaotong University is the president unit and permanent secretariat unit of the alliance. At present, 151 universities in 38 countries and regions along the land and maritime Silk Road have become alliance members, forming a higher education cooperation platform across five continents. It carries out diversified exchanges and cooperation and establishes

multiple sub-alliances in areas such as cultural heritage, health, tourism, management, chemical industry, law, aerospace and others. The Presidents' Forum of the UASR has been held for 6 consecutive sessions. In the post-pandemic era, the UASR strives to promote closer cooperation between universities in different countries, and marches forward on the path of achieving mutual benefit and win-win results. The universities will pave the way for a new Silk Road; advocate collaborative innovation, integration, spiritual connection and mutual learning between civilisations; and put aside generational and national differences. Members will promote the building of global education following the development concept of harmonious coexistence, and work together towards the new era of the Silk Road.

4. Prospect of cooperation between university-affiliated think tanks in China and the EU in the post-pandemic era

At present, China-EU relations are at a crossroads due to the profound impact of COVID-19 and Sino-US relations. The pandemic has made China an urgent and significant topic for the people, governments, and program managers in European countries for the first time. Development of EU-China relations during this crisis may have a lasting impact on their future relations (*ETNC, 2020*).

In the context of the history of economic and trade cooperation between the two, the EU has been China's no. 1 trading partner for 16 consecutive years until it was surpassed by ASEAN in 2020, which was mainly because of Brexit. And China overtook the United States to become the no. 1 trading partner of the EU in 2020. China and the EU have conducted more commercial exchanges in medical materials than in aid materials. However, there are still differences in the areas of economic and trade

relations, ideology, society, culture, and other areas between China and the EU. Europe also hopes to strike a balance between its relations with China and the United States.

Although differences among EU members persist, a common understanding is very obvious: on the one hand, Europe believes that the United States is still its most important ally, and it needs US military protection. On the other hand, Europe hopes to strengthen economic and trade cooperation with China. Therefore, it is almost impossible for Europe to decouple its trade with China (*Think-tank Network on China, 2020*).

Differing from the current focus on "how to proceed" in China-US relations, China-EU relations face a more urgent problem of "how to judge". Especially how Europe judges and recognises the impact of China's rapid development on Europe (*Jiang, 2019*). The further development of China-EU relations is impeded owing to a "cognitive deficit" between the decision-making research circles in China and Europe.

The TTCSP report points out that think tanks must become stronger and more flexible to respond to pandemic challenges faster and put forward effective advice on how the world will respond to the pandemic. The report points out five areas where think tanks need to exert more effort and can play a greater role: (1) public health crisis; (2) formulation of strategies on economic recovery and revitalisation at the national and international levels; (3) innovative and inclusive government and non-government intervention strategies that aid vulnerable groups such as children and teenagers, the elderly, women in difficult circumstances, migrants, and ethnic minorities; (4) a rapid, fast-response and flexible mechanism to cope with future crises and promote international cooperation; (5) operation mode innovation in areas of research, activities, communication and fundraising.

Think tanks must become stronger and wiser to adopt a faster response to COVID-19 and provide effective recommendations

on policy-making to support vulnerable and affected industries globally. The world is facing numerous global challenges, including unbalanced economic growth, the spread of terrorism, accelerated climate change, prominent transnational migration and transnational crime, and the expansion of the impact of infectious diseases. No country can deal with these challenges alone, so it is urgent for all countries in the world, including China and Europe, to work together to solve them by improving the global governance system. Climate change is the top future priority of China-EU cooperation. The EU hopes to help China fulfil the goals of carbon neutrality and peaking carbon dioxide emissions. China's economic rise will contribute 30% to world economic growth in the next decade, and China will become the world's largest economy in 2030. European enterprises can seize the opportunities presented by China in the run up to peaking its carbon dioxide emissions before 2030 and achieving carbon neutrality before 2060 (*JIEMIAN, 2021*). On the bright side, the pandemic again proves that China and the EU should be partners, not competitors (*China Daily, 2020*).

The following suggestions are for the cooperation between university-affiliated think tanks in China and the EU:

1. Actively carry out international cooperation and invite experts and scholars at home and abroad. Welcome all talents who are interested in the projects. Excellent foreign experts can be hired by university-affiliated think tanks, or participate in short-term visiting programs that are project-related.

2. Establish a rotation system. Universities in China and the EU can hold various types of online/offline academic conferences in turn.

3. Improve the system of visiting scholars between universities in China and the EU. University-affiliated think tanks in China and the EU can exchange visiting scholars to strengthen mutual understanding and cooperation.

4. Conduct joint research on social and economic issues of common concern, such as climate change, epidemic prevention and control, digital economy, globalisation and global governance.

5. Jointly release economic forecast indicators to improve the social influence of both sides.

6. There are numerous ways to promote the influence of think tanks. Think tanks have the most direct influence on decision-makers, and their influence on the public reflects the social recognition of think tanks. China and the EU should make good use of the mass media to maximise the global influence of their think tanks.

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AGE OF EURASIA

FUTURE DIRECTIONS OF KNOWLEDGE, TECHNOLOGY, MONEY AND SUSTAINABLE GEOECONOMICS

In recent decades, the rise of Asia has become a common argument of geopolitical analysts, economists and decision-makers around the world. Today, economic trends and technological development clearly show that this is not only a popular idea, but a reality unfolding before our eyes. The East Asian giant, China, will not only soon overtake the US as the world's largest economy, but it is already at the top of the list of global patent applications. Other smaller Asian "heavyweights" such as Singapore and Korea also have comprehensive strategies for digital and green transition.

Although these developments highlight the role of Asia, there is in fact an even larger community of common destiny: Eurasia. The planet's largest landmass is growing increasingly interconnected, with networks of physical and digital infrastructure, technology hubs, knowledge sharing and people-to-people links. These connections reach back to the age of the ancient Silk Road, but in the face of modern-day challenges, cooperation between Asia and Europe and long-term sustainable development may now be more important than ever. We must now strike a new balance between the East and West, find a new harmony between technology and society, environment and economy, and – last but not least – ensure a stable and efficient international financial system.

This collection of studies aims to make a significant contribution to this thinking: it benefits from the international network of the Magyar Nemzeti Bank, the central bank of Hungary, and the growing professional community of the annual Budapest Eurasia Forum, bringing together a unique group of renowned experts both from Asia and Europe. The book offers a comprehensive understanding of Eurasia as a power hub and a framework for cooperation by highlighting the historical links and similar concepts in the supercontinent, as well as recent megatrends. Among other things, its multidisciplinary approach covers regional cooperation formats, geopolitical strategies, incentives for innovation and investments, smart cities and the future of money.