



# GEO AWAKENINGS

Building a sustainable future in  
the emerging Eurasian era

2023

EDITORS

Barnabás Virág – Marcell Horváth



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A study volume of the  
Magyar Nemzeti Bank  
on sustainable geopolitics  
in Eurasia

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Edited by:  
Barnabás Virág and Marcell Horváth

Peer-reviewed by:  
Zsófia Gulyás

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The papers in this volume contain the opinion  
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## Foreword by Governor György Matolcsy

Climate change and mounting geopolitical tensions are two of today's most urgent issues, and they represent an unprecedented threat to the global community. The question is frequently asked: "What could offer a steady, long-term solution to these issues?" Political compromises and the quest for sustainability may be short-term solutions by themselves, but in my view neither can be genuinely successful without cooperation between East and West. To make significant progress in addressing current issues, whether it be to halt climate change, to ease geopolitical tensions, or, overall, to establish a future based on sustainability in all respects, we must build our future on broad, inclusive and comprehensive Eurasian cooperation. Cooperation, as the main watchword of the Eurasian century, fosters continual progress since it embodies strength, balance and multiple perspectives.

The significance of geopolitics has undeniably increased in the 21<sup>st</sup> century. Despite the difficulties that lie ahead of us, we are lucky in that we will not have to "grope in the dark," as we can use the recurring patterns that our past experiences have made available to us to navigate our present and shape our future. The well-known geopolitical theorist of today, George Friedman, identified two cycles in US history that, in my opinion, might serve as a benchmark for us as well: the so-called 80-year institutional cycle and the 50-year socioeconomic cycle. A crisis often follows a cycle change, putting the economies of countries or regions to the test. Technology advancement and geopolitical turning points frequently coincide, and innovations help fuel the financial revolution. Increasing financial digitalisation, such as the introduction of central bank digital currency, is a good example for this. Countries that actively participate in the financial revolution and successfully take advantage of the new prospects could have a significant advantage in the geopolitical arena. Overall, it can be

said that if detected in time, emerging crisis situations can offer enormous opportunities.

Despite all the uncertainties, we may be certain of the persistence of change. Because of this, it is in our best interest to be at the forefront of change because doing so will allow us to have the greatest impact on the pace and course of change. However, cooperation at the highest level is required in order to take advantage of the opportunities brought about by change as effectively as possible and to keep our future under control. It is now clear that Eurasia is the leading force in the emergence of a radically new global order. In addition to increasing cooperation, the Eurasian countries have a huge responsibility in realising their respective strengths in consideration of the most important trends influencing the future, such as the growing recognition of digitalisation and green financial solutions, the increasing responsibility of society and the individual, and the rising significance of sustainability and innovation capacities. In addition to political players, central banks are increasingly taking on this responsibility as well, so the expansion of central bank roles into fields such as sustainability and the advancement of international relations is becoming more common worldwide.

Building on last year's topic, the present volume aims to examine sustainability from a geopolitical perspective in the spirit of providing an up-to-date reflection of the current affairs of our times. Similar to last year's collection of studies, this volume also underlines its main message from three perspectives – this time from the geopolitical, the financial and the technological perspective – on the importance of Eurasian cooperation and the need for an innovative, sustainable approach. As also demonstrated by the studies in the volume, cooperation is unavoidable, not only on the part of individual international actors, but also on the part of different disciplines. This is even more so the case, as sustainable development is now one of the key pillars in the evolution of each individual discipline.

The most characteristic trend of recent years is that globalisation, which reached its peak at the turn of the millennium, has been shaken by the ever-increasing geopolitical fragmentation; one need only consider the deepening trade and technological confrontation between the US and China or the escalation of the Russian-Ukrainian War in 2022. It became clear that by sustaining and further improving multilateral cooperation and international connectivity, the positive effects of globalisation can be maintained and further enhanced, while its negative effects can be offset. Fragmentation poses a threat from geopolitical, financial and technological points of view, as it can hinder the regional or global efforts made thus far towards a long-lasting, innovative and sustainable future. This is why it is hugely important to highlight the significance of such international efforts and initiatives that cross borders and try to serve as the most optimal alternative for the coming generations. For instance, the Belt and Road Initiative, the Budapest Eurasia Forum or the Asia Europe Meeting (to list but a few) are multilateral platforms that – through a wide spectrum of cooperation, connectivity and fusions – point the way to a more liveable future. At the same time, we should not forget about the efforts which are of one specific focus – such as talent management, green growth or sustainable financial services – and are directed towards solving the existing challenges of our times.

The 2020s is a decade of turning points, which opens up new horizons for the countries of the Eurasian region and for Eurasian cooperation. I trust that with this volume the Magyar Nemzeti Bank can also contribute to the realisation of Hungary's aspirations of becoming an intellectual and financial hub in the future and of forming a bridge between the East and the West, in the heart of Eurasia. The present volume strives to provide a comprehensive and diverse picture of the transition taking place today from geopolitical, financial and technological perspectives. Through their studies, renowned experts from China, Germany, Singapore, the United Kingdom, South Korea, Norway and Hungary provide excellent examples of the need for cooperation and its forward-

looking nature. The MNB offers its sincere thanks to the authors for their outstanding work and hopes that this year's volume of studies, similarly to previous years, will appeal to a wide range of readers, providing a stable point for future discourse on this increasingly relevant topic. As the Chinese proverb says, "a single thread cannot become a cord, and a single tree does not make a forest." Therefore, cooperation is crucial for the development of Eurasian countries.

György Matolcsy  
Governor  
Magyar Nemzeti Bank



## Foreword by the Editors

*Barnabás Virág, Deputy Governor, Magyar Nemzeti Bank*

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

As the global trends that intensified at the turn of the 2010s and 2020s continue to deepen, we have another momentous year behind us. Climate change is present as an increasingly pressing issue in our daily lives, and, in spite of attempts to defuse them, geopolitical tensions around the world are not only not diminishing but becoming more of a concern. We live in the geopolitical era in the first decades of the 21<sup>st</sup> century, which also happens to be a time of complicated transformation. The Russian–Ukrainian War, emerging geopolitical fragmentation, reshoring, nearshoring and friend-shoring processes, or technological rivalry all contribute to an atmosphere of global politics and economics that is becoming more and more heated, similar to how climate change warms the planet. Additionally, climate change has led us to a crucial point environmentally and socioeconomically. All of these changes substantially reshape the existing global order and give multipolar international relations a new focus. Economies are shifting, new technologies and financial solutions are emerging, and the role of digitalisation, robotisation and artificial intelligence is becoming more and more apparent. In light of the rapidly changing nature of the global environment, the Magyar Nemzeti Bank, the central bank of Hungary (MNB), views the annual compilation and publication of the volume of studies on Eurasia as a responsibility of the utmost importance, in which it seeks fusion solutions to the greatest problems of our time while taking into consideration contemporary trends, such as long-term sustainability.

The MNB is convinced that maintaining, developing and expanding multilateral cooperation at various levels is necessary to achieve long-term sustainability, which is a common feature of solutions to the most pressing global problems, including climate change and growing geopolitical fragmentation. Increasingly significant geopolitics have an impact on practically every aspect of life, including international finance, economic decision-making, technology development and even the monetary policy considerations of central banks. Considering the expansion of the role of the central bank discussed in last year's volume, we therefore consider it a serious responsibility to become advocates for the enhancement of Eurasian cooperation in geopolitical, financial and technological aspects as well, besides the green transition. All of this represents another milestone in terms of fulfilling the economic and social responsibilities of central banks. The main issue raised by this volume is how to build a global consensus based on sustainability in the newly emerging Eurasian era. In answering this question, in addition to the ongoing geopolitical transition, technological innovations and the financial revolution that is emerging in parallel cannot be ignored.

The MNB has given particular attention to creating, fostering and expanding its international relations over the past decade. As a result, we published the Eurasia volume of studies for the third consecutive year in 2023, on the margins of the Budapest Eurasia Forum this time. After introducing our first volume of studies, with the title *Age of Eurasia – Future directions of knowledge, technology, money and sustainable geoeconomics*, at the Budapest Eurasia Forum in 2021 with the goal of advancing Eurasian dialogue, the second volume, entitled *The Future is Now – Eurasian central banks at the forefront of innovation*, was released in 2022. We firmly believe that this series will help to advance financial institutions' cooperation across Eurasia. Our objective in 2023 was to create a volume that focused on the relationship between geopolitics and sustainability in the Eurasian network. Through chapters that focus on geopolitics, finance and

technology, the studies in the volume serve to demonstrate the most recent developments in sustainable geopolitics in Eurasia. The publication aims to offer a fresh perspective on Eurasian thought, to advance research in this field and – last but not least – to highlight the significance of the initiatives and platforms for cooperation established to address the region's challenges.

In the next few paragraphs, we briefly summarise the diverse and thought-provoking topics covered in the individual studies of each chapter. The first study in the volume was written by Marcell Horváth, Zsófia Gulyás and Dávid Szabó (MNB). The emerging new world order is influenced by factors such as the slowing global economy, geopolitical tensions, technology development and climate change. The authors of the introductory study argue that central banks must manage the shifting geopolitical landscape pro-actively, recognising the causes, effects and connections of geopolitical processes. Inflation is significantly impacted by geopolitical unrest, with supply chain disruptions and rising energy costs contributing to it. The age of Eurasia has developed with a more fragmented global order brought on by the US–China trade war and the Russian–Ukrainian War. Central banks and monetary authorities must enhance cooperation agreements across institutions in order to bolster the global financial safety net, notably in areas such as green finance, central bank digitalisation and global financial stability. In order to adjust their operations and react swiftly to international events, central banks must be aware of the ongoing changes in the global balance of power, as underlined in the article.

Beginning with a study by Norbert Csizmadia, Head of the Board of Trustees of the Pallas Athene Domus Meriti Foundation (PADME), the first chapter explores geopolitics in the context of connection and cooperation. The purpose of the first study is to provide readers with a better understanding of the new geoeconomic world order through the use of maps and theses. The age of Eurasia is defined by connectedness, complexity and

sustainability. The relevance of geography has been revalued by technological advancement, creating a “New Renaissance” in the currently emerging world order. In the 21<sup>st</sup> century, knowledge and creativity are the most valuable commodities, with data (Big Data) based on geofusion nodes produced by networks and fusions. Long-term sustainable development is a key pillar of this new era, in which geoeconomics transforms global economic processes and power linkages. The 21 theses offered in this study can help to grasp this phenomenon.

The next study was written by Henry Huiyao Wang, president of the Center for China and Globalization, and its secretary-general, Mabel Lu Miao, with the contribution of Ruijun Zhang. Through a theoretical summary and practical exploration of globalisation in the 21<sup>st</sup> century, their joint work sheds additional light on the Chinese perspective on the future of globalisation and the new ways for sustainable globalisation. A discussion over whether the world is experiencing a phase of “deglobalisation” has resulted from the massive impact of the Covid-19 pandemic. Examining the past and present of China’s integration into globalisation, the authors demonstrate how China is shifting from being a beneficiary to a driver of globalisation, as it takes on more obligations internationally and brings new ideas to global governance. They suggest human-based globalisation, open regionalism and global coexistence and co-governance as three foundations that China should build on to establish a new type of globalisation.

In the next study, Yeo Lay Hwee, Director of the European Union Centre and Senior Fellow at the Singapore Institute of International Affairs, presents an overview of the development of the Asia–Europe Meeting to highlight the growing significance of cooperation between Asia and Europe. The meeting was conceived in an era of “hyper-globalisation” and optimism for multilateral cooperation. After the Second World War, Asia and Europe gradually distanced themselves from one another. The end of the

Cold War led to increasing competition and cooperation between the two regions, driven by economic interests. The launch of the Asia–Europe Meeting in 1996 signalled the growing importance of Asia–Europe cooperation. With the rapid enlargement of the EU and the Association of Southeast Asian Nations (ASEAN), ASEM attracted new members from South and Central Asia, Australia, New Zealand, Russia, Norway and Switzerland. As a result of the organisation’s rapid enlargement, after the Russian invasion of Ukraine and the EU members’ growing unease with China, high level meetings of ASEM have become more challenging to organise. The study analyses the concepts of connectivity and multilateralism and links them to the expansion of multilateral platforms such as ASEM and Asia–Pacific Economic Cooperation (APEC). In order to prevent a downward spiral toward conflict, the study discusses if and how ASEM could be reconceived.

The last study in the first chapter examines the geopolitical significance of the United Arab Emirates (UAE) and its connections to technological innovation. It was written by Meszár Tárík, Researcher at the Mathias Corvinus Collegium (MCC) – Migration Research Institute. The UAE, which has abundant natural gas and oil resources, plays a significant geopolitical role in the Middle East. Its economy has expanded significantly in recent decades as its oil revenue and investments have made it a powerful and technologically advanced country regionally and globally. In order to increase its importance on the global stage, the UAE is reportedly fusing its geopolitical position with technology innovation through strategic planning and considerable economic investment. The purpose of the study is to highlight the most recent technological innovation made by the Arab country and to provide insight into the UAE’s noteworthy accomplishments in the fields of artificial intelligence, sustainable development, smart cities and the use of renewable energy sources. In terms of methodology, the author describes actual projects and draws conclusions from official statistics, while using geopolitical

analysis to ascertain the country's position within the Arab world and the larger area.

The volume's second chapter shifts to the subject of finance and begins with a paper by Levente Horváth, Director of the Eurasia Center at the John von Neumann University. The Belt and Road Initiative (BRI), one of the most significant and prominent drivers of Eurasian connectivity, celebrates its 10<sup>th</sup> anniversary in 2023. It plays a key role with regard to some of the 21<sup>st</sup> century's trending concerns, such as sustainability, greening, competitiveness and connectivity, in addition to serving as a framework for a new world order. In contrast to China, which is less vocal about greening and sustainability but is pushing forward with full force, the West is accustomed to hearing actors on these topics speak out loudly but seeing little actual action. The study shows how China is becoming a leader in sustainability, how it is making progress toward achieving the Sustainable Development Goals (SDGs) set by the UN, which institutions have been given key roles, and in which projects and how they participate.

Past developments and potential future directions in China–EU cooperation on green finance are discussed by Christoph Nedopil, Associate Professor of Practice in Economics at the Fanhai International School of Finance (FISF), Fudan University. For the past ten years, the EU and China have played a leading role in green finance and worked together on regulations through cooperative projects including the Network for Greening the Financial System (NGFS) and the Common Ground Taxonomy. The cooperation is motivated by economic interests and strong political support, particularly through the 2005 EU–China Partnership on Climate Change. However, the development of cooperation in green finance is at risk due to rising geopolitical tensions. This paper focusses on previous initiatives, domestic goals and scenario building approaches to explore the prospects and difficulties of green finance cooperation between China and the EU. According to the author, in a time of increased geopolitical

tensions, green finance priorities have to be used to bridge gaps while these recommendations also present opportunities for investors and developers.

Michael Mainelli, Chairman of the Z/Yen Group, together with his colleagues Simon Mills and Mike Wardle, collaborated on the study that follows in the chapter. The authors contend that innovation is being driven by financial centres, while we confront considerable obstacles both as individual economies and globally. The Sustainable Development Goals (SDGs) of the UN include these issues and emphasise the need for ongoing innovation to meet them. Financial centres have the potential to spur economic innovation and create an environment where innovative products and industries can flourish by developing a cluster of expertise. This environment attracts talent and skills and provides opportunities for social engagement and for utilising cutting-edge technologies and goods. Successful financial ecosystems enable a focus on sustainable and fair development and open up the possibility of investment across the economy.

The second chapter's final research contribution is a summary of the roundtable discussion entitled "Financial Infrastructure and Services in the Digital Era" held on 31 March, at the Boao Forum for Asia Annual Conference 2023. The paper was prepared by colleagues of the Boao Forum for Asia Academy. The keynote speeches of the roundtable discussions were given by Zhou Xiaochuan, Vice Chairman of the Boao Forum for Asia and former Governor of the People's Bank of China, György Matolcsy, Governor of the Magyar Nemzeti Bank, and Doni P. Joewono, Deputy Governor of Bank Indonesia. Over 20 top officials from governments, central banks and international organisations, as well as CEOs in the financial industry, participated in a panel discussion moderated by Huang Yiping, Deputy Dean of National School of Development at Peking University, where they shared their extensive knowledge and experience regarding digital financial infrastructure and services.



The third chapter in the volume examines sustainability from a technological aspect. The first study, entitled *Technological Sovereignty and World Order*, was prepared by Professor Glenn Diesen from the University of South-East Norway (USN). With the Peace of Westphalia, which replaced Europe's fragmentation with a balance of power between sovereign states in 1648, the current world order was founded. In the 20<sup>th</sup> century, after the fall of the Soviet Union, the unipolar era brought the world order to a crossroads with the US aiming to either establish itself as a new Pax Romana or facilitate a cooperative balance of power between sovereign states. The goal of technological sovereignty is to restore a "balance of dependence" in the international system, preventing great powers from aspiring to hegemony. This is accomplished through technological self-reliance and diversification of partnerships. The integration of Eurasia has emerged as the most effective strategy for pursuing technological sovereignty and reestablishing the global system of sovereign states. As new technologies transform the international economy, the new industrial revolution, driven by digitalisation and automation, is fostering cooperation across Eurasia. The stability of a world order based on sovereign equality and a balance of power is enhanced by the balance of dependence within a multipolar Eurasia, which deters attempts to advance hegemony and sovereign inequality. Europe must decide whether to degrade its technological sovereignty by cooperating with the US in a system based on collective hegemony or whether to build itself as an independent pole of power based on diverse technological partnerships within Eurasia.

The second paper was written by Raekwon Chung, Board Director at the Ban Ki-moon Foundation For a Better Future, who argues that four significant structural issues with the existing climate-economy paradigm must be resolved in order to shift to clean energy by 2050 and achieve net zero emissions. In order for financial flows and technological innovation to continue without interruption, carbon pricing must first be addressed. Second, since



carbon emissions calculated based on production (GDP) conflates carbon leakage from developed countries to developing countries with climate mitigation, carbon emissions data must be estimated based on consumption, not only on GDP. Third, in order for consumers to participate in and share climate action, the current global climate-economy paradigm needs to give them options in the form of Personally Determined Contributions (PDCs). Currently, consumers are left out of the process, and there is limited room for action only for governments and corporations by reaching the Nationally Determined Contributions (NDCs) of the Paris Climate Agreement. Fourth, the narrative that “carbon mitigation will reduce GDP” based on “cost-benefit analyses” needs to be replaced with one that emphasises the positive effects for economic growth and job creation that could be triggered by investment in a clean energy transition. For an economy-wide systemic transition towards a carbon-free future, a gradual, step-by-step internalisation of carbon prices must be the fundamental foundation.

The final study in the volume is a joint paper of Eng Chye Tan, President of the National University of Singapore (NUS), and Adrian WJ Kuah, Director of the Futures Office at the NUS. This study explores how international universities might support sustainable futures through the case study of the NUS, which serves as a hub for ideas and talent in society and as a node connected to larger knowledge networks. While “sustainability” is often described in terms of climate change and environmental challenges, the authors suggest adopting a holistic perspective of “sustainability,” which includes human health and well-being, socioeconomic vibrance, and environmental and climate health. The study highlights that a global university can make a modest contribution to reducing the effects of a post-Covid world that is fragmenting and warming through its organisational actions, work in societies, and role as an honest and competent broker for knowledge creation across networks.

We sincerely hope that with these short summaries, we have managed to give readers an insight into the intriguing content of the volume. These studies not only contribute to current discussions but also have the potential to shape future conversations in both the professional and public spheres. We are sure that we have once again enriched the range of sources dealing with the current affairs of the Eurasian region with an outstanding publication, and we are confident that with our volume we can further strengthen and popularise the “Eurasian brand,” which is so important to the MNB.

Budapest, November 2023

# The Implications of Geopolitics on Central Banks' Responsibilities

Marcell Horváth – Zsófia Gulyás – Dávid Szabó

*A new world order is currently emerging, one that is impacted by factors such as the slowing global economy, the challenges arising from global geopolitical tensions, the rapid development of technology and climate change. From the perspective of central banks, it is crucial that they manage the shifting geopolitical landscape pro-actively rather than in a reactive manner by being aware of the causes, effects and connections of geopolitical processes. Inflation is significantly impacted by geopolitical unrest. Supply chain disruptions brought on by geopolitical fragmentation might be partially blamed for the high inflation. Inflation is also rising as a result of rising energy costs brought on by geopolitical tensions, as it is challenging to produce and transport necessities such as grain or microchips due to a lack of natural gas and crude oil. The liquidity and profitability of non-financial firms are also negatively impacted by the elevated inflationary pressure, which increases credit risks for banks and threatens macro-level financial stability. Geopolitical tensions between the major economies significantly raise threats to financial stability by increasing financial fragmentation and impacting international payment systems, asset prices and cross-border capital flows.*

*There have been numerous global geopolitical tensions since the turn of the 20<sup>th</sup> century that continue to have an impact on us now. The*

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Marcell Horváth is Executive Director for International Relations at the Magyar Nemzeti Bank. E-mail: [horvathm@mnbb.hu](mailto:horvathm@mnbb.hu)

Zsófia Gulyás is a Junior International Advisor at the Magyar Nemzeti Bank. E-mail: [gulyaszso@mnbb.hu](mailto:gulyaszso@mnbb.hu)

Dávid Szabó is Head of International Cooperation and Analysis Department at the Magyar Nemzeti Bank. E-mail: [szaboda@mnbb.hu](mailto:szaboda@mnbb.hu)

*Second World War and the Cold War, which resulted in geopolitical fragmentation and polarisation of the international community, have been among those that have generated the greatest economic challenges of the past century. The age of Eurasia has arrived at the turn of the 2010s and the 2020s, with a more dispersed global order as a result of the US–China trade war and the Russian–Ukrainian War. Recent disruptions in international trade have sparked discussions about economic security and raised concerns about the resilience of supply chains. In order to strengthen and widen the global financial safety net through agreements between countries, it is crucial from the perspective of central banks and monetary authorities to improve cooperation agreements between institutions. Improving cooperation is especially important when it comes to issues that are now inescapable, such green finance, the digitalisation of central banks, central bank digital currencies and worldwide financial stability. In order to be able to respond quickly to international events and adapt their operations to such, central banks must be aware of the continual changes in the global balance of power.*

**Journal of Economic Literature (JEL) codes:** E31, E50, E52, E58, N40

**Keywords:** role of central banks, geopolitical fragmentation, geopolitical tensions, financial stability, inflation, supply chains, Second World War, Cold War, US–China trade war, Russian–Ukrainian War

## 1 Introduction

A new world order is currently taking shape, one that is influenced by escalating geopolitical tensions that mark the end of the “hyperglobalisation” era, the slowing global economy, the difficulties posed by global social processes, the rapid advance of technology and climate change. Global economic governance needs to be reformed, because of the many difficulties the United Nations and the international system founded on the Bretton

Woods institutions are currently confronting. As a result of Asia's expansion, the world is transitioning structurally from unipolarity to multipolarity (Khanna, 2019). A Eurasian geopolitical alliance is emerging as an alternative to Atlanticism as the existing international order shifts towards uncertainty. The fact that the 21<sup>st</sup> century is known as the Eurasia century is no coincidence (Horváth et al., 2021). Danny Quah, Dean of the Lew Kuan Yew School of Public Policy, claims that as a result of the growth of China and other East Asian nations, the global economy's centre of gravity is progressively moving from the West to the East, towards the Eurasian axis (Edmonds, 2015). This conflict, beginning with the rivalry between the US and China or Russia's "special military operation" beginning in 2022, which would signal the dissolution of the Yalta system following Second World War, will decide the primary geopolitical trend of the ensuing decades. Some great powers' narratives are becoming dominated by the spirit of a cold war mentality (Wang & Miao, 2023).

A situation known as Thucydides' trap occurs when a dominant state is alarmed by a rising rival, and the fear of losing hegemony triggers a chain of events that results in conflict. The global geopolitical, geoeconomic and geoideological framework is being rebuilt because of the conflict between the established and emerging powers. The current global supply chain is being disrupted by escalation of the trade war and technological export restrictions between the strengthened alliance systems. To build a new global supply chain, smaller nations will probably have to choose between the two competing superpowers, which could lead to a "new Cold War" and the emergence of a bipolar world order (Horváth & Bartha, 2018).

Blocking began in opposition to multilateral cooperation. While in a globalised world, capital flowed to locations where the best conditions for its settlement and return were guaranteed, regionalisation came to the fore with the emergence of deglobalisation trends. More and more emphasis is being placed

on regional supply chains, protection of internal markets, and to the phenomenon of “reshoring” (bringing production home), “nearshoring” (relocating parts of their manufacturing to countries with comparable time zones and geographic proximity to their markets) and “friend-shoring” (getting inputs from suppliers in allied countries). Geopolitical rivalry and the dangers of unilateral exposure encountered during the COVID-19 pandemic are important catalysts for these processes. In response to these problems, the “China Plus One” strategy was born, that is, when companies try to avoid investing only in China and diversify their businesses towards other target countries.

Moreover, foreign direct investment (FDI) is becoming a pressure instrument that is funnelled between the allied countries. If the foreign currency is converted into the local currency in the target country in order to make the investment, FDI has an impact on foreign currency liquidity. As a result, the domestic banking system’s foreign exchange liquidity grows, and the value of the domestic currency may increase. However, when foreign companies bring home profits, the current account balance deteriorates and a need for financing in foreign currencies arises. As a result, foreign currency liquidity declines and the local exchange rate may weaken. Due to the investors’ higher expected rate of return, FDI is often a more expensive source of funding. The resulting expected current account deficit must therefore be offset by the productivity of the implemented investment, which, e.g. through technology transfer, etc., results in higher exports for the country. Based on these, it can be said that the withdrawal of FDI may even make it difficult to ensure adequate foreign exchange liquidity.

As Christine Lagarde, President of the European Central Bank (ECB), said in April 2023 at the Council on Foreign Relations’ C. Peter McColough Series on International Economics, “the tectonic plates of geopolitics are shifting faster” (Lagarde, 2023, para. 2). After the 20<sup>th</sup> century, we are once again witnessing strong

geopolitical fragmentation, during which the competing parties try to appropriate as much of the global economy as possible according to their own interests. This unstable and still developing environment also affects the operation of central banks, mainly through supply shocks resulting from the vulnerability of global supply chains, as well as international relations that are increasingly polarised due to geopolitical tensions. However, the process of geopolitical fragmentation does not take place overnight, as the “new reality” emerges gradually (Lagarde, 2023).

All of this is also supported by the Central Banking survey in 2023, which found that geopolitical threats are an increasingly urgent issue for the operation of central banks, in addition to the very challenging inflation. Out of 79 central banks, geopolitical concerns were ranked as the third-largest challenge by 19 respondents (24 per cent), the second-biggest challenge by 19 more, and the biggest challenge by 13 (16.5 per cent) central banks. According to the survey, the third most important risk is premature monetary policy easing (Pringle & Mendez-Barreira, 2023). In addition to the difficulties, the process also contains many opportunities, since with every major crisis a new era is ushered in, which holds new challenges and thus encourages us to develop and look for new solutions.

From the point of view of central banks, it is therefore of primary importance that, knowing the causes, consequences and connections of geopolitical processes, instead of taking a reactive approach, they proactively manage the changing geopolitical realities. As György Matolcsy (2022), Governor of the Magyar Nemzeti Bank, the central bank of Hungary (MNB) predicted, in addition to governments and the business sector, the 2020s will be determined by the role of central banks. Therefore, the central banks need to introduce a geopolitical approach into their decision-making to meet the challenges of the 21<sup>st</sup> century and to satisfy this new role.

## 2 The impact of geopolitical fragmentation on central banks' operations

### 2.1 Central banks' development and role

Although the tasks of central banks were established over centuries, they did not become the institutions at the core of the financial system until the early 20<sup>th</sup> century. Then they eventually prioritised maintaining price stability over all other duties, putting their toolset at the service of this goal. The Bank of England is responsible for the creation of the two-tier banking system. In the 1850s, in addition to receiving the authority from the English government to issue banknotes, the Bank of England was also given the responsibility of providing additional loans to struggling commercial banks during times of financial difficulty. The Bank was made the lender of last resort in this manner. In the 19<sup>th</sup> century, all industrialised nations finally adopted the two-tier banking structure, in which the central bank is placed above the commercial banks. The state-granted monopoly gave the central banks a unique position and allowed for a quick increase in their size. To manage and have an impact on monetary policy and the operation of commercial banks, central banks typically deploy financial and economic regulators, also known as central bank instruments (Fábián & Virág, 2018).

Nowadays, the scope of tasks of central banks has expanded and gone beyond achieving and sustaining price stability through monetary policy, as they are also responsible for the stability of the financial system. In order to steer the liquidity of the economy, central banks must also influence the amount of money in circulation and ensure the issuance of banknotes and coins. Supervision of the financial infrastructure also falls within the competence of central banks. In terms of currencies, central banks are in charge of managing operations that contribute to exchange rate stability, as well as maintaining and controlling



their official reserves. They monitor national payment systems and ensure compliance with pertinent financial regulations by regulating the interbank market. Specific financial institutions are under the control of central banks in some countries, such as Hungary, where micro-prudential regulation and supervision has been integrated into central banking. Additionally, central banks take on an advisory role, produce studies and reports, support for governments' economic policy and provide liquidity to commercial banks (Santander, 2023). An increasing number of central banks, like the MNB, are assuming duties that were previously viewed as unorthodox, such as sustainable contribution to economic growth (Act CXXXIX of 2013 on the Magyar Nemzeti Bank, 2023). The MNB, the first in Europe, has a "green mandate" that includes promoting environmental sustainability as part of its range of operations since 2021 (MNB, 2021a). Therefore, it is becoming more and more important for central banks to monitor the international adoption of economic best practices associated with the green mandate.

## 2.2 Central bank mandates that are most influenced by geopolitics

Although the primary objectives of central banks may vary, they usually involve formulating and implementing monetary policy with macroeconomic objectives in mind. The monetary policies of central banks are significantly impacted by the shifting political and economic circumstances. Geopolitical processes affect the operation of central banks through inflation and financial stability. To accomplish their goals, central banks must collaborate and coordinate their policies due to globalisation and the interconnectedness of economies. As a result, central banks must be more vigilant and proactive in their decision-making due to increasing geopolitical tensions.

Geopolitical tensions have a significant impact on inflation. According to a 2023 study involving 43 countries based on long-

term historical data, geopolitical risks will lead to high inflation overall in addition to lower economic activity, increases in military spending and government debt, and declines in international trade (Caldara et al., 2023). The setting of official interest rates, which can be used to slow the pace of inflation by raising them or to speed up consumption by decreasing them, is one of the key tools that central banks use to handle these challenges. High inflation arising from increasing geopolitical risks can partly be traced back to:

- supply chain disruptions caused by geopolitical fragmentation, as the fragmentation of global value chains along geopolitical lines has a price-inflating effect through higher trade barriers, for example, specific trade bans in the chip sector, causing producers within each separate bloc to substitute away from increasingly expensive inputs from outside the bloc. The resulting demand shock results in a lower trade flow between blocks, and within the block it leads to an adjustment of production structures and a change in the demand for production factors. Changes in the price of capital and labour also affect household income and consumption habits (Attinasi et al., 2023).
- increasing energy costs brought on by geopolitical tensions as it is difficult to produce and transport essential goods such as grain or microchips owing to a lack of natural gas and crude oil.

Increased inflationary pressure adversely affects the liquidity and profitability of non-financial corporations, generating credit risks for banks and undermining macro-level financial stability (International Monetary Fund, 2023). By escalating financial fragmentation and affecting cross-border capital flows, FDI, international payment systems and asset prices, geopolitical tensions between the major economies greatly raise risks to financial stability. The exclusion of Russia from the Society for Worldwide Interbank Financial Telecommunication (SWIFT) and the contingent efforts to strengthen alternative systems such as Russia's Mir Payment System will make global money flows more

difficult and expensive. The impact mechanism of geopolitical fragmentations on global financial stability has two main channels, according to the latest volume of the *Global Financial Stability Report*, published twice a year by the International Monetary Fund (IMF).

- The so-called “financial channel” has direct impacts by financial restrictions placed on capital flows and payments in the form of capital controls, financial sanctions and international asset freezing. Increased risk aversion among investors, tighter financial restrictions, escalating hostilities or expropriations can also directly affect cross-border capital allocation, result in financial fragmentation and lower asset prices. The cross-border credit and investment outflows caused by financial restrictions therefore increase the banks’ debt restructuring risk and financing costs, and also raise the interest rates on government bonds. A sudden reallocation of capital could cause liquidity and solvency stress in the financial and non-financial sectors, endangering macro-financial stability.
- Through the so-called “real channel,” financial stability can be indirectly affected by restrictions on global trade and technology transfer, as well as disruptions to supply chains and commodity markets (International Monetary Fund, 2023).
- As an additional factor, export restrictions also have an impact on the current account balance, i.e. they may contribute to a current account deficit and consequently increase the need for external financing (accumulation of foreign debts). This can be the case when main export markets become unavailable due to the restrictions or bans (*ceteris paribus*). However, the level of the current account balance might not change if imports likewise decline by a comparable amount.
- In this new world order, foreign direct investments (FDI) could also turn into a pressure instrument that are funnelled between the allied countries. Geopolitical tensions and the lack of FDI

investments or the withdrawal of them may even make it difficult to ensure adequate foreign exchange liquidity for the targeted countries and could even pose financial stability risks.

### 3 Economic crises resulting from geopolitical fragmentation

Since the beginning of the 20<sup>th</sup> century, there have been many global geopolitical tensions that have had consequences that affect us to this day. Among these, the Second World War and the Cold War caused the most significant economic challenges of the last century, resulting from geopolitical fragmentation and polarisation of the international community. As for the 21<sup>st</sup> century, at the turn of the 2010s and the 2020s, the age of Eurasia has arrived with an increasingly fragmented world order due to the US–China trade war and the Russian–Ukrainian War. The 2020s are outstanding in many ways since the so-called 400-year cycle, which is the smallest common multiple of the 50-year socioeconomic cycle and the 80-year institutional cycle identified by George Friedman, also recently came to an end. Crisis often erupts at the end of a cycle, which prompts the economy to adopt new models and new types of knowledge (Matolcsy, 2023). Due to the 400-year cycle, global events resemble the first European Thirty years' War (1618–1648) in their patterns. The Mayflower arrived at Cape Cod in 1620, marking the start of the previous 400-year cycle (Matolcsy, 2022).

According to Matolcsy (2022), “we are starting to recognize the return, rerun and parallels of two decades of the previous century: the 1970s and the 1940s” (p. 22). Regime changes that take place as a result of the increasing polarisation of international relations always boost inflation. Accordingly, looking back at the last 100 years, we can discover 25-year turning points: every 25 years, major geopolitical and technological changes are accompanied

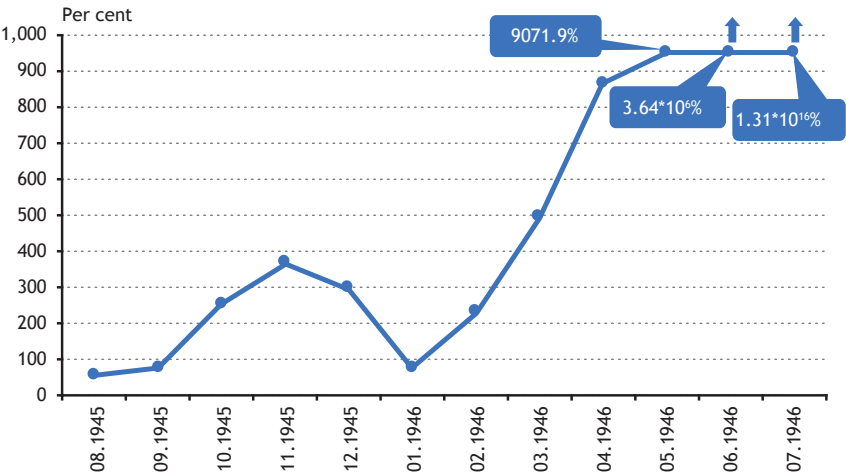
by financial revolutions. With the signing of the Bretton Woods agreement in 1944, the era of the pound and the gold standard was replaced by a system built around the dominance of the US dollar. The focus on the USD may be primarily linked to the key American role in winning the Second World War, but its background was the development of the technological and economic superiority of the USA since the end of the 19<sup>th</sup> century. After that, the IT revolution supported the USD's dominant position until recently. The Bretton Woods system was officially ended in 1971, at the height of the Cold War, when the USD was fully decoupled from its gold base and an exclusively "created money" (as opposed to "produced money," such as gold) came into existence. Due to the rapid advance of computer technology and the advent of the global Internet in the 1990s, "created money" as a bank liability became a perfect topic for the great digitalisation wave in the unipolar world order that developed after the end of the Cold War. In the 2020s, during a period of renewed geopolitical tensions and at the beginning of a new world order, several types of digital money or forms of money appeared (such as central bank digital currencies, CBDCs), and they have since evolved into transformative forces (Horváth et al., 2023). The "golden age of central banks" is still to come because all regime changes require central banks that are even more powerful and innovative (Matolcsy, 2022, p. 101). In addition to the new 400-year cycle, our time marks the start of a shorter stagflationary phase as well, which can be compared to the 1940s and the 1970s.

### 3.1 Inflationary consequences of the Second World War

There are striking parallels between the events occurring today and the post-Second World War era. One of the most representative examples of the inflationary consequences of the Second World War is the hyperinflation of the pengő in Hungary between 1945 and 1946, which eventually resulted in the reintroduction of the forint; this was one of the most dramatic instances of post-war inflation. The forint, which was introduced

to stop hyperinflation, can therefore be viewed as fundamentally a technological advancement by the MNB and the Hungarian government. The MNB's geopolitical achievement of escaping with the nation's gold reserves to Austria and keeping them safe there at the end of the Second World War served as the foundation for the transition's success. The MNB's gold stock, along with other valuables and artifacts, were returned after a decision was made in Washington in June 1946.

Figure 1. Hyperinflation of the pengő (forint basis) between August 1945 and July 1946 (per cent)



Source: Own compilation based on Danyi (2022)

The elimination of supply shortages, pent-up demand and price controls, which characterised the post-war period, resulted in high inflation in the US as well, lasting from July 1946 to October 1948. Inflation reached a high of 20 per cent in 1947. During the war, supplies were either completely depleted or running low. Because manufacturing resources were focussed on military production, consumer or industrial durable items were basically non-existent. Following the Second World War, prices were under pressure

from repressed demand. The severe rationing of consumer items throughout the war placed restrictions on households. Foods such as sugar and meat, as well as durables such as cars and gasoline, were rationed by the government. Savings from individuals expanded dramatically and were quickly used up after the war (Rouse et al., 2021). The price level was 30 per cent lower as a result of the price controls than it would have been otherwise. In 1946, when the restrictions were removed, prices increased sharply. For instance, after food price controls expired at the end of June, the price of food alone increased by 13.8 per cent in the following month.

The post-Second World War inflationary period, according to Benjamin Caplan (1956), ended after two years as both domestic and foreign supply chains returned to normal and consumer demand started to level off. The economy entered a mild recession with a 1.5-per cent loss in real GDP as a result of fixed investment beginning to shrink, which also influenced price declines.

Geopolitical turning points frequently involve a monetary revolution, and financial innovations are frequently linked to technological innovations, which implies that the usage of money and the development of infrastructure go hand in hand (International Economy, 2020). The Bretton Woods system was established as a result of the geopolitical upheaval that occurred after the Second World War, during which the US dollar became the global currency and the US assumed the role of the global hegemon (Matolcsy, 2020a). After the Second World War, a period of relative peace was achieved on a global scale, the basis of which was determined by the global leadership role of the US in the economic, military and cultural sense. Pax Americana, which enabled the US to become a global hegemon, was therefore basically built upon on the easing, but not eliminating of geopolitical fragmentation. With the rise of the two global superpowers, the US and the Soviet Union, and the formation of two blocs around them, the end of the Second World War

brought about a new global order. Even though there was much international turmoil during the Cold War because of the disparities in ideologies and interests between the two blocs, there was never an actual war between the US and the Soviet Union.

### 3.2 Inflationary effects of the 1973 oil crisis during the Cold War

The Great Inflation, which lasted from 1965 to 1982, was heavily influenced by the Cold War. According to Keynesian economics based on government intervention in taxation and economic stimulus spending, the US spent considerable amounts of money on both the Apollo Programme and the Vietnam War between 1965 and 1973. Keynesian economics produced high levels of government expenditure that sparked inflation after the Second World War until the early 1970s. The US then implemented Reaganomics and tax cuts, which decreased inflation and restarted economic growth, but resulted in large deficit spending (Rust, 2021).

On October 6, 1973, however, war broke out in the Middle East when Egypt and Syria unexpectedly attacked Israel. Following that, the three-week-long Yom Kippur War ended with a surprising Israeli victory. The Soviet Union was supporting the neighbouring Arab states while the US was resupplying Israel's military. The Organisation of the Petroleum Exporting Countries (OPEC), which unites the Arab oil-exporting nations, imposed an embargo on the US and refused to provide it oil in retribution for US support for Israel. The US, a significant oil importer, has limited ability to protect itself from the high worldwide price of petroleum. The cost of all petroleum-based fuel increased, which resulted in price rises for almost all consumer products, heating oil and electricity. Rising inflation was controlled by OPEC by maintaining low output (Rust, 2021).

Oil prices roughly quadrupled during the oil embargo recession, which lasted from November 1973 to March 1975. This had



a significant negative impact on the economy since customers' spending on other goods was constrained as a result of the higher petrol prices for consumers (Huddleston, 2020). The fact that the US was experiencing the so-called "Nixon shock," which began in 1971, significantly heightened the impact of the price increase. The Bretton Woods Agreement's system of fixed exchange rates, which had stabilised the global financial system since the Second World War, was terminated, which signified the end of the US dollar's ability to be converted into gold in order to safeguard the American economy. This led to a sharp decline in the value of the US dollar, which in turn caused inflation to soar (Szabó, 2022).

After the embargo was removed in March 1974, oil prices rose steadily until peaking in April–July 1980 at USD 39.50. Costs for households and businesses skyrocketed in response to the sudden surge in oil prices. Businesses increased prices in order to pass these costs on to customers, and households demanded higher wages in order to cover the cost of living increases. Stagflation resulted from a spiralling wage-price relationship that maintained high inflation, despite increasing unemployment and slowing economic development. The recession was also exacerbated by the Fed's interest rate policy. Between February 1972 and August 1973, the Fed funds rate climbed from 3.3 per cent to 10.5 per cent. At the start of 1973, GDP growth began to stagnate. Additionally, the Fed increased rates to 12 per cent in July 1974 in an effort to control inflation, which further reduced growth (Coppola, 2022).

The USD's status as a global currency was solidified throughout the 1970s, a time when financial digitalisation was already well under way. The petrodollar is the USD used to buy crude oil. The US and Saudi Arabia agreed in the 1970s that the price of oil would only be quoted in USD in exchange for specific security guarantees from the US. This was followed by other Arab countries, and thus finally the entire oil market was pegged to the USD. The petrodollar was invested in by Arab countries on the capital markets, which also had an effect on the yield on US

bonds and stocks by driving it down and making it less expensive to finance the nation's debt. Today, several countries, particularly China, have supported paying for oil purchases in RMB instead of USD.

### 3.3 Development of bipolar world order in the 21<sup>st</sup> century

#### 3.3.1 *The US-China technology and trade war*

China has established itself as a significant player in the global economy and the international monetary and financial system. Its high-tech industries, which are primarily represented by information and communication technology (ICT), have seen tremendous growth. Chinese businesses have become an increasing threat to the high-value, Western countries' high-tech industries. As a result, the US previously made multiple attempts even during the Obama administration to stop Chinese companies from investing in the US semiconductor industry and increasingly restricted China's access to American technology through commercial means. The quick ascent of China's cutting-edge science and technology, including ICTs, has been seen since President Trump assumed office. Since 2017, tensions between the US and China have risen due to ongoing trade disputes and technical competitions between the two superpowers. The Trump administration started a tech war with China based on a zero-sum mentality, which has a significant impact on how the two countries interact going forward and even on global political and economic trends (Sun, 2019).

It is generally agreed that Trump's signing of the "Presidential Memorandum Targeting China's Economic Aggression" and the imposition of tariffs on steel and aluminium in March 2018 marked the official start of the trade conflict. However, tensions between the US and China had already appeared earlier. The US refusal to acknowledge China as a market economy was the catalyst for the conflict between the two superpowers. The December 2017 adoption of the "National Security Strategy"

reflected Trump's assertive foreign policy. The list of dual-use products that could not be sent to China was expanded, export controls were strengthened, and restrictions were put in place on China's investments in American technology. The *Entity List* was introduced as a result of which US businesses were prohibited from doing business with listed corporations such as the ZTE Corporation (Kapustina et al., 2020).

The US has repeatedly imposed restrictions on Chinese technology companies in recent years and has taken a variety of actions against TikTok, a key actor in the rivalry between the two countries. The US imposed a prohibition on sales of design software, semiconductor manufacturing machinery and advanced chips from corporations such as Nvidia (NVDA) and Advanced Micro Devices (AMD) to Chinese companies in the autumn of 2022. The US then unveiled extensive export restrictions in October 2022 in an effort to stop China from achieving new advancements in the design and manufacture of AI chips. China eventually announced a security review of US memory chip giant Micron Technology (MU) in March 2023. In addition, China is probably going to limit rare earth metal shipments this year. It is the world's primary source of these metals, which are essential for making semiconductors, EV motors and missile systems. Furthermore, China is considering limiting the export of machinery and technology used to create photovoltaic cells for large solar panels. These actions make the decoupling of the two major powers even worse (Graham, 2023). Separating the supply chains of the West and China will cause prices to rise permanently, because alternative industry development will necessitate government spending and subsidies. If money supply is increased by related bank lending and funding schemes, it can result in inflation as a monetary phenomenon.

The fact that National Security Advisor Jake Sullivan stated in a speech in September 2022 that US export controls earlier sought to maintain technology leadership but did not compete

for dominance also foreshadows an increase in rivalry between the two superpowers. The US now is up against a rival ready to invest practically limitless resources in becoming the industry leader in technology that can serve as “force multipliers.” In view of the changed strategic environment, the US aims to maintain the greatest possible lead in the future (Graham, 2023). It is possible to draw the conclusion from the battle for technological advantage that new technologies will alter the world in the 2020s, just as they did in the 1940s (Matolcsy, 2022).

One of the next stages in the competition between the US and China is related to central bank digital currency (CBDC), which is one of the latest technological breakthroughs, in which China is leading the way. In addition to China, the rising powers include India and the Association of Southeast Asian Nations (ASEAN), leading the transition from the unipolar to the multipolar world order. Regionalism is increasing and alliance systems are becoming rigid. As a counterbalance to the ever-increasing emphasis on Eurasian cooperation, there are serious efforts to strengthen Atlanticism, and protectionist instruments such as the US’ *Inflation Reduction Act* are being introduced.

Technology and emerging powers are the driving forces of the new digital money revolution of the 21<sup>st</sup> century, which is happening concurrently with geopolitical shift. We currently live in the age of the fusion of geopolitics, money and technology, according to Matolcsy (2020b). These three elements work together to foster the emergence of a multipolar or even bipolar system, as well as the shifting of the global economic and political axis to the East (Boros & Kolozsi, 2019). Although the US economy is still strong today, there have been recent indications of stagnation and a slow decline in the use of the USD. In a speech in April 2023, Christine Lagarde warned that deteriorating relations between the US and China threaten the leading position of the USD and EUR in global reserve management. According to IMF data, in the fourth quarter of 2022, the USD accounted for 58 per cent of all central bank

reserves, the EUR slightly more than 20 per cent, and the RMB only 2.7 per cent. However, in a survey that took place between February and mid-March this year, the majority of respondents said that the RMB would become a larger part of international reserves in the rest of the decade (Mosolova, 2023).

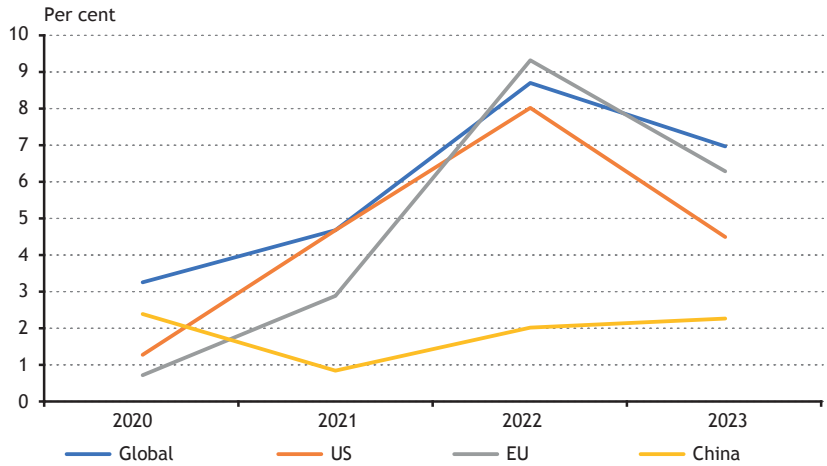
### *3.3.2 The Russian-Ukrainian War*

Russia invaded and occupied areas of Ukraine on 24 February 2022, escalating the Russian–Ukrainian War that had started in 2014. The conflict caused a significant shock to the world economy, particularly to the oil and food markets, which resulted in a supply shortage and record-high prices. In a world already plagued by pandemic-driven inflation, the results will be elevated energy prices and diminished trust in the economy and financial markets (Macchiarelli, 2022). The euro area has been more exposed to the economic effects of Russia's invasion of Ukraine as compared to other economic zones. This is mostly due to the euro area's heavy reliance on energy imports, which in 2020 accounted for more than half of the region's energy consumption. Additionally, before the conflict, Russia was a significant energy supplier to the euro zone. Due to its high degree of openness, the euro area's economy is susceptible to changes in global value chains and marketplaces (Arce et al., 2023).

The war significantly increased the inflationary pressures that were already present in the euro area during the post-pandemic recovery and raised consumer prices, particularly for food and energy. Rising from 0.25 per cent in 2020 to 2.59 per cent in 2021 and then 8.38 per cent in 2022, headline inflation surged (O'Neill, 2023a). Inflation related to food and energy accounted more than two thirds of this record-breaking inflation in 2022. While food inflation has previously made the highest contribution to inflation, energy inflation was by far the biggest driver of inflation in 2022. January 2023 saw a 14.1-per cent increase in food prices compared to the previous month. Given how energy-intensive the production of food is, the high rates of food inflation reflect

some of the indirect effects of high energy costs, for which the war has been a major factor. The impact of the war can be more clearly seen when focussing on the inflation rates of the various components. Prices for food items such as wheat or oilseeds, for which imports from Ukraine and Russia had been crucial before the war, saw inflation rates that were significantly higher than the national average for food inflation (Arce et al., 2023).

Figure 2. Annual inflation rates from 2020 to 2023 (per cent)



*Note: 2022 and 2023 global, 2023 US, 2023 EU and 2023 Chinese data are forecasts. 2022 data for China is a preliminary figure published by the National Bureau of Statistics of China in January 2023.*

*Source: Own compilation based on O'Neill (2023b), Statista Research Department (2023) data, O'Neill (2023a), Textor (2023)*

There are indications that the war's impact on the euro area's inflation may be tempered by changes in the global energy and food markets. The cost of electricity is a significant influence in this regard. Natural gas consumption in the EU fell by about 20 per cent in 2022, which made it easier for the EU to deal with the decline in Russian gas supplies brought on in part by EU sanctions. Additionally, attempts to diversify energy sources

have helped to explain the recent steep decline in natural gas prices from their all-time highs in the fall of 2022. The biggest driver of inflation in the euro area at the moment is consumer food inflation, and leading indicators such as farm gate prices in the euro area or the prices of agricultural commodities on global markets have showed sharp declines since the middle of 2022 (Arce et al., 2023).

As technology advances, Russia is a significant producer of palladium, which is used in engine exhausts to cut pollution. It produces around 40 per cent of global mine production and 10 per cent of global platinum supply. 15 per cent of the titanium used in aircraft produced globally comes from Russia and Ukraine. Around 13 per cent of the world's fertiliser supply comes from Russia. Disruptions to the worldwide supply of these commodities, when combined with the post-pandemic supply chain issues already present, have the potential to cause issues in certain industries, such as the manufacture of new vehicles, where ongoing shortages could support high pricing (Macchiarelli, 2022).

The Russian–Ukrainian War has prompted the Western alliance of the US, the UK and the EU to impose sweeping financial sanctions on Moscow, including freezing some USD 300 billion worth of Russian central bank assets. Data from the World Gold Council show that many of the purchases over the past year have been linked to central banks in countries that are not allies of the West. The People's Bank of China bought 62 tonnes of gold in November and December 2022, raising its total reserves above 2,000 tonnes for the first time. Turkey's official gold reserves increased by 148 tonnes to 542 tonnes last year. In 2022, the states of the Middle East and Central Asia were also active buyers of gold. According to John Reade, chief market strategist at the World Gold Council, the sanctions against the Russian central bank led many non-aligned central banks to re-evaluate where they ought to keep their international reserves (Mosolova, 2023).

The Russian–Ukrainian War, according to Christine Lagarde, changed the “global map” and started a fundamental re-evaluation of economic ties and interconnections in our globalised economy. These changes have significant effects on Europe. And if we want to succeed in this new and more unstable global environment, we must act accordingly. However, that does not imply limiting free commerce, instead, we must leverage our regional strength and seek to make commerce safer in this uncertain time (Lagarde, 2022).

## 4 Conditions for avoiding negative impacts of growing geopolitical tensions

The recent interruptions in global trade have fuelled talks about economic security and prompted worries about the resiliency of supply lines. In order to ensure access to essential manufacturing inputs, some countries have begun to use supply chain strategies aimed either at “reshoring,” “nearshoring” or “friend-shoring.” Examples of actions taken to improve supply security include China’s “dual circulation” strategy, the US *Chips Act*, and the establishment of the EU’s “open strategic autonomy” (Attinasi et al., 2023). Although these strategies and laws stabilise economies, they also increase polarisation at the same time. Therefore, a great deal of emphasis must also be placed on the maintenance and development of global cooperation in order to avoid geopolitical and financial fragmentation.

From the point of view of central banks and monetary authorities, it is of utmost importance to enhance cooperation agreements between institutions, thereby strengthening and expanding the global financial safety net through mutual assistance agreements between countries, such as bilateral and multilateral currency exchange agreements. Great emphasis should also be placed on enhancing cooperation between international regulatory and



standard-setting bodies, as well as on the work of international financial institutions such as the IMF, the World Bank or the Bank for International Settlements (BIS).

It is crucial for central banks to keep track of global best practices since doing so will enable them to apply ideas for policy that will best serve the economic strategy of their respective governments. More FDI can be recruited through boosting national economies' competitiveness and efficiency, and an efficient economy also experiences less inflationary pressure. Long-term reductions in energy use and inflation can also be achieved through the green transition and improved energy efficiency. The practices of Asian nations are model in this area, so it is crucial to strengthen Eurasian cooperation from this perspective as well.

The enhancement of cooperation is also crucial in the case of topics that have become unavoidable nowadays, such as central bank digitalisation, since the increase in geopolitical fragmentation greatly threatens the smooth development of globalised, digital financial services. If the systems were fragmented, then the advantage resulting from the renewal of cross-border international transactions through CBDCs would also be lost. Project Dunbar<sup>1</sup> and Project mBridge<sup>2</sup> are two excellent examples of central bank collaborations brought together by the BIS. In order to avoid these risks, the coordination of supervisory authorities is important, and, in order to avoid consumer and financial stability risks, information sharing is crucial. A good example of this is that in July 2021, the China Securities Regulatory Commission (CSRC) and the MNB signed a bilateral cooperation agreement in order

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<sup>1</sup> Project Dunbar is led by the BIS Innovation Hub in partnership with the Reserve Bank of Australia, Central Bank of Malaysia, Monetary Authority of Singapore and South African Reserve Bank.

<sup>2</sup> Project mBridge is involving the BIS Innovation Hub Hong Kong Centre, the Hong Kong Monetary Authority, the Bank of Thailand, the Digital Currency Institute of the People's Bank of China, the Central Bank of the United Arab Emirates and the National Bank of Kazakhstan.

for the two parties to exchange information and share knowledge. The agreement covers, among other things, information sharing between the authorities as well as supervisory cooperation for the operation of cross-border institutions (MNB, 2021b). The Network of Central Banks and Supervisors for Greening the Financial System (NGFS), which coordinates central banks' green financial activities, also promotes their increasingly prominent green mandate through international collaboration.

## 5 Conclusion

Geopolitical tensions, primarily on inflation and financial stability, greatly influence the activities of central banks through direct and indirect effects. Throughout history, we have already seen numerous examples of this, among which the consequences of the Second World War, the Cold War and the multipolarisation in the 21<sup>st</sup> century stand out. Following the current geopolitical fragmentation, one of the most significant developments is that the influence of the RMB, which is currently the fifth most active currency for international payments and the fifth among international reserve currencies, is increasing under the current international monetary system (Yang, 2023). This corresponds to the ambitions of China, which is emerging as a great power, and supports the importance of Eurasian cooperation.

International collaboration is crucial for minimising certain elements of the new global order that are having a significant impact on inflation. It is no longer clear that goods are created where their production costs are lowest, because of the “reshoring,” “nearshoring,” and “friend-shoring,” phenomena that are becoming more prevalent. Additionally, the sanctions imposed on Russia during the Russian–Ukrainian War demonstrate that nations do not always buy hydrocarbons from the supplier who offers them for the lowest price. India and China

are currently Russia's biggest customers, not the European Union. Labour is becoming more and more expensive because of the aging society, which is primarily a feature of the West, but also of some Eastern countries such as China, Japan or South Korea. For the time being, it is unclear how much automation or migration will be able to replace these processes. Global warming is also a risk. Global water scarcity poses the threat of war in more and more locations, and harsh weather has an impact on agricultural output. Famine and a lack of water can cause new wars and mass migration. Since environmentally friendly technologies are more expensive, the green transition, which is crucial for long-term sustainability, also has an inflationary effect on prices.

Sir Paul Tucker, former Deputy Governor of the Bank of England, stated in March 2016 during the Tacitus Lectures series in London that the countries that coordinate their monetary policy, economic policy and geopolitics will be the winning countries, nations, communities and leaders of the 21<sup>st</sup> century (World Traders, 2016). The coming years will be crucial in terms of the realignment of the geopolitical and economic balance of power; therefore, in addition to monitoring and forecasting macroeconomic processes, it is essential that central banks also monitor geopolitical processes and adopt a geopolitical approach in their operations. As Matolcsy stated: "We might gain some insights for the coming decade from the 1940s and 1970s if we trust the hints of the cycles of history. The gist of all these hints might be very simple: these years will be completely different from the previous decades" (Matolcsy, 2022, p. 17). One of the most important responsibilities of central banks is to keep abreast of the ongoing changes in the global balance of power in order to be able to react in time and adapt their activities to international events.

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## Chapter 1

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“Geoconnectivity”  
- Common past,  
common challenges,  
one destiny



# Maps and Theses for the New Geoeconomic World Order

Norbert Csizmadia

*We are at the dawn of a new world order in which our world is becoming increasingly interconnected. In order to understand this new world economic order, we also need new maps, the key characteristics of which are connectedness, complexity and sustainability in a new Eurasian age. A complex and sustainable interconnected Eurasia. A complex and interconnected Eurasian age that is sustainable for the long run. A complex world which is interconnected and builds on sustainability. The Atlantic age that lasted for 500 years is followed by the Eurasian age. This study introduces the world in which we live through maps, some of which have been prepared using an entirely new approach. Society, economy, sustainability, technology, ecological footprint, connectedness and scientific relationships are shown on the maps seen from a European, Chinese and Eurasian perspective.*

*The new world order which is about to be born will also mean a “New Renaissance” since technological development has revalued the importance of geography. The 21<sup>st</sup> century is the century of knowledge and creativity, where the most important currency is represented by individual ideas and innovations. Countries which do not possess sufficient knowledge will be compelled to purchase it. Therefore, the value of knowledge is increasing all the time. We have entered an age in which data (or Big Data), as the most important raw material, builds on the geofusion nodes created by networks and fusions. New collaborations of new players will come into being and former peripherals will become the new centres.*

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Norbert Csizmadia is Head of the Board of Trustees of the Pallas Athene Domus Meriti Foundation (PADME). E-mail: [csizmadia.norbert@padmebudapest.hu](mailto:csizmadia.norbert@padmebudapest.hu)

*In addition to technology and knowledge, another basic pillar of the new age of globalisation is long-term sustainable development. We are witnessing the rise of geography and economic geography in this new age when geopolitical processes are replaced by geoeconomic ones and instead of a struggle for territory, actors compete for markets. Geoeconomics describes and unlocks global economic processes as a geographical fusion node junction of economics and the social sciences. Geoeconomics transforms the global economy and global power relationships. This study offers 21 theses for understanding this phenomenon.*

**Journal of Economic Literature (JEL) codes:** O13, O18, O19, O40

**Keywords:** new world economic order, globalisation, connectivity, complexity, technological development, geography, geopolitics, geoeconomics, geofusion

## 1 The revaluation of the importance of geography

For a long time, geography meant the description and portrayal of the Earth and our environment (geography 1.0). Following the age of discoveries, the scope of geography widened, new territories came into view (geography 2.0). Territories became connected through commerce (geography 3.0) and centuries later – along the borderlands – the territorial way of thinking would become integrated and new sub-branches would be created, such as social geography, economic geography, etc. (geography 4.0). Towards the end of the 20<sup>th</sup> century, the geography of globalisation (geography 5.0) became dominant. As technological development follows industrial revolutions, so does social progress (see visions of Japanese society 5.0, 6.0), and thus the new cycle of geography is about technology and the geography of fusions (geography 6.0). By relying on modern geopolitics and technology, the new geofusion geography opens the way for development to smaller countries and areas where human resources are scarce, but there

is plenty of knowledge and innovation. The era of geofusion is about the rise of geoeconomics and geotechnology.

Maps play an increasingly important role in our daily lives. At the same time, substantial changes have become necessary in the field of cartography. We need new kinds of maps with new morphological symbols based on a new cartographic approach. New types of world order self-organisation are coming into being, and the maps that reflected the great geographical discoveries are complemented in the 21<sup>st</sup> century by digital navigation, creating digital and virtual geopolitics. The traditional understanding of space changed in the second half of the 20<sup>th</sup> century. Our world is continuously shrinking (global village), but also expanding at the same time. In the 21<sup>st</sup> century, the deserved significance of geopolitics based on the geographical space approach is being restored with the persistent growth of the importance of the geographical components of certain decisions.

In the new world order, the network, the global and the information characteristics become equally important. Therefore, in addition to their global nature, the new-style maps emphasise networks and information. Using modern online map services and other devices, anyone can participate in mapmaking more effectively than at any time before. Social media projects such as OpenStreetMap create user-generated maps covering the whole planet with a level of cooperation that would have been impossible before the appearance of digital technology. The power of charting maps has always been bound up with the ability to generate, organise and disseminate knowledge. Using digital maps, we can also observe how the new technological devices reshape the international economic sphere. We can see the importance of urban centres on the night-time aerial photographs published by NASA, the connecting points of air transport reveal the pattern of the new economic power centres, as well as the economic and commercial hubs.

In order to understand the processes taking place in our world, we need to turn to geography. Everyone is talking about geopolitics

these days. Yet, they predominantly approach the question from a political science (defence policy, security policy) point of view instead of taking into account the geographical (“geo”) factors. Geography is a means to understanding the world: by way of geographical maps we can explain the hidden as well as visible connections of our world. Geography is economy (geo-economy), politics (geopolitics), technology (geotechnology) and design (geodesign) rolled into one, it relies on natural laws (geonomy), and it is also a vision of the future and fusion.

## 2 The innovative geographical axis of the future: New “lucky zones”

Examining the development of East and West throughout the past 15,000 years, British historian Ian Morris (2011) concluded that changes in historical processes correlated with geographical latitudes. In other words, geography can explain why the West has ruled the world in the past 500 years. Whereas the West lost its leadership role for a thousand years following the fall of the Roman Empire, it rose again from the 1500s. Yet, it will be worth our while to look East again in the future.

Due to its geographical position, the climate of the Eurasian continent is favourable for agriculture and thus for development in general. This “lucky zone” extends from Southern Europe right up to the southern part of China, includes Israel, the United Arab Emirates, Singapore, South Korea (the KIDS countries) and the three global hubs of China, that is Shanghai, Shenzhen and the Chengdu–Chongqing economic area (Matolcsy, 2021). In his book *Guns, Germs, and Steel: The Fates of Human Societies*, Jared Diamond (1999), like Ian Morris, underlines the importance of Eurasia. With its 4+3 centres, this is the future-axis of the new Eurasian age. What is common among them is that these are relatively young countries and global centres that have built up the world’s most

innovative nations in 50 years. They have few natural resources, but they have grown large in from knowledge, innovation and technology. Exploiting their geographical locations, they constructed significant transport hubs.

Another shared characteristic is that they possess a strong vision of their future. They associate a solid value system with this vision of the future: the strength of the family, respect for the old, high esteem of knowledge, a work-based economy, religion, a strong sense of nationhood, helping the community and the world, harmonious coexistence with nature and the cultivation of traditional values nurture the realisation of this vision for the future from one day to another. They combine the traditional and the ancient with the modern, grafting the values rooted in ancient sources into modern technologies. They are seeking out and searching for new technologies. They are building on world class education systems. This is where the best universities are located. Talent is spotted in early childhood and is nurtured from thereon. The recipe of a successful vision for the future is clear: a society and an economy centred on the family and on work. A system which is predicated on the triad of nature, culture and the future, in other words on sustainability, on a future-proof culture and the fusion of talent, knowledge, technology and capital.

In his work *A Study of History* (1947), Arnold J. Toynbee considers the basic patterns of the emergence of civilisations to be patterns of interaction. Having examined the rise and decline of a total of 28 civilisations through history, the author came to the conclusion that the key to the rise of civilisations has been giving the right answers to challenges as prompted by creative minorities composed of leadership elites. He further argued that civilisations follow cycles, and that the study of history is based on commercial and scientific observations. Of the four civilisations that remain in the 21<sup>st</sup> century, two have outstanding importance: these are the Western and that Far Eastern civilisations. In Toynbee's view, these either combine together or Western civilisation will be left on

its own and will start to decline. We are, therefore, in the process crossing a historical boundary in our time. As a result, the 500-year long Atlantic period is being replaced by the new Eurasian age which is built on long-term sustainability. Those who wish to understand the future had better look east.

The spatial structure of the world economy appeared “relatively simple” in the 20<sup>th</sup> century. It divided the world into two parts: the “developed” global north, and the “underdeveloped” global south. Based on the *Brandt Report*, named after former German Chancellor Willy Brandt, the so-called “Brandt Line” demonstrated the North–South divide between the economies during the 1980s. The line cuts the world in two broadly along the 30<sup>th</sup> northern parallel. North of the line lie the “developed” countries, to the south of it the “underdeveloped” ones. While 40 years ago, one quarter of the population lived in the northern “developed” world and this territory produced 80 per cent of the GDP of the world economy, three quarters of the Earth’s population lived in the “underdeveloped” southern territories, providing 20 per cent of the global GDP. The Brandt Line had a significant influence on geopolitical and economic geographical thinking in the 20<sup>th</sup> century.

By 2013, Thomas L. Friedman had come to believe that instead of developed and underdeveloped countries, we should talk about countries that stir people’s imagination and those that do not. The unipolar world order has turned into a multipolar one. As a result of the continuous development that has been taking place since the turn of the millennium, the line between developed and developing countries has become completely blurred and has lost its meaning by now. In his book *Factfulness: Ten Reasons We’re Wrong About the World – and Why Things Are Better Than You Think*, Hans Rosling (2018) argues that, on the basis of statistical data, we can now only name just 13 developing countries. While, for instance, during the 1980s China belonged to the group of underdeveloped countries, it has now become the world’s number



one economic superpower. Geographical names and positions become increasingly revalued and are in permanent competition with each other.

### 3 New geopolitical world models

According to one of the most important American geopolitical thinkers of our time, George Friedman, who has Hungarian roots, the most important great powers and geopolitical force fields of the new economic and geopolitical world order are situated between 23.5 degrees and 66.5 degrees of the northern parallels of latitude, i.e. between the Tropic of Cancer and the Arctic Circle. This is where the great powers with the largest territories are situated. They possess significant populations, economies and military power (Canada, USA, Germany, France, Türkiye, Iran, Saudi Arabia, India, China, Russia, Japan).

Juan Perez Ventura, a researcher at El Orden Mundial,<sup>3</sup> proposes the theory that in terms of defining centre and periphery, not only nation states, but also global cities (parts of the nation states) as economic and commercial hubs also play an outstandingly significant role. According to Ventura, in today's world globalisation is not a global phenomenon because the world is in fact in the process of polarisation. This polarisation which has traditionally been called North–South dynamic has changed over the years, since the countries of the earlier periphery have undergone a super-fast transformation since the 1990s. These emerging economies can no longer be regarded as periphery. There is a transitional “zone” in our world which spans from the Amazon across the Sahara desert and the Tibetan high plateau, forming one belt on the map. These territories are uninhabited and relatively poor in resources. On Ventura's world map, the

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<sup>3</sup> For further information on the El Orden Mundial institute, please visit <https://elordenmundial.com/>.

global cities and regions located north and south of this belt are equally important. Yet, while north of this belt we mostly find the power centres of the Atlantic economic age, the fast growing economic and global centres of the new Eurasian world order are situated south of the belt.

## 4 The geopolitics of yin and yang: The Eurasian age boundary

Therefore, if we drew the disappearing or transforming Brandt Line 40 years later, adding to it both Juan Perez Ventura and George Friedman’s models, we would be left with an even more exciting picture. But where is this “invisible line” today and what is its significance? If we take geography and natural factors as the bases of our considerations, we will see that the contiguous watersheds (catchment areas) are separated by divides (mountain ranges) which on the Eurasian continent is represented by the Eurasian mountain range spanning east–west (from the Pyrenees right up to the Himalayas.) The map will also show that the most important infrastructure networks: railway lines, gas pipelines and motorways are located in the contiguous land areas north of the Eurasian mountain range. These regions therefore play a dominant role in transportation, energy networks and logistics in general. This is the so-called “hardware” region. Compared to this, we find the most important air transport, IT and other technological and service centres as well as the fast growing economic and global commercial as well as financial centres in the much more fragmented areas lying south of the Eurasian mountain range. These are the so-called “software” regions with centres such as Barcelona, Milan, Istanbul, Tel Aviv, Dubai, Hyderabad, Bangkok, Singapore, Shenzhen, Chengdu, Shanghai, Seoul and Tokyo. Hardware and Software are like yin and yang: they are different, but they exercise their influence together.

If we examine the geopolitical processes and conflicts happening today, the roles become easily recognisable. In the north, we find the countries occupying extensive territories and wielding significant military power. Due to their contiguous territories, they are characterised by infrastructure projects, such as gas and other pipelines, railway lines as well as logistical construction projects. By contrast, the southern areas rely more on maritime shipping and air transport. We find the most innovative countries and the most developed global urban hubs in the latter regions, where instead of battle tanks, the military are developing drones. This is the so-called KIDSingChi Axis (South Korea, Israel, Dubai, Singapore and the three Chinese economic centres: Shanghai, Shenzhen, Chengdu–Chongqing) which is the world's most innovative region. As George Friedman puts it, small and innovative countries can also become economic and military great powers in our present age.

If, starting from Mackinder Heartland (“crush zone” or “pivot area”) theory, we add Brzezinski's (1998) chessboard, an image emerges in which the conflict between Russia and Ukraine unmistakably appears as part of the “war” of the global North whose actors are aligned in an east–west direction. Through this approach, energy, infrastructure routes, pipelines as well as economic and commercial spheres of interest lie at the heart of this North-Eurasian warfare.

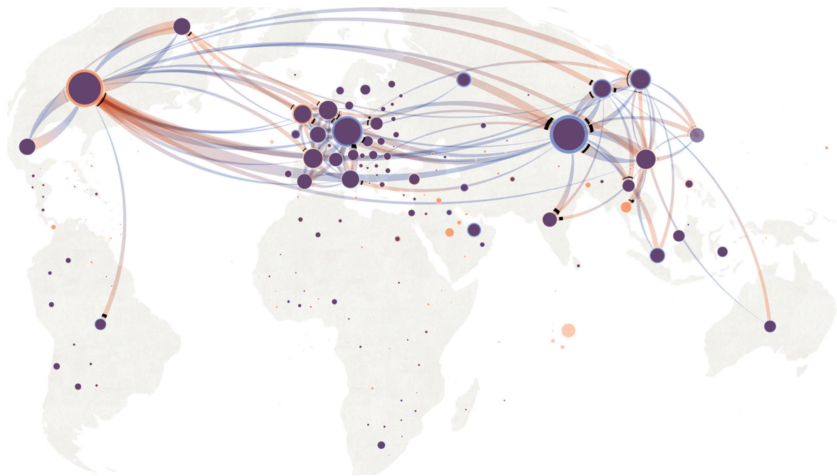
## 5 The territorial distribution of some 100 thousand billion US dollars

According to 2022 data, the following countries account for the highest shares in the global economy (in thousand billion US dollars): the USA (20.89), China (14.72), Japan (5.06), Germany (3.85), the UK (2.67), India (2.66), France (2.63), Italy (1.89), Canada (1.64) and South Korea (1.63) (Global Peo Services, 2022). In 2022,

the 15 strongest economies represented 65 per cent of the total global GDP, which amounted to USD 100.2 thousand billion in the last year (Statista, 2023). Based on the forecasts of the International Monetary Fund (IMF) dated October 2022, real growth in Asia will be 4 per cent (IMF, 2022a). Compared to this, from the earlier 6 per cent, global real GDP growth slowed to 3.2 per cent in 2022 (IMF, 2022b). In 2022, growth in China was 3 per cent, 2.1 per cent in the USA and 3.7 per cent in the European Union (IMF, 2023). Over the past 40 years, Asia has dramatically increased its share in global economic output. While its share was 8.9 per cent in 1980, this has now increased to 45 per cent and by 2030 it is likely to exceed 50 per cent. By contrast, while Europe and the United States together provided 51.5 per cent of global economic output in 1980, this ratio has now fallen to 36 per cent (World Economics, 2023).

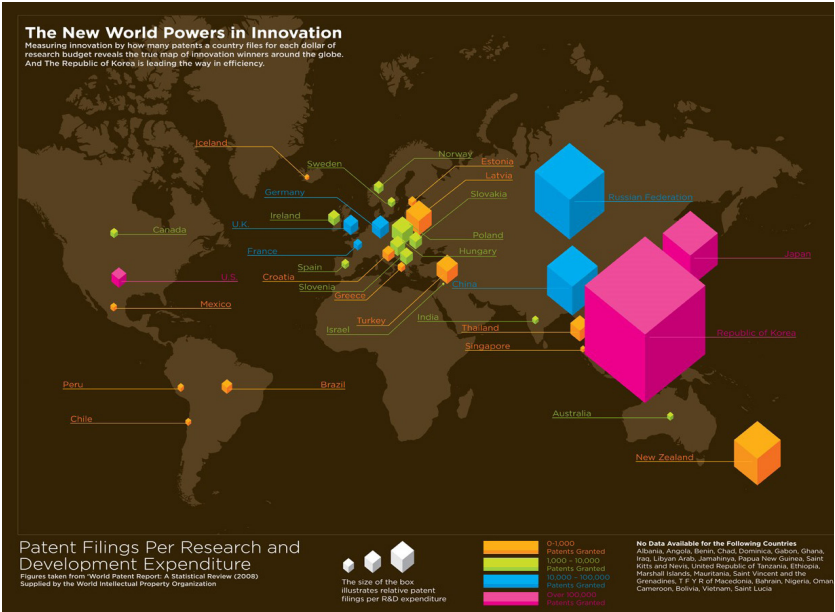
The central role of the United States in world commerce has become seriously debatable, whereas the rise of Eurasia is all the more spectacular. While, according to 2019 figures, only 52 countries identified the United States as their most important trading partner, China was considered to be No. 1 trading partner by more than 120 countries (Green, 2023). The USA and the European Union have been cultivating the closest and in traded volumes most substantial trading relationship in the world. In 2020, the value of trade between the EU and the USA amounted to USD 394,385 million, while that between the EU and China was USD 228,747 million (WITS, 2020). Furthermore, it is worth pointing out that the third largest trading partner of the EU outside Europe is the Association of Southeast Asian Nations (ASEAN). As a result of the latest free trade agreements and China's megaproject called Belt and Road Initiative (BRI), further expansion of commercial relations between Europe and Asia is expected in the future.

Figure 1. Distribution of trade flows between the United States, Europe and Asia based on 2017 data



Source: Clarke (2018)

Figure 2. New world powers in innovation



Source: Csizmadia (2016)

Figure 3. Network of scientific cooperation in 2018



Source: *Csizmadia (2023)*

## 6 Conditions and consequences of the rearrangement of geopolitical roles

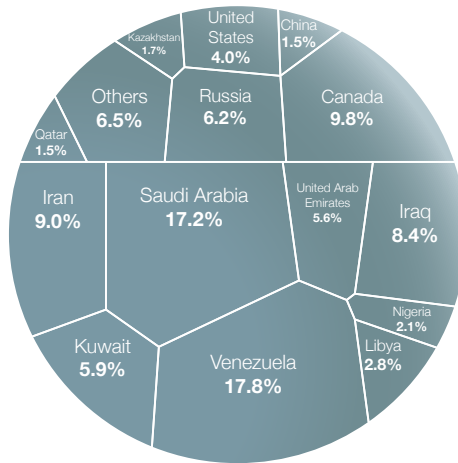
The 21<sup>st</sup> century will be the century of creativity and knowledge. Countries that cannot produce the necessary knowledge will be forced to purchase it. In contrast to countries with large territories that mainly rely on natural and physical resource factors, small countries, especially those with scarce natural resources, need to excel with their knowledge base. This is what Asia’s “small tiger” countries did: Singapore, Hong Kong, South Korea and Japan, just like the small states of East-Central Europe, among others, the Baltic states (Estonia, Lithuania, Latvia), or indeed Hungary. Taking a look at the map of 21<sup>st</sup> century innovation potentials, which shows where innovations and patents originate from, it can easily be seen that, in addition to the South-East Asian countries, East-Central Europe also plays an increasingly significant role. The network diagram of joint scientific research projects between 2005 and 2009, compared with that of 2018, is also worth looking at. Focusing on Southeast Asia or the Indian subcontinent,

it becomes clear that these regions have become stronger in this respect and have been integrated into the scientific bloodstream.

Without any doubt, the global megacities are the world's socio-economic convening and convex focal points today. Whereas in the 1800s hardly more than 3 per cent of the world's population lived in urban areas, the ratio today is 56 per cent (World Bank, 2023). The greatest urbanisation wave of human history is expected to continue in the coming years, accelerating the paradigm change. Whereas in 1950 the populations of 83 cities surpassed one million persons, in today's world, there are 578 cities where the population is higher than one million. Of the latter, 32 cities surpass the ten million figure, and there are 9 cities where more than twenty million people live (World Population Review, 2023). The cities of Asia and Africa are growing most dynamically. The future of global cities are affected by globalisation, urbanisation and technological development. Other important factors are the educational and innovation potentials of the cities as well as the long-term sustainability of the utilisation of environmental resources. The formulation of new ideas, innovation-driven economy, technology, attracting talent, an open labour market as well as the dynamic of the property market of the cities acquire ever greater significance. Numerous smaller cities compete successfully with bigger ones.

In the age of globalisation, it is not only the national economies but the big cities also compete with each other to attract regional company headquarters. In the globalising world economy new, global urban hierarchies appear whose main driving forces include the flow of international capital, information and services. Those big cities that are able to induce the big multinational corporations to choose them for their regional or global headquarters may occupy the leading positions in this hierarchy.

Figure 4. Where is the oil? Crude oil production by country, 2018 (billion barrels, Gbbl)



Source: Csizmadia (2023)

Natural resources have a decisive influence on the position, potentials, economic policy and role played in international commerce of the geopolitical players. Countries that possess significant natural resources, for instance, the largest producers and exporters of crude oil and natural gas, often obtain an outstanding role in the shaping of global policy. It can be stated on the basis of various estimates that a decisive proportion of the currently known natural gas and crude oil reserves are located in the central part, the so-called “strategic ellipsis” region, of Eurasia. 70 per cent of the Earth’s crude oil reserves and 65 per cent of its natural gas reserves can be found in this region. In addition to energy sources, the importance of the ownership of freshwater reserves is also on the increase in the 21<sup>st</sup> century. This is also true for rare earth minerals which are indispensable, especially in space exploration and control over cyberspace. Four out of the eight countries in the world in possession of the largest rare earth mineral reserves are situated in Eurasia, with China leading the list (Kelly, 2023). In his book *Belt and Road: A Chinese World Order*, Bruno Mações (2019) declares that those who own the rare earth minerals can be regarded as rulers of the world.

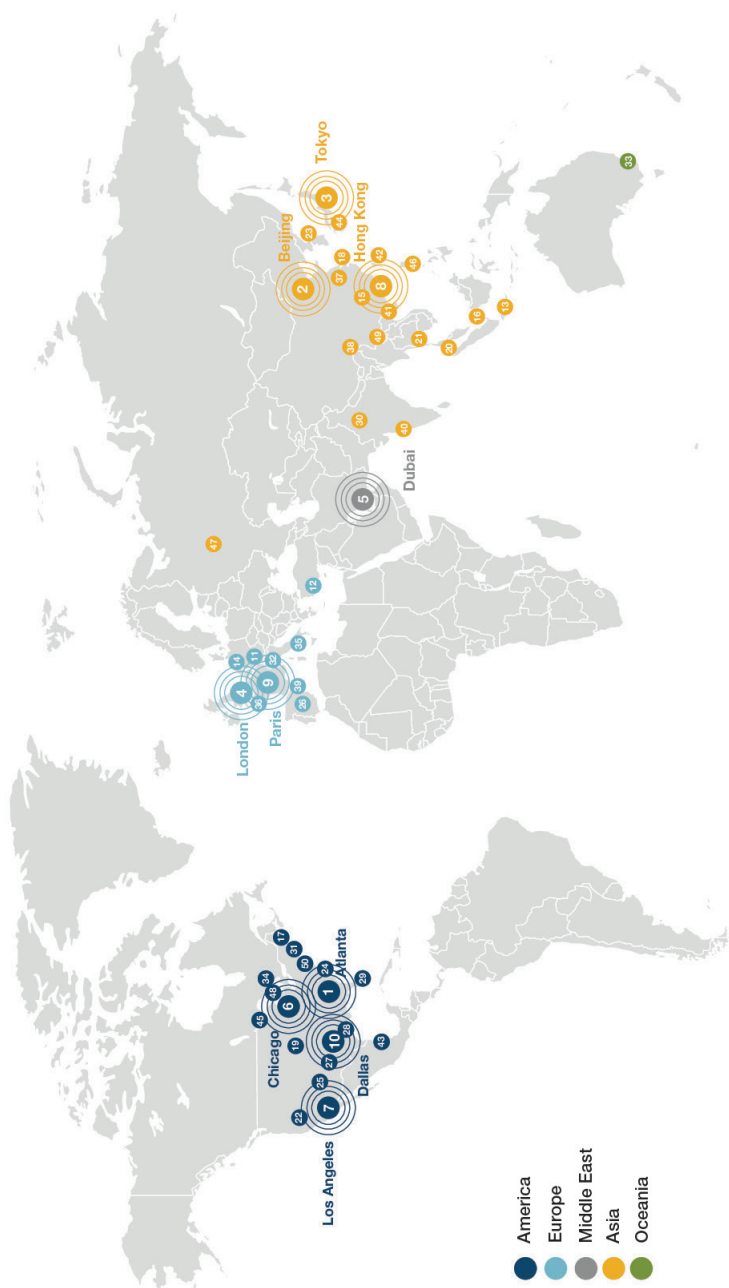




Human energy consumption per capita has increased by 120 times since the time of hunter-gatherer societies. Energy use has not only increased, but also become increasingly complex with the development of mankind. Energy use has become extremely diverse, but the availability of energy sources remains limited in both variety and quantity. Initially, only biomass was used, in the form of food or wood. Subsequently, renewable energy (water, wind), fossil energy, and then nuclear energy appeared in the energy mix. The energy mix varies widely from country to country, depending on the availability of energy sources determined by geography and geological potentials as well as sustainable energy management factors. Iceland’s geological conditions allow it to cover 78 per cent of its total energy consumption from geothermal energy and a significant part of its remaining energy from hydropower, while Denmark already satisfied 39.1 per cent of its electricity consumption from wind energy in 2014.

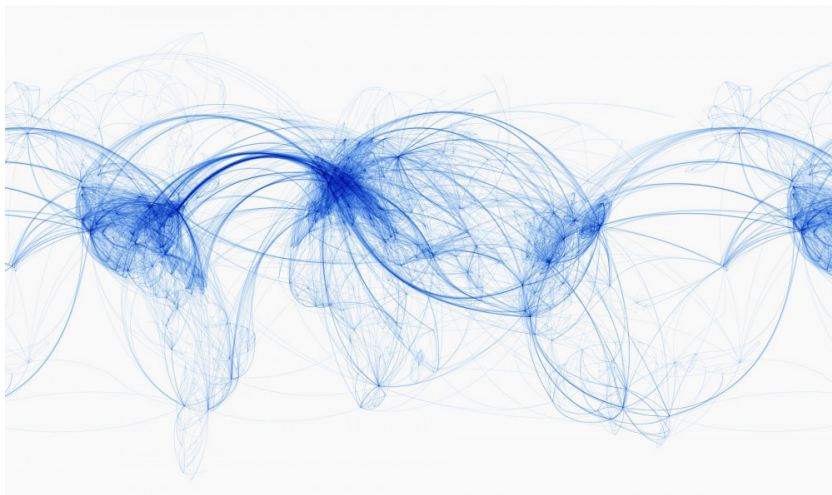
According to the latest figures of the Official Aviation Guide (OAG), Atlanta’s airport is still the busiest in the world, followed by Dubai, with Tokyo coming in third. From the Eurasian region, the airports of London (5<sup>th</sup>), Istanbul (6<sup>th</sup>) and Paris (10<sup>th</sup>) are ranked among the top ten (OAG, 2023). The OAG prepares a detailed annual report on the busiest domestic as well as international flight routes. A report drafted in 2022 shows that between October 2021 and September 2022 the busiest international flight route was the Cairo–Jeddah route with 35 flights and 3.2 million seats reserved daily. In the second place was the Dubai–Riyadh route which, while served by 40 flights per day, the number of reserved seats was slightly lower at 3.19 million for a 12-month period. Indian routes also show a rising tendency; the Mumbai–Dubai and the Delhi–Dubai routes have also been included among the first ten. In 2019, before Covid-19, the busiest international route was between Kuala Lumpur and Singapore Changi. However, this route slid back to the fifth place in 2022 with an average of 33 daily flights. According to the report, nine of the ten busiest domestic flight routes can be found in the Asia-Pacific region. The busiest among these is the flight route between Seoul and Jeju Island (a favoured tourist destination) with an average of 224 flights per day (OAG, 2022).

Figure 6. The world’s 50 busiest airports in 2016



Source: Csizmadia (2023)

Figure 7. Air transport routes in 2016 based on the routes of 182 airlines in the world, and the network of major air traffic hubs



Source: *Digital Science* (2016)

In relation to connectivity, besides air transport, the importance of shipping also needs to be emphasised. Based on a 2023 ranking, of the world’s 15 busiest maritime ports, eleven can be found in Asia, one in the Middle East, two in Europe and only one in the USA. Because of the Port of Shanghai, China tops the list, but more than half of the ports on the ranking list are Chinese. The largest port in Europe is in Rotterdam (the Netherlands), while the biggest turnover in North America is handled by the Port of Los Angeles (USA) (GoComet, 2023).

## 7 The Belt and Road Initiative

The Belt and Road Initiative was launched by China in 2013 and has now become the most extensive and most important investment project in human history. As a complex network, it can be flexibly expanded both in time and in space. The essence of China’s long-term plan is that by constructing the New Silk

Road it should re-establish the historic, cultural, economic and commercial potentials that Eurasia once had. The New Silk Road consists of railway lines, the development of maritime and land ports, motorway projects, and the establishment and upgrading of logistics hubs and networks created via economic corridors. Since the start of the project in 2013, China has made substantial financial investments and conceived plans in order to turn the idea of an economic belt encompassing the “New Eurasia” into reality. The essence of the New Silk Road is to relocate the axis of the global economy from the oceans back to land routes and to re-establish and rebuild Eurasia’s former economic, political and cultural leadership role. The New Silk Road is actually a complex network that can be expanded flexibly in both time and space. It connects those actors that make up the new phase of globalisation: according to the latest data, this constitutes 40 per cent of the world’s GDP and around two thirds of the population of the earth (McBridge et al., 2023).

64 countries joined the Belt and Road Initiative at its inauguration. By March 2022, with the signature of the Memorandum of Understanding concluded with China, the number of countries joining the initiative had risen to 148 (Green Finance & Development Center, 2023). The main hubs of the infrastructure networks built within the framework of the New Silk Road will reorganise the regions in terms of their significance, with new centres cropping up. The Greek Port of Piraeus can shorten the duration of sea transport by 20 days, while transportation on the Xi’an–Duisburg rail route takes 24 days instead of the previous 42 days. A new axis of development will be created, which has an east–west direction in the North and northwest–southeast direction in the South, which connects Piraeus to Rotterdam or the port of Hamburg. This would create a North–South Belt spanning from the Baltic Sea to the Adriatic as well as the Black Sea. It is no coincidence that according to Chinese plans, two centres will develop in this region: one of them is the northern centre with Warsaw as its main hub, which will mainly manage transportation

and logistics and energy investments; while the other one will be Budapest in the South, home to financial services, cultural and intellectual partnerships.

The new world order redraws our maps. Regions that previously belonged to the periphery are moving to centre stage. On the one hand, the 21<sup>st</sup> century has ushered in a polycentric world order, and on the other hand, the economic gravitational field has moved unquestionably and significantly to the East. Central Europe has numerous potentials, and the region has undergone undoubted changes during the past decade. Central Europe has always been and always will be an important part of Europe, and equally, a strong Europe is in the interest of the Visegrad Cooperation (V4) countries. The main nodes of the newly built networks will also redefine the significance of the individual regions. Since the New Silk Road will connect with Europe through the East-Central European countries, the region will attain even greater significance. While Europe is thinking in terms of an East–West division, the middle part of the continent has acquired a North–South regional pattern. Central Europe, i.e. the junction between east and west, may turn into the bridgehead and the economic and geopolitical force field of a new Eurasian supercontinent. Central Europe is a unit not only from a historical and geographic point of view, but also as an intellectual and cultural entity. Central European identity may rise from its slumber of semi-demise, and the countries in this region may identify themselves with this new framework. In order for the Central and East European countries to become gateways to the Eurasian continent that is taking shape today, it is by all means necessary for them to transform into independent economic force fields. Instead of the east–west division, the response from the region is the construction of a Central European “geoeconomic field” based on new infrastructure corridors with a north–south orientation. This region can become the key belt of the New Eurasia. The four prominent components of the Central European economic and geopolitical field within the EU are the Visegrad Cooperation (V4),

the Three Seas Initiative (connecting the Baltic, Adriatic and Black seas), the Via Carpathia motorway (connecting Greece and Lithuania via Debrecen and Miskolc) and the New Amber Trail railway corridor running along the western edge of the region starting from the Slovenian port of Koper right up to the Baltic Sea. Trieste is also connected to this scheme with the concession contract concluded for a Hungarian maritime port. These routes come into contact with Hungary's western border. A new sub-zone is being organised between Piraeus and Rotterdam/Hamburg girded in the east by the Via Carpathia motorway, by the New Amber Trail in the west and by the New Silk Road in the east and southeast. Exploiting its geographical position, the region will also rise in the geopolitical sense and will play an increasingly important role in the period ahead.

The Belt and Road Initiative can be summarised in six 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 the macro level: connectivity, strategic synergy, capacity-building; at the 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. These will, in turn, be achieved through six economic corridors.

Global civilisation will be replaced by a new type of "geocivilisation," which aims to create a harmonious world order along the axes of common interests. Its basis is the transplantation of the millennia-old Chinese ecological civilisation into the 21<sup>st</sup> century. This is so, because this long-lasting epoch builds on sustainable growth: green technology, green money, ecological attitudes and peaceful evolution. One of the pillars of Chinese philosophy is the yin and yang principle. 21<sup>st</sup> century geopolitics



is also striving for balance based on the principle of yin and yang: east and west, north and south, the simultaneous accomplishment of hard and soft components. In addition to the great global centres, via the partnership between global cities and the nation states, the winners of long-term collaboration between China and the United States and of the harmonious cooperation between the centres and the peripheries, will be the new gateways (the ASEAN countries of Southeast Asia, the countries of Central Asia, the East-Central European countries and the large hubs).

## 8 Interconnectedness and geofusion

Our world is not only multipolar, it is also connected by networks. We live in the age of fusions and networks where the main question is how one particular geographic location is connecting to the rest of the world. Network nodes and interconnectedness are the two most important geopolitical and geoeconomic factors of competitiveness. And if a given geographic node holds a vision for the future and concentrates on knowledge, technology and the future, then it may well turn into one of the new global centres.

The expression “connectography” (a word created by fusing connectivity and geography) was introduced by Parag Khanna in his book entitled *Connectography: Mapping the Future of Global Civilization*, published in 2016. In Khanna’s interpretation, geoeconomic systems have been organising themselves into new types of geographical networks which operate in accordance with new kinds of methodological principles. In Khanna’s view, in this new formation, the direct and indirect connection of various infrastructures, often at great distances from each other, and the management and control of the resulting supply chains define the basis of the new geopolitical paradigm. Interconnectivity has therefore become a new world paradigm. The recent maps showing traditional political boundaries may be complemented with indications of power lines, pipelines, motorways, rail



networks, internet cables and air transport routes, in other words, with the symbols of the global network society. The geopolitical race is expanding and transforming in the struggle for the interconnectivity of supply chains. Competitive connectivity is the most important geopolitical factor of the 21<sup>st</sup> century (Khanna, 2016).

The lines of infrastructure (and hence interconnectivity) become the most important lines on today's maps; they provide the clearest explanation for our 21<sup>st</sup> century world order. As Khanna explained in 2017 in a lecture at Corvinus University of Budapest, "If we only look at infrastructure, we can see what we have built, but not what the impact is on the rest of the world. Therefore, in the 21<sup>st</sup> century, we need to learn three kinds of geography – natural geography, political geography, and functional geography – if we really want to understand what is happening around us. Each region counts as the region is part of the network. The world is becoming increasingly complex, and we must be aware of the value of connectivity, regionalism, and other forces that shape the world much more than our traditional geopolitical theories, which are only based on area, size, and military force."

## 8.1 Geofusion

The term "fusions" first came into general use in music. Fusion in music (especially in the jazz age or in world music) produces a new style after an interchange and subsequent synthesis or fusion between different styles in music. The definition of fusions in gastronomy, for instance, is the following: "where oriental flavours meet western flavours." The first gastronomic fusion occurred in the Raffles Hotel, Singapore's most famous hotel, in 1899, with the assistance of the Armenian Sarkies family.

The fusion of 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. Geofusion maps create

new ways of looking at a great variety of geographical locations, explaining the geopolitical and geoeconomic connections by maps. 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. Thus, if we depict the new geofusion map of the 21<sup>st</sup> century, we will get a surprising new result which shows the economic, commercial, geopolitical and cultural forces of the new polycentric world order. The most important challenge is that we must keep this world order sustainable in the long term.

Figure 8. “Geofusion” world map of the 21<sup>st</sup> century



Source: Csizmadia (2023)

In 2013, the geomatrix creating software of “3D Map Technology” launched a real-time satellite imaging program called “GeoFusion” which runs on the flights of several airlines. This is a special “fusion” map which shows exactly where the aircraft we are currently sitting on is located at the moment, and this has triggered a real-time cartographic revolution. In Khanna’s book *Connectography: Mapping the Future of Global Civilization*, the GeoFusion software is defined as “integrat[ing] virtual reality and 3-D visualization techniques into its GeoMatrix and GeoPlayer engines to produce near real-time visualizations used in industries

such as aviation, defense, space exploration, education, and entertainment” (Khanna, 2016).

Figure 9. Southeast Asia’s hubs and connectivity links, as captured by NASA



Source: Csizmadia (2023)

## 8.2 The three most important “passwords” of the new world order

The three most important passwords and keys to the new world order are connectivity, complexity and sustainability. What the export products of any given country are and how those products connect into the global product space are among the

most important factors of economic complexity. Two factors have truly great significance: one is knowledge (i.e. a highly qualified work force), the other is the exported product itself (in other words, that high value-added industries should be present in as large a proportion as possible in the export structure of a given country).

The global city states are the symbols of the new Renaissance. In addition to strategic companies and nation states, cities will be the new power centres of the 21<sup>st</sup> century. Axes and belts of growth are appearing from the Boston–New York–Washington axis through the Pearl River delta (Hong Kong–Shenzhen–Guangzhou) to Singapore. If we take into account new kinds of urban competitiveness factors such as interconnectivity, technological factors, innovation, knowledge networks, connectedness into global commerce, welfare factors, liveability, the size of green areas, etc., then Singapore, Seoul and Shanghai emerge as winners alongside London, New York, Paris and Tokyo.

When, as part of the Tacitus Lecture series in March 2016, Sir Paul Tucker, a former Deputy Governor of the Bank of England, was asked who the winning countries, nations, communities and leaders of the 21<sup>st</sup> century will be, he answered: those countries that harmonise their monetary policies, economic policies and geopolitics (World Traders, 2016). The winners in the long run of a sustainable future system will be those countries that are connected, strive for balanced financial policy and growth, and possess their own long-term vision for the future, in which the goals of monetary policy, geopolitics and economic policy as well as the related national strategy are the same.

## 9 21 theses for the 21<sup>st</sup> century

To sum up, the 21 most important theses for the new world order of 21<sup>st</sup>-century geopolitics and geoeconomics are the following:

1. We live a new world order, where new actors, new partnerships, new battlefields and new myths are born.
2. The new world order is polycentric and multipolar.
3. Geography has become essential. In order to understand the new changing world order, we must return to geography.
4. We live in the age of geoeconomics, which, besides geopolitics, is an increasingly important new discipline, the result of a fusion between social science, geography and economics.
5. We are entering into a new age in technological development.
6. We live in the age of fusions and networks.
7. The world's economic pole has clearly shifted to the East.
8. The most important watchwords of the 21<sup>st</sup> century are connectivity, complexity and Eurasia.
9. Data is the raw material of the 21<sup>st</sup> century, while experience is its service.
10. The 21<sup>st</sup> century will be the "land" age of Eurasia, putting an end to the 500-year Atlantic age.
11. Because of their geographical location, the most important areas and winners can be the gateway regions (the Southeast Asian ASEAN countries, Central Asian countries, countries of East-Central Europe), in other words, the former peripherals will become the new centres.
12. New alliances are formed in accordance with shared values.
13. We live in the age of a new Renaissance.

14. Just as the city states in the age of the Renaissance, today's global city states and megaregions will assume an increasingly important role.
15. A new way of thinking and set of values are beginning to emerge: the role of nature, family, harmony, and sustainability will become ever more important, and so will national identity and local culture, instead of globalism.
16. Our world is progressing from a global civilisation towards a sustainable new “geocivilisation.”
17. When the world builds on balance, the ancient yin and yang principle where influence is exercised jointly becomes important.
18. Balance equally implies the balance of employment, growth, and finance; the threefold equilibrium of geopolitics, money, and technology, as well as the fusional balance of the natural, social and economic sciences.
19. The ancient will be the “new,” in other words, in the age of technology, those nations and centres will be able to make a breakthrough which are able to transform their ancient knowledge and traditions in compliance with the demands of the 21<sup>st</sup> century. Those nations that can recreate ancient knowledge built on long-term sustainability.
20. We must redraw our maps in order to understand the spatial changes and trends of the 21<sup>st</sup> century.
21. The future will be long-term and sustainable.

## 10 Conclusion

The greatest challenge is to find the right solutions to global climate change, sustainability and sustainable economic growth in a world of connectivity and complexity. The explosive development of information technology considerably changes human, social, geographical, economic, political and cultural relations, as it significantly facilitates access to knowledge about the world, the use of data, and 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 strongly 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, network science, a new phenomenon, 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.

To find the right solutions, we must have new maps, novel approaches, fusions with long-term vision of the future, because we need renewal, new economics, new functional geography, sustainable technologies and new models. We need to redraw our static maps, because changing human values and technological innovations require dynamic maps. The information explosion and globalisation trends are leading to a radical change in the way economies operate around the world. The present period is the unique “geomoment” when a knowledge-based competition begins between territories and leads to completely new economic rankings. In this competition, the geopolitically-based new economic geography and dynamic maps presenting new phenomena in multifaceted ways will help to choose and implement the right and fast path.



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# A Chinese Solution to Globalisation in the 21<sup>st</sup> Century

*Henry Huiyao Wang PhD – Mabel Lu Miao PhD*

*The Covid-19 pandemic, which began in 2020, may have permanently changed the course of globalisation. Furthermore, only two years later the Russia–Ukraine conflict shattered European security and the world order established after the Second World War, plunging the world into a more insecure status quo. This has all resulted in a persistent debate on whether the world is entering a period of “deglobalisation.” In the wake of the pandemic, the looming threat to world security, economic recession and the rising populism that is spreading around the world, globalisation has entered a new period in its history and humanity is faced with a new “Bretton Woods” moment.*

*In this context, the authors seek to provide a new perspective on the future of globalisation, to explore new approaches for sustainable globalisation, to map out a new path for globalisation and provide a theoretical summary and practical exploration of globalisation in the 21<sup>st</sup> century.*

*By examining theories of globalisation and changes that have occurred, this paper analyses and defines globalisation using new perspectives of technology and humanism, which characterise globalisation in a post-pandemic world. Meanwhile, it also analyses the history and current state of China’s integration into globalisation. Vetted data and facts show*

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Huiyao Wang is President of the Center for China and Globalization, China.

E-mail: wanghuiyao-mail@cgc.org.cn

Lu Miao is Secretary-General of the Center for China and Globalization, China.

E-mail: miaolu@cgc.org.cn

Ruijun Zhang, Research Fellow of the Center for China and Globalization, has also contributed by translating and editing this paper.

E-mail: zhangruijun@cgc.org.cn

*that China is transitioning from being a beneficiary of globalisation to a driver of globalisation thanks to its own development. It is also trying to take on more international responsibilities and contribute to innovations in global governance.*

*Using theoretical research on the development of globalisation and looking back at the process of globalisation in China and other parts of the world, the authors conclude that globalisation is now at a crossroads. They explore China's philosophy of promoting inclusive and equitable globalisation and demonstrate how China is giving new impetus to globalisation by leveraging its strengths and unique characteristics. Based on long-term research, dialogue and exchanges with influential opinion leaders from around the world in government, industry and academia, the authors have developed new theories on China's path in terms of globalisation and innovation in global governance. They also propose three pillars and seven pathways as China's model to promote a new form of globalisation.*

*The three pillars are human-based globalisation, open regionalism, and global coexistence and co-governance, which are implemented through seven specific pathways. The first of these is based on "human-based globalisation" and embraces global talent flows and overseas Chinese communities.*

*The second comprises two pathways to implement open regionalism – regional integration through an Asian Common Market and consolidating globalisation in Belt and Road Initiative (BRI) countries. A new regional integration arrangement that uses a higher standard would contribute to cooperation in other areas and ultimately result in a new type of globalisation. Furthermore, a more inclusive BRI would strengthen the foundation of a new type of globalisation in Eurasia, which can fill the gap between the East and the West and foster a rebalancing of globalisation.*

*Thirdly, global coexistence and co-governance require novel ideas to reform the global governance system, as well as shared responsibility in global governance. China, having transitioned from a beneficiary of*

*globalisation to being its main driver, advocates multilateral cooperation mechanisms, which means providing more public goods for the world to ensure a new model that incorporates global governance. The country ought to strengthen its three major partnerships with the Global South, the European Union (EU) and the United States (US) – each for different purposes – to provide better guidance for globalisation.*

*China should strengthen cooperation with emerging economies in the Global South, as this can build a more representative platform for global governance and promote globalisation in a more inclusive and equitable way. The country should strengthen cooperation with European countries in areas such as climate change and the digital economy, while also enhancing cooperation with the EU in international affairs to ensure an effective balance in relations between China, the US and Europe. This will inject momentum into global multilateral cooperation and lay a new foundation for global governance. As two responsible global powers, China and the US should work to build a new “G2 model” and strengthen cooperation in areas such as climate change, infrastructure, the digital economy and public health to avoid falling into the “Thucydides Trap.”*

*The authors finally conclude that China has an effective “set of tools” to upgrade global governance. These include the country’s respect for and willingness to maintain existing international multilateral mechanisms and emphasise the reform of dispute settlement mechanisms under the existing rules, especially within the framework of the United Nations (UN) and the World Trade Organization (WTO). China also advocates upgrading the global governance system by establishing worldwide institutions that focus on current obstacles and challenges such as infrastructure deficits, climate change, data security, economic inequality and global talent.*

**Journal of Economic Literature (JEL) codes:** F01, F02, F13, F15, F23, F51, F52, F53, F62, F63

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# 1 Introduction

One's perception of globalisation is far less widespread than it is today. At the dawn of the 21<sup>st</sup> century, the global financial crisis, Brexit from the EU, Trump's election as the US president, the Covid-19 pandemic, the Russia–Ukraine conflict and other “black swan” or “grey rhino” events all have relentlessly delivered heavy blows to globalisation.

Voices against globalisation as well as those proclaiming the end of globalisation have prevailed and echoed in recent years. Indeed, the new round of hyper-globalisation that started in the early 1990s seems to have lost its former glory given the rise of many global challenges. This also inspires us to reflect on the difficulties facing globalisation. For all the unprecedented wealth it has brought to mankind, globalisation has also undeniably exacerbated the imbalances in global resource allocation and widened the gap between rich and poor, both between and within countries. At the same time, concern over climate change, geopolitical games and technological iteration have also intensified conflict. Given the accelerated evolution of the international power landscape, geopolitical competition among major powers has intensified. Meanwhile, the global flow of people, capital, goods and information has been hindered by the divide, confrontation and mistrust between countries.

At the same time, however, we believe that the growing power of China and other supporters of international multilateralism will lend new impetus to the advancement of globalisation. Biden's inauguration as the 46<sup>th</sup> President of the USA has led to a renewed US embracing of multilateralism, the signing of the Regional Comprehensive Economic Partnership (RCEP), China's application to the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP), the end of the China–EU Comprehensive Agreement on Investment (CAI) negotiations in late 2020, as well as a consensus by over 130 countries around the world on

a minimum income tax for multinational corporations – these positive signals of multilateralism have all shown the efforts and confidence of the countries involved.

During a globalisation downturn, policy initiatives that hinder globalisation and voices that question or even deny globalisation also spur more people to think about how to make globalisation more inclusive, fair and sustainable at all levels and in all sectors. Given this epochal shift, we need to think where globalisation will go from here. We should also consider what principles and paths should be followed to ensure globalisation serves human development better. Finally, as a beneficiary of globalisation, China needs to consider what role it can play in the next phase of globalisation’s development.

## 2 Globalisation at a crossroads

### 2.1 A historical context

Since the start of globalisation, pioneers have gradually broken geographical barriers down and reshaped the global landscape. By opening up the global market, they linked production and trade systems of different countries and facilitated the flow of capital, technology, talent and information globally, and thus dramatically increased productivity and accumulated abundant wealth.

In the 1980s, faced with new rising forces such as the Federal Republic of Germany, Japan and the Four Asian Tigers, and the Third Industrial Revolution along with the growth of multinational corporations, the market-led economic system pursued by the West demonstrated its clear advantage over the planned economic system of the Soviet East. More countries began to recognise, learn from and even introduce market economy elements. The globalisation of goods was reborn under this consensus. This read especially true in the 1990s, with the epochal shift in Eastern Europe, the collapse of the Soviet Union, and the

broken “Two Parallel Markets” system; these all created a political condition for the formation of a unified global market.

Simultaneously, the standardisation of containers, as well as advances in transportation and communication technology continued to deepen the international division of labour, providing effective support for the expanding scale of international trade. Globalisation sped up and created thriving prosperity.

## 2.2 First two decades of the 21st century

The period from 1990 to 2008 could be termed the heyday of globalisation, but after the 2008 global financial crisis, all has not returned to the previous track. Two “black swan” events – Donald Trump’s election as US president and Brexit – created uncertainty in the future of globalisation. In addition, the rise of the Islamic State of Iraq and Syria (ISIS), frequent terrorist attacks in Europe, the refugee crisis, the rise of right-wing parties in European elections, Trump’s withdrawal from multiple treaties, the yellow vest movement in France, as well as the trade war launched by the US, demonstrated a trend of deglobalisation.

The Covid-19 pandemic that erupted in the early spring of 2020 ravaged the world and triggered the most serious global public health crisis since the Second World War. The global economy seemed to press the pause button automatically. The industrial chain, value chain and supply chain were disrupted, and many industries suffered heavy blows. As a result, the global economy contracted by 4.3 per cent in 2020 – sparking the worst recession since the Great Depression of 1929 (UN, 2021).

Confronting this unprecedented global crisis, the international community, which ought to be united, was overwhelmed. Many countries closed their borders and even seized medical supplies from others passing through their countries. The pandemic opened a Pandora’s box, making an already volatile world even more uncertain. The Russia–Ukraine crisis in 2022 once

again reinforced the idea that the end of globalisation and the transformation of the global landscape are nigh (CCG, 2022).

## 3 Issues caused by globalisation

### 3.1 Unequal globalisation cannot be sustained

In the 1980s, neoliberalism dominated the world as Reaganomics dominated. As the main driving force of economic globalisation, multinational corporations were able to use production factors around the world more easily and frequently. The global development of multinational corporations strongly promoted international economic and technical cooperation, which also laid the foundation for the formulation of global trade rules.

With the deepening of globalisation, however, the disadvantages of multinational corporations have emerged. The free flow of capital and free flow of interests have given rise to various problems. An International Monetary Fund (IMF) report in 2019 pointed out that non-OECD countries lose a total of some USD 200 billion in tax revenue each year as multinational corporations shift profits to low-tax areas (IMF, 2019).

Tax evasion by multinational corporations has widened the gap between the rich and poor in developing countries, increased poor populations and worsened living standards, thus blighting efforts to reach the UN 2030 Sustainable Development Goals. The failure of tax regulation also exacerbates deglobalisation, causing a contraction of global trade and a sluggish economy. Meanwhile, the interests of the middle class in some countries have been damaged, resulting in a collective backlash from the group.

Given the global capital for profit, the development imbalance has become a visible symptom of the globalisation crisis. Prosperity and inequality were two sides of the same globalisation coin in the past. The free competition encouraged by market economies



and globalisation were unable to solve the unequal distribution of national interests by itself, and this tends to produce the Matthew effect. This is an economic factor in internal social unrest and even world wars that have occurred since the birth of capitalism.

As economic globalisation expands, it inevitably requires national governments to adjust to a new *status quo*. The inequality of the dominant force inherent in globalisation makes it operate less equally than the rules would suggest. This makes globalisation not always in the interest of all participants. Notably, however, many opponents of globalisation do not go against globalisation per se and would rather simply challenge the rules.

### 3.2 Global governance lags behind global practice

Sovereignty has borders, but issues span borders. Global governance has become more pivotal in an era of globalisation where people increasingly interact with each other.

Current institutions of global governance, as the author of *The World is Flat: A Brief History of the Twenty-first century* Thomas Friedman claims, are attempting to maintain a dynamic balance between nation-states and markets (Friedman, 2005). Such a balance played an important role in accelerating global economic and financial integration in the 1990s and the first decade of the 21<sup>st</sup> century. After the 2008 financial crisis, Professor Dani Rodrik at Harvard University noted in *The Globalization Paradox: Democracy and the Future of the World Economy* that the core contradiction of globalisation is the disconnect between government forces with national boundaries and market forces without national boundaries (Rodrik, 2011).

Globalisation is naturally contradictory to the idea of the nation-state. In the anarchy of the international community, to construct a global governance framework means that the nation-state needs to cede some of its sovereignty. Rodrik points out that there is a major trilemma in the world economy – “we cannot

simultaneously pursue democracy, national determination, and economic globalization” (Rodrik, 2011, p. 19). This contradiction also applies to the larger context of globalisation. In recent years, a surge of counter-globalisation reflects a reassertion of sovereignty by nation-states and a rising populist and nationalist sentiment. The imbalance in global distribution has eroded social solidarity within nation-states, which create new political cleavages and scepticism among the masses about the elite democracy of the past. Counter-globalisation has become a movement for nation-states to reinvestigate national autonomy.

Globalisation has approached a tipping point. It has brought new changes in infrastructure, data security, and business models. Meanwhile, globalisation practices have also placed new demands on global governance.

However, existing global governance mechanisms appear to be overwhelmed in responding to global issues. For example, technological changes create challenges in coordinating interests and social management risks. The rapid growth of multinational corporations has far exceeded the scope of the existing international tax system, and reform is urgently needed. The development of financial technology has increased the potential risk of financial crimes. Advances in network communication technology have also raised concerns about privacy breaches. The global public health crisis in 2020 proved that the current global governance system lacks adequate governance, it lacks sufficient capacity to address emergencies.

The global governance system created in the 20<sup>th</sup> century is no longer able to tackle the conflicts of the 21<sup>st</sup> century effectively, and urgent reform and innovation are needed. Simultaneously, the rise of China and other emerging countries has reshaped the global landscape (Wang, 2021). Old rules of globalisation are increasingly unsuited to the current relations between nations (Institut Montaigne, 2022).

## 4 A Chinese solution to globalisation

### 4.1 Three pillars and seven pathways

Policymakers worldwide need to rethink how to keep imbalances in the global landscape from triggering conflicts between countries or regions as the balance of world power changes. China, as a critical player in globalisation, is one of its most important beneficiaries. Since implementing its policy of reform and opening up, the Chinese economy has grown at an average annual rate of 9.5 per cent, while its share of the world economy increased from 1.8 per cent in 1978 to around 17 per cent in 2020 (Xinhua, 2021). In the past few decades, China has become the world's largest trader in goods, the largest industrial country and the second largest economy. The country surpassed the US to become the world's largest foreign capital inflow country in 2020. While achieving its own development, China has also been feeding back to the world, becoming an engine for world economic growth (Wang & Miao, 2022a).

As globalisation stands at a crossroads, China bears responsibility comparable to its economic weight. We attempt to explore ways to promote inclusive and equitable globalisation and inject new impetus into globalisation by leveraging its advantages and characteristics (Wang & Miao, 2022b). Our vision is divided into three pillars – human-based globalisation, open regionalism, and global coexistence and co-governance, which are implemented through seven pathways.

#### *Human-based globalisation*

Globalisation has been accompanied by the flow of people from its very beginning. From this perspective, immigrants are both a product and a driving force of globalisation. In the process of immigration, immigrants not only influence trade, investment and technology exchange, they also create new ideas and integrate the cultures of different countries. This enhances their identification

with each other and creates a foundation for reaching a consensus on global cooperation.

### **Path 1: Embracing global talent flows and overseas Chinese communities**

China has become a fertile ground for global talent innovation and entrepreneurship. According to the Global Innovation Index Ranking, China’s ranking has risen rapidly, to 11 in 2022 from 29 in 2015 (WIPO, 2015; 2022). Given its ongoing integration into the global economy and growing role in global governance, China embraces more global talent for innovation and development. The launch of a green card programme for high-level talent has facilitated the introduction of high-level talent worldwide. The introduction of market-based recognition criteria for permanent residence applications has also proven successful.

We also welcome members of the 60 million strong overseas Chinese community to contribute to China’s development. Overseas Chinese serve as a link in Sino-foreign economic and trade cooperation, cultural, scientific and technological exchanges, as well as a bridge between China and the world. Meanwhile, Chinese students studying abroad receive international, high-quality education, and develop a global vision. The experience makes them more familiar with global rules and enhances global networks and cross-cultural adaptability, making them well suited to the needs of a globalised economy.

### ***Open regionalism***

Regional economic cooperation promotes diversity in globalisation, while regional integration is a mechanism for regulating the imbalance of gains from economic globalisation. Since interests in different regions vary, a certain region can develop its own regional interests, which buffers the negative effects of globalisation.

## **Path 2: Regional integration through a “Common Asian Market”**

China embraces open regionalism. Promoting Asian regional integration is an important measure in supporting globalisation via multilateral principles. In the current complicated and volatile global climate, China actively deepens its economic and trade ties with Asian countries. Apart from consolidating and developing bilateral economic and trade relations with Asian countries, it promotes major free trade areas in Asia (Mahbubani, 2022), including “ASEAN 10+N.” Also, China is seeking to join the CPTPP, and advocates the integration of the CPTPP and RCEP towards a unified Free Trade Area of the Asia–Pacific (FTAAP) to give new impetus to economic globalisation.

## **Path 3: Multilateralising the BRI**

In the course of globalisation, instability in the international community impedes effective regulation of global markets. The scarcity of international public goods has to a certain extent led to a widening of the gap between developing and developed countries. The China-launched BRI endeavours to supply public goods to the world, which is pivotal for promoting global connectivity, especially in the Eurasian continent. Given its *status quo* of bilateral agreements, multilateralisation will be a prerequisite for BRI to offer global public goods and promote innovation in global governance (Wang, 2022). China remains open to further standardising the Belt and Road platform in terms of rulemaking, personnel composition, organisation and management, and project implementation. This move aims to attract more countries to participate in the initiative, enabling them to learn from others’ strengths to complement their own weaknesses, achieve mutual benefit, and compete fairly, to create more opportunities for the recovery and growth of the world economy.

### *Global coexistence and co-governance*

After the Second World War, a UN-centred global governance system was created largely by the US (Wang & Michie, 2021). As the global landscape changes and rising developing and emerging economies drive an increasing trend towards multipolarity, the old system of global governance is increasingly unable to meet the needs of countries to solve present global issues. Global governance currently lags behind global practice. This contradiction is the fundamental reason why countries need to promote more innovative forms of global governance, which requires making global governance more representative and driving a more inclusive and equitable version of globalisation (Wang & Miao, 2022c).

### **Path 4: Strengthening South–South Cooperation**

As members of a transregional global international organisation, BRICS (Brazil, Russia, India, China and South Africa) countries have their own unique cultural history and economic development processes. The future of the BRICS countries could potentially provide an example for the future of globalisation. The BRICS cooperation mechanism is an emerging force in the global financial sector and political security. To a certain extent, this balances the discourse power of developing and developed countries in the context of global governance. Sub-Saharan African countries have long been economically low in the global industrial chain, supply chain and value chain, and have less of a voice in political matters. However, they also have great economic potential, rich natural and human resources, and could benefit in the process of economic globalisation. After modernising, Latin American countries such as Brazil, Argentina and Chile have built economic foundations and achieved a high degree of integration with the world. Despite once being caught in the middle-income trap, Latin American countries are having a relatively positive impact on global affairs and have become another global force in addition to East Asia, Europe and the US.

### **Path 5: Enhancing cooperation with European countries**

Europe, as the second largest economic region only to the US, is moving towards closer economic integration. However, the continent is also facing geopolitical crises like Brexit and the Russia–Ukraine conflict. Europe and China currently have no geopolitical disputes, and bilateral economic and trade exchanges are close. They have been each other's most important investors for a long time, and concluded CAI negotiations in 2020. China and the EU take similar stances on many global issues, and both advocate an international order based on multilateralism.

China–EU relations will determine the degree of internal economic integration in Eurasia in the future and lay a new foundation for global governance. The completion of the CAI negotiations as scheduled has created a historic opportunity for China and the EU to enhance mutual trust and cooperation. China and the EU also have promising prospects for cooperation in fields such as climate change, the digital economy and clean energy. With these advantages, China should cooperate more with the EU in global affairs, especially within the framework of the UN, to ensure a stable and more multilateral world order.

### **Path 6: Creating a “new model of great power relations” with the US**

Sino–US relations are a priority in China's foreign affairs policy as they affect the development of the two countries as well as the future of globalisation. China has worked to seize all opportunities to avoid falling into the “Thucydides Trap” (Allison, 2017) and achieve a form of “cooperative rivalry” (Nye, 2023) as coined by Joseph Nye, former Dean of Harvard's Kennedy School of Government. In the long run, the best outcome is for two countries to maintain strategic mutual trust, economic and trade cooperation, and people-to-people and cultural exchanges. China and the US need to ensure cooperation between their business communities, carry out state-level diplomacy, and foster people-

to-people and cultural ties. Bilateral cooperation in areas such as climate change, infrastructure, digital economy and public health can help to quieten calls for decoupling. The two countries should also cooperate on reforms to global governance to avoid decoupling and any increased risk to the world order.

### **Path 7: Advocating the concept of “co-governance”**

As a representative of emerging and developing economies and given its rising global clout, China recognises its responsibilities and seeks to replace confrontation with cooperation, which has always been a fundamental part of its vision for global governance. As a keen driver of innovation in the global governance system and a reformer of existing global governance institutions, China also advocates for a multilateral cooperation mechanism based on the concept of “co-governance” that balances “East and West.”

## **4.2 Policy recommendations for inclusive globalisation**

China has clarified its thinking and developed a set of policy tools to upgrade global governance. China’s priority is to respect and maintain existing international multilateral mechanisms despite strong headwinds in changes to globalisation. China is not looking to build a new world order from scratch and emphasises reforms to dispute settlement mechanisms under existing rules, especially within the framework of the UN and the WTO.

### ***Reforms to the UN and WTO***

With rising unilateralism and protectionism in addition to existing hegemony and intervention, the current system of global governance is often ineffective due to a lack of leadership. The Russia–Ukraine crisis has exacerbated global geopolitical issues and a series of new issues, such as a shifting global landscape, climate change, digital economy, and the BRI, have created new challenges for the UN. Pragmatism, balance, and regulation are at the core of the UN, but they are also the foundations for its reform. The UN should be able to coordinate, guide and regulate areas



such as the digital economy, climate change, the management of polar zones, and safeguard peace and global security. It should also give full play to its advantages and participate in regional and global development projects such as the BRI.

The WTO, a permanent international organisation independent of the UN, plays a unique role in global economic governance. For years it has played a leading role in balancing international trade relations and reducing trade frictions, despite endless doubts of a marginalised WTO. Moving from the global periphery to the centre, emerging countries have become an integral part of international trade and the world economy. However, the different demands of emerging economies and advanced economies have kept the WTO from functioning properly.

Reforms to the WTO could potentially begin with plurilateral agreements in place of multilateral agreements to improve efficiency and implementation. Second, a reformed WTO should fully consider the demands and capabilities of developing countries and endeavour to find common interests among parties in disagreement, who must also exercise patience and maintain a win-win mindset to avoid a zero-sum outcome. Finally, as we enter an era of digital trade, the WTO should take advantage of the potential to promote e-commerce negotiations, enhance digital transitions in cross-border goods and service trade, narrow the digital gap, strengthen privacy protection, and ensure fair competition.

China can also contribute to innovation in upgrades to the global governance system based on the principles of shared responsibility for global governance and “co-governance” with other countries in the world by establishing global institutions that focus on the current obstacles and challenges globally such as infrastructure deficits, climate change, data security, economic inequality and global talent.

### *Creating a Global Infrastructure Investment Bank (GIIB)*

There is global demand for investment in infrastructure, but a lack of funding along with the issue of matching supply and demand are structural issues that have existed for years in international development financing. Since its launch in 2015, the Asian Infrastructure Investment Bank (AIIB) has operated in accordance with the model and principles of multilateral development banks, adhering to high international normative standards, and it has been recognised by the UN and other multilateral organisations. Under the proper conditions, it is possible for the AIIB to be upgraded to a Global Infrastructure Investment Bank (GIIB) to focus more on expanding the scope and regional distribution of infrastructure investment, providing funding for eligible infrastructure investment projects around the world. However, this requires inviting new members to play a major role, specifically the US and Japan, and bringing in countries from Africa and Latin America. In the future, the GIIB could play a greater role in building sustainable infrastructure, digital infrastructure financing and stimulating private financing.

### *Establishing a global organisation to find a solution to climate change*

The global climate crisis is one of the most serious challenges in the 21<sup>st</sup> century. Many countries have set detailed emission reduction targets and launched initiatives. To accelerate the pace of efforts to reduce global emissions and incorporate the needs of less developed countries, we suggest adding China, India and Russia to the G7, and discussing more effective multilateral climate cooperation mechanisms under a G10 framework. The integration of these three countries would increase the representation of the organisation from 10 per cent to 47 per cent of the world's population. The G10 would also incorporate the world's six largest carbon producers and bring together representatives from both developed and developing countries, which could serve to build bridges between countries with different levels of development

and take various green development cooperation models into account.

### *Establishing a global taxation organisation*

Global tax system reform is essential to address the core issue of the uneven distribution in globalisation. In 2021, 132 countries reached a consensus to reform the “global minimum corporate tax” and agreed to fix the global minimum corporate tax rate at 15 per cent. With a view to closing loopholes in the global tax system, the global minimum corporate tax rate will encourage multinational companies from developed countries to repatriate their income from tax havens to their home countries, which will also raise the income of their own people. However, the reform of the global tax system will not be achieved overnight, as it focuses on how to reasonably allocate the tax base on the basis of the lowest tax rate and effectively respond to tax challenges brought about by the global digital economy.

### *Establishing a global data security organisation*

Data flows epitomise globalisation in the 21<sup>st</sup> century. Data globalisation drives the world economy and brings many challenges. In this process, cross-border data flows are critical, but complexities such as national security, geopolitics and privacy protection have kept countries from reaching a consensus in promoting free data flows and enhancing data localisation. Establishing a D20 (the Data of Twenty) would lead to a discussion about reaching a consensus on cross-border data flows in countries with relatively advanced digital economies. In addition to this, establishing a “global data organisation” would lead the way in creating standards for global data security and data use as the world has not yet reached a comprehensive multilateral solution to either of these issues.

### *Promoting Alliance of Global Talent Organizations (AGTO)*

Global talent has become an important part of world population flows. Differences in visa policies, talent policies and public benefits in different countries make it difficult for them to flow

freely (Wang & Michie, 2021). The AGTO, established in 2020, aims to unite major immigration organisations and institutions worldwide and provide a platform for governments to coordinate talent flows. It creates a fair and competitive international platform for talent exchange and lowers the barriers to global talent cooperation. At the same time, the AGTO protects the rights and interests of individuals and narrows gaps in knowledge and innovation capabilities between different countries. The AGTO should work to enhance communication between international organisations and relevant actors, filling the gaps in global governance and talent management.

## 5 Working towards an inclusive, fair, multilateral and sustainable model of globalisation

Globalisation is a fluid concept, and its evolution affects not only China, but other countries as well, which means that we must explore solutions together. The course of China’s development will profoundly influence the future of globalisation and as the world’s expectations of China become greater, the wisdom we share and the solutions we provide will enable China to play a greater and hopefully more positive role in globalisation and global governance. Facing twists and turns in the course of globalisation, we need to work with other countries to identify as many common interests as possible, pursue broader and deeper cooperation in a spirit of mutual benefit, resolve urgent global issues, and promote a model of globalisation that embraces inclusiveness, fairness, multilateralism and sustainability.

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# Revitalising Multilateral Platforms for Rebuilding Connectivity and Multilateralism - The Case for the Asia- Europe Meeting

*Dr Yeo Lay Hwee*

*The Asia–Europe Meeting (ASEM)<sup>4</sup> was conceived in an era of “hyper-globalisation” and optimism about multilateral cooperation. Asia and Europe, two old continents that had traded for centuries through the ancient Silk Road, had become slightly distant after two world wars. The end of the Second World War saw the devastation of continental Europe, the demise of imperialism and the hastening of decolonisation in Asia and Africa. The rise of the United States and the USSR as leaders of two different ideological blocs locked in intense competition, the rebuilding of Europe after the war and its division saw the gradual decline in Asia–Europe engagement. The US looms large in the Transatlantic sphere*

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Dr Yeo Lay Hwee is the Director of the European Union Centre and Senior Fellow at the Singapore Institute of International Affairs.

E-mail: [layhwee.yeo@ntu.edu.sg](mailto:layhwee.yeo@ntu.edu.sg) / [layhwee.yeo@siiaonline.org](mailto:layhwee.yeo@siiaonline.org)

The study is based mostly on various policy discussions and dialogues that the author had participated in throughout the ASEM process.

<sup>4</sup> The Asia–Europe Meeting (ASEM) is a unique, informal platform for political dialogue and cooperation between 53 partners in Asia and Europe. It was launched in 1996 initially with 26 partners comprising then 15 EU member states, the European Commission, seven Association of Southeast Asian Nations (ASEAN) member states, China, Japan and South Korea. The current European partners in ASEM are Austria, Belgium, Bulgaria, Czechia, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the EU, Norway, Switzerland and the United Kingdom; and from Asia: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Vietnam, ASEAN Secretariat, Australia, Bangladesh, China, India, Japan, Kazakhstan, Mongolia, New Zealand, Pakistan, Russia and South Korea.

*and its presence in the Asia-Pacific region is also widely felt. Asia and Europe grew distant as the US dominates in both the Transatlantic and Transpacific arena.*

*The end of the Cold War with the seeming victory of the capitalist model over the communist model ushered in an era of intense economic competition but also cooperation as nations big and small, North and South put their faith in the market economy to bring about development. Driven largely by economic interests, ties between Asia and Europe grew. The need for a forum where Asian and European leaders could meet to signal the growing importance of Asia–Europe cooperation led to the launch of the Asia–Europe Meeting in 1996.*

*From an initial gathering of 26 members (15 European Union member states, the European Commission and 10 East and South East Asian countries), ASEM expanded rapidly with the enlargement of the EU and the Association of Southeast Asian Nations (ASEAN), and with new members from South Asia, Central Asia, Australia, New Zealand, Russia, Norway and Switzerland.*

*This rapid enlargement inevitably had an impact on the functioning of ASEM. The Russian invasion of Ukraine and the EU countries’ increasing unease with China make it difficult for any high level ASEM meetings to be convened in the foreseeable future. In fact, it seems that all official ASEM meetings have been suspended. However, it would be a mistake to give up on the fundamental need for more dialogue and cooperation between Asia and Europe. Hence, there is a need to repurpose ASEM for it to remain a conduit for rebuilding connectivity and multilateralism.*

*The paper begins with discussion of the ideas of multilateralism and connectivity, relating them to the proliferation of multilateral forums such as ASEM and APEC (Asia–Pacific Economic Cooperation). It uses ASEM’s development over a quarter of a century to illustrate the changing geopolitical environment, the weakening of global institutions and the challenge to multilateralism as a functioning principle to engender cooperation. It ends with a discussion on if and*



*how ASEM might be reconceived, as the world desperately needs to prevent a downward spiral toward conflict and a potential clash of civilisations.*

**Journal of Economic Literature (JEL) codes:** F00, F02, F10, F33

**Keywords:** Asia–Europe relations, multilateralism, international institutions, connectivity, globalisation, regionalism, governance, free trade agreements

## 1 Introduction

The Asia–Europe Meeting (ASEM) was conceived in the post-Cold War period of positive sentiments about the market economy and the benefits of globalisation, and the importance of multilateral cooperation governed by a set of international rules and institutions. The ideological competition between two blocs in the Cold War period was replaced by intense economic competition amongst emerging economies and increasing economic integration as a result of economic liberalisation. Regionalism and globalisation went hand-in-hand. Both bottom-up market forces and top-down government policies resulted in the proliferation of a multitude of subregional and regional economic agreements such as the ASEAN Free Trade Agreement (AFTA), the North American Free Trade Area (NAFTA) and Mercosur. At the same time, fears of being “shut out” of regional blocs led to the pursuit of a parallel track of multilateral cooperation, for example within the World Trade Organisation (WTO), and the rise of various inter- and cross-regional forums such as the Asia–Pacific Economic Cooperation (APEC).

ASEM was a desire by the EU members and its Asian partners in East and South East Asia to diversify their economic links and strengthen their economic positions vis-à-vis other competing regions and regional blocs. It was justified as a forum to strengthen

the weakest link amongst the three major economic regions driving global growth – East Asia, Europe and North America. While the Transatlantic ties between Europe and North America were strong, informed by history and a common set of values, and the Transpacific ties had been enhanced by the launch of the APEC in 1989, the ties between Asia and Europe were an uneven patchwork of bilateral ties and were not served by any overarching multilateral framework. East Asian countries were additionally concerned about being shut out of the European market as the European Union had deepened its economic integration with the completion of the Single Market in 1993. At the same time, the EU was concerned that it would be outcompeted by its economic peers such as the US in the growing Asian markets, as the US strengthened its economic engagement with Asian countries through APEC.

ASEM got off to an optimistic start in 1996 with the inaugural summit celebrating the rediscovery of Asians and Europeans of each other after a short hiatus when Europeans had focussed on their own internal reconciliation and post-war reconstruction, while Asian attention had been on postcolonial nation-building and development. A series of follow-up meetings and initiatives were announced at the close of the inaugural summit, ranging from the call to set up an Asia–Europe Foundation (ASEF) to promote people-to-people exchanges to expanding the official meetings beyond the summit and foreign ministries to other ministries and sectoral bodies, in order to foster cooperation not only in the economic arena (trade, investments and finance), but also in political and sociocultural fields.

The initial optimism about ASEM quickly fizzled out. Rapid enlargement of ASEM’s membership did not help to deepen the dialogue and cooperation between Asia and Europe. The agenda and development of ASEM were also very much influenced by the broader geopolitical and geo-economic forces. For example, the Asian Financial Crisis (AFC) in 1998–1999 shifted

the initial emphasis of ASEM on trade and investments to one that encompassed the social and political fallout from the crisis. The Great Financial Crisis (GFC) in 2008–2009 exacerbated the increasing scepticism about the neoliberal economic model and the benefits of globalisation and open free trade. It also signalled the arrival of a China (relatively unscathed by the GFC because of its controlled financial market and capital movement) that is more confident of its own state-driven model of development. China became more active in trying to shape and influence the agenda of multilateral institutions and forums in which it is a member. Within ASEM, one saw the emergence of the connectivity agenda as China launched its grand strategy for development – the Belt and Road Initiative (BRI).

ASEM now lies at an inflection point. The Covid-19 pandemic which was seen as originating from China and the Chinese handling of the pandemic, the Russian invasion of Ukraine, the increasing distrust of China (for its behaviour during the pandemic and the “no limits” friendship with Russia) all added up to put stress on not only multilateral forums such as ASEM and G20. Far more insidious was the election of Trump as the 45<sup>th</sup> president of the US and his administration’s ‘America First’ policy that fundamentally challenged multilateral governance and cooperation and fanned the rise of economic protectionism and widespread scepticism of globalisation.

In the following, the article first explains the rise of multilateralism as an organising principle of international relations, and the proliferation of multilateral forums and the shift of discourse from globalisation to connectivity. It specifically examines these concepts in the context of ASEM and hence contemplates how ASEM could be used as a platform to revitalise and rebuild connectivity and multilateralism.

## 2 The end of the Cold War and the proliferation of multilateral forums

The end of the Cold War ushered in a period of optimism about the emergence of a global order based on liberal norms, the rule of law and multilateralism. It was also a period of intense economic competition within the framework of a neoliberal agenda of free and open trade governed by a set of market principles.

This era saw the proliferation of several multilateral forums and growing faith in multilateralism as a pathway towards global governance. Multilateralism as understood by several Western scholars (such as John Ruggie) refers to the coordination of relations among three or more states in accordance with certain generalised principles of conduct “without regard to the particularistic interests of the parties or the strategic exigencies that may exist in any specific occurrence” (Ruggie, 1992, p. 571). The institution of multilateralism also requires the acceptance of two other principles – that of “indivisibility among the members of a collectivity with respect to the range of behaviour in question” and the principle of diffused reciprocity in which the arrangement is expected to “yield a rough equivalence of benefits in the aggregate and over time” (Ruggie, 1992, p. 571).

The EU prides itself as an entity built on the principle of multilateralism and is thus a strong advocate for effective multilateralism in the global arena. Asian countries on the other hand do not share a common understanding of multilateralism – for some countries, multilateralism is simply cooperation amongst a bigger group of states, and additionally for some, this cooperation takes place under a specific set of rules and procedures defined by the group, and not the generalised principles of conduct as defined by Ruggie. The proliferation of multilateral forums – some much more institutionalised and others more informal – was palpable in the immediate Cold War era – from the birth of the APEC forum to the ASEAN Regional Forum (ARF) to

ASEM. The overwhelming aim of these multilateral platforms was to promote dialogue and cooperation as a way towards achieving common goals and addressing common challenges.

ASEM was an entity born of this era. Additionally, it was also a response to the increasing economic competition that saw the proliferation of economic groupings such as the North American Free Trade Agreement (NAFTA), the ASEAN Free Trade Agreement (AFTA) and the completion of the Single Market within the EU. Institutionalists see ASEM as a multilateral forum with the potential to become a building block towards global governance, while realists see ASEM as an instrument of its members to build a strong Asia–Europe link to balance the Transatlantic and Transpacific links. At the same time, some constructivists believe that ASEM can serve as catalysts for identity building in Asia and Europe.

The proliferation of multilateral institutions unfortunately has not helped cement multilateralism as an organising principle in global governance. In fact, the short period in the immediate post-Cold war era was really a unipolar world dressed up in multilateral niceties. The “multilateral” world supported by Western dominance (led by the US) was increasingly challenged as the West entered relative decline with the rise of other major powers and actors. Multilateralism was dealt a fatal blow with the election of Trump and his pursuit of a unilateral ‘America First’ policy. The US withdrawal from multilateral regimes such as the Paris Agreement and global institutions such as the United Nations Human Rights Council and the United Nations Educational, Scientific and Cultural Organization (UNESCO), and his questioning of the ties that the US has built with Europe and China threatened the fundamental edifice of the global order. Subsequently, even though Trump was gone, the policies and the emotions he set in motion and the “realpolitik” between the US and an increasingly assertive rising power, China, has led to further dysfunction and stresses within the global system.

The Global Financial Crisis (GFC) of 2008–2009 further challenged another post-Cold war era phenomenon – hyper-globalisation and the increasingly integrated global economy. The socioeconomic havoc wreaked by the GFC led to a much more concerted pushback against globalisation by groups that felt left behind in an increasingly competitive and integrated global economy. While globalisation and free and open trade was feted as a “good thing” for development in the 1990s to the early 2000s, the mood turned in the aftermath of the GFC. This was especially prevalent in the developed economies of the US and Europe where more people questioned the benefits of globalisation and clamoured for greater economic protectionism. Global institutions such as the WTO began to falter.

ASEM with its informality and focus on dialogue managed to continue to grow despite the darkening global conditions – from an initial 26 members in 1996 to 53 members by 2014. From an essentially EU–East Asia configuration, it became a much more transcontinental Eurasian entity with the entry of countries such as Russia, Kazakhstan, Mongolia, Switzerland and Norway into the process. China began to use the ASEM process to push for greater physical connectivity with its BRI. Within ASEM, the connectivity agenda began to take on greater significance.

### 3 The evolution of the connectivity agenda within ASEM

It was not surprising that the connectivity agenda emerged not long after China presented the BRI. The ambition of the BRI includes a land-based “economic belt” linking China to Europe through Central Asia, and a “maritime silk road” from the Pacific to the Indian Ocean. The word connectivity as used by the Chinese connotes physical connectivity – investing in building a massive infrastructure of roads, rails and ports to support trade expansion.

In the developed economies, connectivity also became a convenient word for “masking” the pushback against globalisation. Globalisation which connotes massive flow of people, goods, services and capital resulting in increased integration and interdependence of economies and societies has brought about unprecedented growth and development. However, such development has been uneven leading to increased inequality and dislocations for many vulnerable groups. As societies and economies faced pushback against globalisation – a word and phenomenon once associated with the positive outcome of lifting millions from poverty – is increasingly being replaced by a new buzzword: connectivity.

Selling the need for connectivity is easier than touting the continued support for globalisation. Connectivity is often viewed in terms of the infrastructural investments and the technologies needed to enable connections and communication that are vital for commerce and development. One thinks in terms of ports, pipelines, roads, railways and digital superhighways. Increasingly, however, connectivity has also expanded to mean “institutional connections” – in terms of interoperability of standards, and even “people-to-people connections.” In short, connectivity should enable greater connections of people and institutions – primarily but not only for commercial exchanges.

However, as geopolitical tensions and geo-economic competition heightens, connectivity is also becoming highly politicised. This could be seen in the rapid proliferation of “connectivity strategies” from various major powers seemingly in response to the Chinese BRI. Japan unveiled its ‘Free and Open Indo-Pacific’ strategy in 2016 and collaborated with India to launch the Asia–Africa Growth Corridor in 2017. Not to be outdone, in 2018 the EU presented its strategy for connecting Europe and Asia and in 2019 announced its partnership with Japan on sustainable connectivity and quality infrastructure.

Such competition in connectivity strategies amongst Asian and European partners was quietly welcomed by the developing economies in Asia and Europe in the hope that they would translate into real investments that would in turn facilitate trade and economic growth. Competition amongst the different ASEM members is viewed slightly differently from the geostrategic competition between the US and China, where there is increasing fear that this strategic competition, if not managed responsibly, would tip into some sort of kinetic conflict detrimental to peace and development in Asia and Europe.

The connectivity agenda is now also increasingly under strain as Europe faces its greatest challenge after the Second World War – a war waged by Russia against Ukraine. The “weaponisation” of connectivity and interdependence has brought pause to the idea of greater connectivity. Decoupling or de-risking – cutting off certain connections to plug vulnerabilities and build resilience in internal systems – is now the buzzword. “Who to connect” has become much more important than “how to connect.” The unquestioning acceptance of more integration and more connections as a positive aspect for peace and development has been challenged. Self-reliance (onshoring) and taking a more values-based approach to connectivity (friendshoring) is fast becoming the preferred approach.

## 4 Polycrisis and the demise of multilateralism?

The Global Financial Crisis, the Covid-19 pandemic, the war in Ukraine and the increasing rivalry between the US and China have brought about significant shifts in international relations and the approach to interstate cooperation. Faith about multilateralism and a rules-based order, optimism about globalisation and its associated benefits, and a technocratic approach towards building



connectivity have all been questioned. The fears of another Cold War or worse, stumbling into world war cannot be over-stated. This realisation has led to some efforts to dial down the US–China rivalry, to rekindle the spirit of multilateralism and work towards a rules-based competition on connectivity.

The world is entering a period of great contestation at a time when it is facing a perfect long storm arising from the uneven recovery from the Covid-19 pandemic, the climate crisis and economic fragmentation. The truth is that many of the challenges arising from climate change and the fact that the world may not be far away from another health pandemic requires states to remain open and connected and to work together more closely, rather than pulling up the drawbridges. The longer-term solutions to many of the challenges that the world faces require greater collaboration not less. However, the question is how to engender this collaboration in the current climate of growing tensions and distrust, especially amongst the major actors such as the EU, Russia and China.

The rupture in relations between Russia and the EU (and the US) because of the war in Ukraine and the increasing scrutiny of Chinese's relations with Russia and its actions globally (and especially in the Asia-Pacific region) threaten to unleash Cold War 2.0. Yet the truth for the majority of middle and small powers is their reluctance to be sucked into a Cold War style competition between the West and Russia or potentially an even more consequential strategic rivalry between the US and China. Russia's position as a permanent member of the UN Security Council has greatly impacted the functioning of the UN. The geostrategic rivalry between the US and China has further strained the functioning of many multilateral institutions, leading some scholars to pronounce the "death of multilateralism." To prevent the demise of multilateralism, forums such as ASEM could be utilised as a conduit for dialogue and communication amongst

partners and adversaries alike to find a way forward to reform and re-energise the multilateral system.

ASEM has the advantage of being an informal and inclusive dialogue forum amongst equals. The absence of the US in the ASEM framework and the fact the ASEM comprises a majority of middle and small powers that are not willing to be passive observers or be forced to choose sides in the geostrategic rivalry between the US and China can create a less politicised environment to start a serious conversation on the future of multilateralism. Such dialogue and communication would be necessary (but not sufficient) steps towards rebuilding an inclusive multilateral framework that balance interests and principles.

## 5 Deglobalisation or reconnecting?

The polycrises that the world faces and the policy responses taken by the US and China and other major economies have led to increasing fears that the world is heading toward deglobalisation. The pushback against globalisation which was palpable in the aftermath of the Global Financial Crisis, and the fears exacerbated during the pandemic with supply chain disruptions and shortages of critical medical supplies have further fuelled protectionist sentiments.

The economic integration and interdependence that were built up through global supply chains based on the idea of comparative advantage is increasingly being questioned as economies looked to de-risk and diversify to achieve economic resilience (sometimes at the expense of economic efficiency). Fears about the weaponisation of “interdependence” have shifted the global conversation from building connectivity to decoupling and de-risking, particularly amongst the Western economies wary of the increasing assertiveness of China.

The rhetoric has moderated recently as economies realised the tremendous cost of decoupling. However, the idea of diversification for resilience and taking a more security-oriented approach towards trade and investments is here to stay. Yet the truth is that the diversification of supply chains requires investment in more connectivity, not less.

ASEM partners should therefore double down on its connectivity agenda. As connectivity strategies proliferate amongst the ASEM partners, it is important that the ASEM platform not only serve as a repository of information, but that the ASEM partners proactively begin a dialogue to examine the normative differences and different priorities of the connectivity strategies. ASEM can add value by hosting discussions and debates to produce a set of broad principles that can support sustainable connectivity, and some of these discussions would also feed into reimagining a set of multilateral principles that can be operationalised to engender international cooperation.

## 6 The inconvenient truth

To begin an honest and open dialogue on the future of multilateralism and connectivity requires the understanding and humility from Western partners that the West cannot remake the world in its own image. This is a first step towards a more realistic vision of peaceful coexistence amongst diverse states, coming together when necessary to confront the common challenges to humanity but retaining their own unique cultural and political identities.

Throughout its over 20 years of existence, ASEM has been criticised for being a talk shop without delivering any tangible benefits. Yet it is this fundamental quality of an inclusive, open-ended dialogue that can be harnessed in this increasingly charged and polarised environment. As former High Representative of the

Union for Foreign Affairs and Security Policy, Federica Mogherini, noted in the Foreword to a publication entitled *The future of the Asia-Europe Meeting (ASEM): Looking ahead into ASEM's third decade*, “when the Asia-Europe Meeting was founded in 1996, it was becoming clear that our brave new world called for a true dialogue between continents and civilisations. The need for inter-continental alliances is even clearer today . . . , the challenges we face are truly global in their nature. Worldwide platforms for policy dialogue are more important than ever.” She added “far from being a liability, the informal nature of ASEM is one of its major strengths” (Gaens, 2015, p. 9).

The pandemic and then the war in Ukraine have inevitably affected the summit and ministerial meetings. Since the last summit, hosted by Cambodia and held online in November 2021, very few official meetings have taken place. It would be a big mistake for ASEM partners not to utilise this platform for dialogue and communication. While understandably it is awkward for the EU to consider Russia's participation in any official meetings in Europe, the very flexibility and informality of the platform should offer ASEM partners the possibility of opening channels or dialogue and communication. ASEM is not a platform for negotiations. It is sufficient for ASEM to provide a platform for informal consultations and dialogue to build a common agenda.

If optics prevent the resumption of official ASEM meetings, ASEM partners could utilise the ASEF that was set up in 1997 to promote people-to-people exchanges, to organise Track 1.5 dialogue<sup>5</sup> on the important issues of re-energising multilateralism and building diverse connectivities. ASEF is unique as the only institution of the ASEM process that is dedicated to promoting intellectual, cultural and people-to-people exchanges. With the official ASEM

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<sup>5</sup> Track 1.5 dialogue refers to dialogue amongst researchers, policy experts and policy makers/officials where the latter attend in an informal capacity rather than in their formal roles.

process in limbo, the role of ASEF is all the more important in engendering the continued dialogue between Asia and Europe to generate ideas and find solutions to inclusive multilateralism and make connectivity work for broad swathes of societies, bringing about real connections underlying the peaceful co-existence of different civilisations and nations.

## 7 Conclusion

ASEM, comprising 53 partners from Europe and Asia, is a vital platform for enabling policy dialogue on a wide variety of issues. The diversity of ASEM partners, comprising developed and developing economies, with different political systems and from different civilisational backgrounds can function as a testing ground or trial balloon for new policy ideas to engender greater collaboration in an increasingly polarised and fragmented world. Its focus on informality, inclusivity and on dialogue and not negotiation has made it a unique platform. ASEM partners have the opportunity (and hopefully the political will) to utilise this platform in a creative way to help shape an alternative to an increasingly conflictual world. Multilateralism as an organising principle must be fortified and defended. Building connectivities to engender growth and development should be a priority.

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# The Geopolitical Role of the United Arab Emirates and its Links to Technological Innovation

Meszár Tárík

*The United Arab Emirates (UAE) plays an important geopolitical role in the Middle East and has rich oil and natural gas resources. Thanks to oil revenues, the UAE economy has grown tremendously in recent decades, and its investments have made it an influential and technologically advanced nation in the region and in the world. It can be said that the UAE is combining its geopolitical position with technological innovation through strategic planning and significant economic investment to gain further prominence on the international stage. The aim of this research is to highlight the Arab country's recent technological innovations and provide a comprehensive picture of the significant achievements the UAE has made in the fields of artificial intelligence, sustainable development, smart cities and the use of renewable energy sources. Methodologically, on the one hand, we present concrete projects and draw conclusions from official statistics. On the other hand, we try to determine the country's role among Arab countries and in the wider region through a geopolitical analysis.*

**Journal of Economic Literature (JEL) codes:** F02, F13, F15

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Meszár Tárík is a Researcher at the Mathias Corvinus Collegium (MCC) – Migration Research Institute, Hungary. E-mail: [tarik.meszar@mcc.hu](mailto:tarik.meszar@mcc.hu)

# 1 Introduction

The UAE has successfully diversified its economy (Dubai in particular), but the country remains dependent on oil and gas revenues, which continue to play a central role in the UAE economy, especially in Abu Dhabi. While Abu Dhabi and the other emirates of the UAE have remained relatively conservative in their diversification approach, Dubai, which has much smaller oil reserves, has taken a bolder cross-sectoral economic policy direction. The city was therefore not content to be constrained by environmental factors, but invested its money in construction projects and large-scale developments that produced, among other things, a thriving tourism industry (Matolcsy, 2021).

Tourism is one of the UAE's largest sources of revenue outside the petroleum sector, and the country boasts several world-famous luxury hotels (e.g. Burj al Arab, Taj Dubai, Jumeirah al Qasr, Emirates Palace, Qasr al Sarab, Anantara, etc.), and since 2009 the organisation of the Formula-1 Abu Dhabi Grand Prix has also brought significant benefits to the country. Overall, a booming construction industry, an expanding manufacturing base and a thriving services sector are contributing to the diversification of the UAE economy. Currently, USD 350 billion worth of construction projects are underway throughout the UAE (BBC News, 2020).

The United Arab Emirates also has an international reputation for technological innovation. Their abundant resources allow them to make significant investments in education, research and development. The development of artificial intelligence (AI) should be highlighted, as the Emirates has an ambitious strategy in this area and numerous projects have been launched in the field of artificial intelligence applications. Some of these have also produced significant results in the fields of autonomous vehicles, health diagnostics, urban planning and education. In addition, the Arabian Gulf country is paying close attention to smart city

initiatives, which use innovative technologies to make urban infrastructure more efficient and sustainable. Perhaps the best-known example is Dubai, which is using a range of technologies to improve quality of life and use resources more efficiently as part of its Smart Dubai project. In addition, the UAE has launched a space exploration programme, the Emirates Mars Mission, and successfully launched the first Mars probe, Al-Amal (Hope) in 2021, making the country the first Arab nation to reach the planet Mars.

## 2 Geopolitical situation of the United Arab Emirates

With an area of 83,600 km<sup>2</sup> and a population of 9,890,000, the UAE has become one of the richest states in the Middle East in recent decades. The country is actually a federation of seven emirates on the east coast of the Arabian Peninsula. The emirates are ruled by emirs from the respective ruling families, from among whom the Federal Supreme Council (al-Majlis al-A’la), the country’s most important political decision-making body, elects the head of state for a 5-year term (currently: Khalifa bin Zayed Al Nahyan), who has the right to appoint the prime minister (currently: Mohammed bin Rashid Al Maktoum).

The UAE has been considered a unified country since the early 1970s and had its own flag, anthem and administrative structure shortly after declaring independence. The economic boom, which was mainly due to the discovery of oil fields, has significantly spurred the country’s development. Construction continued in the 1980s and 1990s, and the Emirati leadership was eager to use the revenues from the oil industry to benefit the population and raise living standards.

In 1994, the UAE signed military and defence agreements with the United States and a year later with France (UAE Embassy, n.d.).



In the 2000s, the UAE also appeared on the international political scene when it became an active supporter of US military operations such as the war against the Taliban in Afghanistan in 2001 and the removal of the Iraqi dictatorship in 2003. In 2009, they entered into another agreement with France in which they agreed to establish a permanent French military base (Ghafari & Colombo, 2021). After 2011, the United Arab Emirates, as well as other Gulf states, participated in international military operations in Libya (N. Rózsa, 2019; Tóth, 2022).

The country was largely spared from the Arab Spring, which began in 2011 and strongly affected other countries in the region, although some Islamist organisations gained ground at the time and had to be rooted out by security forces. Sixty members of the fundamentalist group al-Islah, which is close to the Muslim Brotherhood, were arrested and banned from organising spontaneous public demonstrations via social media (BBC, 2020).

## 2.1 The geopolitical orientations of the United Arab Emirates

It is becoming increasingly clear that the United Arab Emirates is no longer a secondary player in the Middle East and is able to compete with various regional powers such as Egypt, Türkiye and Iran. For this reason, it is actively cooperating with the various major powers. Moreover, it is increasingly important for the UAE to expand the geostrategic space in which its traditional foreign policy operates (Marsai, 2020; Pénczvártó, 2022).

As for the relationship between the UAE and the US, cooperation has become increasingly close since the 2000s, and the Arab country often provides logistical support to Washington. The UAE actively supports US military expansions. The rapprochement between the two countries can also be observed in defence procurement, as the United Arab Emirates has purchased large quantities of helicopters, fighter-bombers and military equipment from the United States (Wagner, 2020).

It is important to mention the development of bilateral relations between the UAE and China. It is well known that the Belt and Road Initiative (BRI) pays special attention to the Middle East (Horváth, 2020), especially the Gulf States, not to mention that this region accounts for 40 per cent of China’s oil imports and is also the main supplier of liquefied natural gas (about 20 per cent, which will increase to 30 per cent in the next two decades) (Tárik, 2021).<sup>6</sup> Over the past decade, China has significantly increased its economic, strategic and diplomatic engagement in the Middle East, particularly in the United Arab Emirates. In 2019, the two countries signed a trade agreement worth USD 3.4 billion under the aforementioned BRI initiative.<sup>7</sup> Under this agreement, Jebel Ali Port will be used to transport Chinese products around the world, making the UAE a hub for land and sea trade. Today, China is the UAE’s second largest trading partner, and the port serves as a gateway for Chinese exports to the Middle East.

As for UAE–Russia relations, the partnership agreement signed by the two countries in June 2018 has proven to be a turning point, and both Moscow and Abu Dhabi value their deepening ties. The two sides also signed a trade agreement worth USD 1.3 billion the following year (Al Jazeera, 2019). Among the member states of the Gulf Cooperation Council (GCC),<sup>8</sup> the United Arab Emirates is the most important trading partner for Russia. The Emirates require Russian raw materials and goods such as various precious metals, steel, ferrous metals, industrial equipment, vehicles, chemicals and foodstuffs, but also import wood, paper and cardboard (Trading Economics, 2023). Russian state-owned corporations

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<sup>6</sup> China’s LNG imports are mainly from Qatar.

<sup>7</sup> Sheikh Mohammed announces USD 3.4 bn investment in Dubai via China’s Belt and Road Initiative (The National News, 2019).

<sup>8</sup> The Council was founded in 1981 and has six members: Bahrain, United Arab Emirates, Qatar, Kuwait, Oman and Saudi Arabia.

and private companies have been operating in the Arab country since the mid-2000s.

The United Arab Emirates is an important trading partner of the European Union, and after the establishment of the EU mission in Abu Dhabi in 2016, EU countries hailed the successes achieved in deepening relations with the Emirates. The EU has repeatedly stated in official statements that the UAE is a country with which it agrees on many issues, from the fight against climate change to trade and cultural relations (Gulf News, 2016). Accordingly, bilateral relations between the two parties extend to energy cooperation, joint cultural and educational programmes, humanitarian cooperation and lively trade activities. In May 2015, the United Arab Emirates became the first Arab country to sign an agreement with Schengen area member states to establish a common visa-free regime. In addition, the Arab country is the largest export market of the European Union in relation to the Arab Gulf States (European Commission, 2023).

### 3 Technological innovations

In 1981, Bahrain, Kuwait, Oman, Saudi Arabia, Qatar and the United Arab Emirates signed an economic agreement now known as the Gulf Cooperation Council (GCC). The areas of cooperation and goals of this union are broad and include culture, regulation, currency, and technological and scientific innovation. In recent years, GCC member states have focussed primarily on diversifying their economies, the most important elements of which are reducing dependence on oil and developing and widely using digital technologies.

To meet the demands of the digital age, organisations in the GCC countries are increasingly investing in technological developments as part of the digital transformation in the region (Al Jazeera, 2022). A number of technologies are central to this. These include

5G, IoT, cloud computing, artificial intelligence, virtual reality and cybersecurity.

In recent years, Arab oil states have invested heavily in artificial intelligence to explore the opportunities it offers for technological and economic innovation. According to IBM, artificial intelligence could contribute more than USD 300 billion to the GDP of the entire region by 2031. In addition, more than USD 2.5 billion has been invested in regional digital start-ups, according to Digital Digest, which tracks information on digital consumption in the region (Al Qabas, 2022). This trend shows the willingness of Arab countries to develop the technological and entrepreneurial skills of their youth.

Companies in the six Gulf Cooperation Council countries are increasingly turning to innovative technologies to develop new business models and create modern customer experiences. This is critical for the region’s economies in light of the coronavirus pandemic and in the context of their long-term efforts to reduce dependence on oil and gas. In the following, we present the most important projects, without claiming to be exhaustive.

### 3.1 Some interesting projects

The following projects will make the UAE a leader in technological innovation in the region.

#### 3.1.1 *Hyperloop Dubai*

The Abu Dhabi–Dubai line has become a focal point for Hyperloop developers. The project aims to cover the distance between the two cities in just 12 minutes. This will be the first working Hyperloop route. Currently, it takes about an hour and a half to cover the 139 km route – so the Hyperloop will make a big difference (Bayut, 2023).

### *3.1.2 Emirati firefighters with jetpacks*

Dubai's leadership is trying to speed up emergency procedures. Firefighters with jetpacks can bypass city traffic and arrive on the scene faster than expected (FireRescue1, 2017). The Dolphin is equipped with a jet ski, a jet pack and a fire hose. This allows firefighters to use the city's waterways to get to the scene faster.

### *3.1.3 Oasis Eco Resort in Liwa*

The Oasis Eco Resort will be the greenest eco-resort in the world, being built in Liwa in the south of the United Arab Emirates (Buckeridge, 2023). The project aims to build the resort around a natural spring, using a range of environmentally friendly technologies. What makes this project special is the surrounding solar roof.

### *3.1.4 Dubai's mega solar market*

Dubai's mega solar park will transform the city into an eco-friendly power plant in the coming decades. The park is expected to generate 5,000 megawatts by 2030, when construction is complete. At the centre of the park will be a 260-metre solar tower. It will likely be the tallest solar tower in the world (Mbrsic, 2023).

### *3.1.5 Self-driving police cars in the United Arab Emirates*

These self-driving cars can launch drones when they spot a criminal. Authorities want to put these cars on the road as part of a technology-enabled police force for better and smarter surveillance. Incidentally, these vehicles are manufactured by OTSAW Digital (The First Group, n.d.).

Based on the various projects, it is clear that the resource-rich Arab countries have embarked on a path to the future by using technological developments to reduce their dependence on oil and increase the resilience of their economies. In this regard, the United Arab Emirates certainly stands out among the six Arab states in the Middle East, whose leaders are determined to achieve carbon neutrality, digital transformation and the creation of a green future.

### 3.2 Artificial intelligence

The UAE has a vision to become a leading AI nation by 2031, creating new economic, educational and social opportunities for citizens, governments and businesses, and generating up to AED 335 billion (equivalent of USD 91.2 billion as of 21 August 2023) in additional growth (ai.gov.ae, n.d.). At the annual government summit in February 2018, the UAE announced key elements of the country’s strategy – none other than the development of AI products to develop new education programmes and support good governance. It is worth noting that, according to the country’s leadership, the AI strategy is in line with the UAE’s Centennial Plan in 2071, which aims to make the UAE the best country in the world by 2071 (ai.gov.ae, n.d.).

In the strategy UAE AI eight goals are mentioned:

- “Build a reputation as an AI destination.
- Increase the UAE competitive assets in priority sectors through deployment of AI.
- Develop a fertile ecosystem for AI.
- Adopt AI across customer services to improve lives and government.
- Attract and train talent for future jobs enabled by AI.
- Bring world-leading research capability to work with target industries.
- Provide the data and supporting infrastructure essential to become a test bed for AI.
- Ensure strong governance and effective regulation” (National Program for Artificial Intelligence, 2018, p. 8).

The text of the strategy states that the UAE has a strong foundation of a cohesive, diverse multinational community that can adapt

quickly to new and emerging technologies. Therefore, it acts as a magnet that attracts the world's best talent to experiment with artificial intelligence solutions in the UAE and opens the doors for practical implementation in various sectors (National Program for Artificial Intelligence, 2018).

We can note that in recent years the UAE has made significant efforts in the development and application of artificial intelligence (AI) technology. The country has set ambitious plans to introduce AI in many economic and social sectors. It has emerged that the UAE's business sector is planning to deploy AI on a large scale. The country's leadership sees automated processes and AI-based robotisation as key to increasing efficiency and productivity. With the help of AI, they can minimise labour costs while improving the quality of products and services.

### 3.3 Smart cities

In recent years, the United Arab Emirates has made significant efforts in the development and implementation of smart city projects. The goal of smart cities is to create a smart and sustainable urban environment through the use of innovative technologies, improving infrastructure, public services and quality of life in every aspect. Leading cities in the UAE, such as Dubai and Abu Dhabi, are pioneering smart city projects. Here are some examples of smart city projects in the UAE.

#### 3.3.1 Dubai Smart City

The city of Dubai is relying heavily on smart city solutions to increase sustainability and efficiency. The introduction of AI and IoT (Internet of Things) technologies is expected to increase energy efficiency, promote electric transportation, and optimise water and waste management. The goal of the project is to improve the quality of urban life and increase the comfort of the population (U.ae, 2023).

### *3.3.2 Efforts in Abu Dhabi*

The capital of the United Arab Emirates, Abu Dhabi, is also placing great emphasis on smart city initiatives. Projects in the city include smart transportation, digitisation of healthcare, efficient energy use, smart buildings and smart infrastructure development. AI and IoT technologies enable fast and efficient processing of data, which improves the operation of infrastructure and public services (U.ae, 2023).

### *3.3.3 Sharjah Sustainable City*

Sharjah is also participating in smart city initiatives that cover a range of areas, from smart street lighting to smart parking. Using data collection and analysis, AI is helping the municipality make optimal decisions and improve the quality of urban life (U.ae, 2023).

### *3.3.4 Ajman Smart City*

Ajman is also working on developments along the lines of the smart city concept. With the help of AI-based systems, the city plans to introduce energy-efficient buildings, intelligent transport systems and automated public services (Trade Arabia, 2016).

The UAE’s smart cities projects focus on technological innovation and sustainable development to make the urban environment more comfortable, efficient and green. Through the development of smart cities, the UAE strives to develop forward-looking urban solutions and improve people’s quality of life.

## **4 Al-Amal**

The Emirates Mars Mission is the United Arab Emirates Space Agency’s unmanned space exploration mission to Mars. The Hope (Al-Amal) spacecraft was launched on 19 July 2020 and entered Mars orbit on 9 February 2021. At the beginning of the 21<sup>st</sup> century, the United Arab Emirates decided to participate in the mission to explore Mars as a member of the international space community.



The launch of the Al-Amal Mars programme is an important step for the country and can be crucial for the future in many ways (UAE Space Agency, 2023).

#### 4.1 The importance of space exploration for the UAE

The Gulf state has been showing excellent economic and infrastructural development for years. The country's leadership decided to take significant steps in the field of scientific and technological progress, and space exploration became one of the priority areas. The Al-Amal Mars programme offers the country the opportunity to present itself on the global stage of space exploration and demonstrate its pursuit of innovation and ambition.

The main objective of the Al-Amal probe, also known as "Hope," is to study the atmosphere and weather on Mars. This opens up a whole new perspective in the exploration of the red planet, as previous missions have focused only on surface exploration. The Al-Amal spacecraft will collect data that will contribute to the understanding of changes in the Martian atmosphere and weather phenomena that may affect the planet's climate (UAE Space Agency, 2023).

In addition, the Al-Amal Mars programme has significant scientific and technological implications for the UAE. Participation in space exploration projects provides opportunities for local researchers and scientists to participate in the work of the international scientific community. This contributes to the growth of the country's knowledge base and inspires younger generations to work in the fields of science and technology.

#### 4.2 International aspects of the Al-Amal Mars programme

The Al-Amal Mars programme is not only significant for the UAE, but also for the international space science community. It is the first time that an Arab country has launched a mission to explore

Mars. The Arab country’s initiative gives a significant boost to the region’s ambitions in the realm of space exploration and creates an opportunity for international cooperation in this field.

The collection of data by the Al-Amal spacecraft and its sharing with the international space exploration community also opens up new opportunities for researchers from other countries in the field of Mars exploration. Data sharing will facilitate comparative studies with other Mars missions and deepen humanity’s knowledge of the red planet (UAE Space Agency, 2023).

The Al-Amal Mars programme also has geopolitical implications for the United Arab Emirates. The project enhances the country’s international reputation and regional leadership in space exploration. It can promote economic diversification and innovation and strengthen the national identity and cohesion of the country’s population. In addition, international cooperation and diplomatic relations can be strengthened through the UAE’s participation in the Mars mission.

## 5 Use of renewable energy sources

The use of renewable energy has many benefits, including environmental sustainability, climate change mitigation, energy security, economic growth, job creation, price stability, improved public health and sustainable development. The use of renewable energy sources can create a more flexible, cleaner and sustainable energy system for current and future generations. A skilled workforce is needed to build, install and maintain the necessary infrastructure, leading to job creation in various sectors. In addition, it is important to note that solar and wind energy in particular can significantly reduce costs, making access to energy more affordable for consumers and businesses. Investing in this direction offers the opportunity for price stability, as renewable

energy sources are much less affected by geopolitical factors or market conditions, unlike fossil fuels. It is known that the MENA region has abundant fossil fuel reserves, yet it is critical that countries in the region prioritise investments in renewable energy. Some Arab states (such as the United Arab Emirates, Saudi Arabia, Jordan, Oman, Egypt, Morocco and Algeria) have taken notable steps toward this transition, recognising the positive impact it will have on their economies and environments. However, there are countries in the Middle East and North Africa region that have not set clear and consistent renewable energy targets, which may lead to energy security and dependence issues in the future. It is imperative that the MENA region seize the opportunities that renewable energy presents and pave the way for a more sustainable and greener future.

The United Arab Emirates has introduced its own energy strategy, which aims to integrate a mix of renewable and clean energy sources to balance economic needs with climate goals and reduce reliance on other energy sources. The country's leadership accepted the latest innovations aimed at sustainable development and was one of the first to ratify the Paris Agreement (Alam, 2016). Suhail bin Mohammed al-Mazroui, Minister of Energy and Infrastructure, stated that the Ministry of Energy and Infrastructure has set the most important benchmarks for the future of the energy sector in the next 50 years by revising the national energy strategy until 2050, developing the national hydrogen strategy and using the results achieved in the last five decades. Therefore, in order to meet the country's energy needs, it is necessary to focus on the use of the cheapest locally available resources and increase exports from the non-oil sector (Arabian Business, 2023). It should be noted that the UAE has significant potential in the solar energy sector, whose low cost will improve the country's energy security and competitiveness and play a key role in achieving carbon neutrality.

## 5.1 Solar energy projects

### *5.1.1 Noor Abu Dhabi Solar Power Plant*

Noor Abu Dhabi Solar Power Plant is located near Abu Dhabi in the Sweihan district. The power plant has 3.2 million photovoltaic (PV) modules that provide electricity to 90,000 people in Abu Dhabi. Waterless robotic technology is used to clean the solar modules. The power plant is operated by Sweihan PV Power Company, which is under the supervision of Abu Dhabi National Energy Company (TAQA). It is a joint venture between the Abu Dhabi government and a consortium of China’s JinkoSolar Holding and Japan’s Marubeni Corporation (U.ae, 2021).

### *5.1.2 Shams 1 in Abu Dhabi*

Shams 1 is a concentrated solar power plant in the United Arab Emirates. It was inaugurated in March 2013 by the late Sheikh Khalifa bin Zayed bin Sultan Al Nahyan, former president of the United Arab Emirates. The USD 600 million, 2.5-square-kilometre plant can feed 100 megawatts of electricity into the national grid, enough to power 20,000 homes and avoid 175,000 tonnes of CO<sub>2</sub> emissions annually. Located in the western part of Abu Dhabi, the plant is considered one of the largest solar power plants (concentrated solar power, CSP) and the first commercial solar project in the Middle East. The power plant features a number of important innovations, including custom-built auxiliary heaters that use natural gas to raise the temperature of the steam produced from 380 °C to 540 °C, increasing the efficiency of the steam turbine and boosting electricity generation. The CSP power plant also uses a dry cooling system to condense the exhaust steam stream, significantly reducing the amount of water used by the power plant compared to a similar plant (U.ae, 2021).

### *5.1.3 Concentrated solar power (CSP) project*

As part of Dubai’s clean energy strategy, the largest single-site concentrated solar power project is underway and is expected to begin generating electricity in a few years. The output is expected to surpass the world’s current largest CSP tower in Morocco,

which has a power generation capacity of 150 MW. The new CSP project will provide electricity at a cost of less than 8 cents per kilowatt-hour. Circular rings of solar mirrors, called heliostats, direct sunlight into a central collection tower, where the sunrays then drive a steam turbine to generate concentrated solar power (U.ae, 2021).

#### *5.1.4 Mohammed bin Rashid Al Maktoum Solar Park*

The Mohammed bin Rashid Al Maktoum Solar Park is based on the independent power producer (IPP) model. Its planned production capacity is 5,000 MW by 2030, and the total value of the investment is AED 50 billion (equivalent of USD 13.61 billion as of 21 August 2023). Once completed, it will avoid more than 6.5 million tons of CO<sub>2</sub> emissions per year. The Mohammed bin Rashid Al Maktoum Solar Park helped Dubai Electricity & Water Authority (DEWA) win the award for Best Sustainable Project of the Year in the UAE at the MEED Quality Awards for Projects 2014, the first time the award has been given to a renewable energy project in the Middle East. DEWA works with innovative technologies for the generation, transmission and distribution of energy and water and aims to make Dubai a global centre for clean energy and a green economy. The goal of the Dubai Clean Energy Strategy 2050 and the UAE Net Zero 2050 is to provide 100 per cent of energy generation capacity from clean energy sources by the date specified in the name. To this end, DEWA is developing the Mohammed bin Rashid Al Maktoum Solar Park in several stages to eventually generate 5,000 MW from photovoltaic and concentrated solar power (U.ae, 2021).

## 6 Conclusion

The United Arab Emirates has achieved spectacular results in the field of innovation and technological development, which also has an impact on its geopolitical relations. The Al-Amal Mars programme, which made the UAE the first Arab country to reach

Mars, was not only a scientific success, but also strengthened the country's prestige and its international relations.

The use of renewable energy has become a priority for the country, which will free the UAE from dependence on oil in the long term. The construction of solar and wind power plants not only diversifies the energy supply, it also creates the opportunity to export green technologies, which is an economic and political advantage in the region.

Smart cities, especially the Smart Dubai initiative, make life easier and make the country attractive for business investment. The development of smart technologies strengthens the UAE's position as a technology leader in the region.

The focus on sustainability is an important step forward for the UAE. The use of sustainable resource and environmental protection not only strengthen internal stability, but also project a positive image in the international community, which increases the country's influence.

Overall, the UAE's technological innovations have significantly strengthened the country's geopolitical position. The Al-Amal Mars programme has made the country a space exploration nation, the use of renewable energy diversifies power generation and promotes green technology exports, and smart cities make the country an attractive destination for investors and businesses. And the focus on sustainability is boosting the UAE's standing on the international stage.

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## Chapter 2

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# Networks for sustainability

- Fusion of hubs



# The Role of the Belt and Road Initiative in Financing Sustainability Goals - With Particular Regard to the Significance of Institutions such as AIIB or the Silk Road Fund

*Levente Horváth, PhD*

*2023 marks the 10<sup>th</sup> anniversary of the Belt and Road Initiative, and on this occasion, in connection with the idea of Eurasia, I examine BRI as one of the most important and prominent drivers of Eurasian connectivity in my study.*

*In addition to functioning as a framework for a new world order, BRI also plays a prominent role in relation to some of the trending topics of the 21<sup>st</sup> century, such as sustainability, greening, competitiveness and connectivity. In the Western world, we are used to the fact that there are very vocal actors in relation to these topics, but little actual action is taken, whereas in China they are less vocal in relation to greening and sustainability, but they are developing them with full force.*

*In my study, I examine how China financially supports sustainability developments, which institutions have been given a key role, and in which projects and how they participate, how China is becoming a standard bearer of sustainability, and how it is progressing towards achieving the Sustainable Development Goals (SDGs) designated by the UN.*

**Journal of Economic Literature (JEL) codes:** Q56, G32, P33

**Keywords:** China, sustainability, SDGs, BRI, Silk Road Fund, AIIB

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Levente Horváth, PhD, is the Director of the Eurasia Center, John von Neumann University. E-mail: horvath.levente@nje.hu

# 1 Introduction

## 1.1 Belt and Road Initiative

The Belt and Road Initiative (BRI) is an ambitious infrastructure project from China aimed at establishing economic corridors through land and maritime routes, connecting Asia, Europe and Africa. This is actually a framework for a new world order, the Eurasia era, that is based on connectivity. The initiative was launched in 2013, with the intent of boosting global trade and economic growth, and thus 2023 marks the tenth anniversary of this Chinese initiative.

BRI has five major priorities: political coordination, infrastructure connectivity, unimpeded trade, financial integration and strengthening people-to-people connections. Political coordination is about involving all participants in the decision-making processes, with every participant treated equally, in the spirit of mutual respect, mutual benefits and peaceful cooperation. Infrastructure development involves the establishment and modernisation of railway and road networks, bridges, ports, airports, energy grids and communication infrastructure. Investment and trade aims to increase the flow of goods and services among participating BRI countries. Financial integration seeks to stimulate financial cooperation and stabilise the financial system. Finally, strengthening people-to-people connections aims to foster cultural exchange programmes and educational cooperation (Belt and Road Working Group, 2019).

Currently, BRI impacts more than 150 countries worldwide, influencing the lives of nearly 6 billion people. The initiative affects global economics, geopolitics and infrastructure development, while also addressing significant challenges, including sustainability issues (Belt and Road Portal, 2022). This article focuses on the financial integration and the financing system of the sustainability goals.

## 1.2 Sustainability goals

The sustainability goals established by the United Nations (UN) in 2015 serve as a global benchmark for sustainable development. These 17 goals and 169 subgoals focus on areas such as eradicating poverty, eliminating hunger, promoting healthy living and well-being, quality education, clean water and sanitation, affordable and clean energy, human dignity, fostering peaceful and inclusive societies, and protecting the planet. The sustainability goals are based on three pillars: economic, social and environmental sustainability. The UN has emphasised that these goals are not attainable independently, and comprehensive sustainable development can only be achieved if these goals are met concurrently (UN, 2023).

These goals are widely accepted by world governments, civil organisations and business communities as the benchmarks for sustainable development. Moreover, these goals are gaining more attention in international financing, including major infrastructure projects and initiatives such as BRI.

It is important to note that while BRI can potentially contribute to achieving these goals through investments and infrastructure development, it is crucial that the projects align with sustainability principles and consider environmental, social and economic impacts. To this end, institutions such as the Asian Infrastructure Investment Bank (AIIB) and the Silk Road Fund play a key role in financing BRI's sustainability goals (Wang & Yang, 2022).

## 1.3 The role of BRI in financing sustainability goals

This study examines the role of the Belt and Road Initiative in financing sustainability goals, particularly focussing on the roles of the Asian Infrastructure Investment Bank and the Silk Road Fund. BRI has had a significant global impact on trade, infrastructure development and economic integration over the

past decade, but its impact on sustainability goals is less known and warrants thorough investigation.

The relevance of the study stems from several factors. Firstly, BRI is one of the world's largest infrastructure initiatives, impacting more than 150 countries and about 6 billion people. As a result, BRI can influence the achievement of sustainability goals on a global scale. Secondly, the financing and implementation of BRI projects may potentially pose challenges from a sustainability perspective, making it important to understand how these projects contribute to sustainability goals.

Additionally, the study is relevant in illustrating the roles played by AIIB and the Silk Road Fund in financing BRI projects and advancing sustainability goals. The role of such institutions in promoting sustainability objectives is of fundamental significance as they influence how BRI projects support sustainable development and to what extent.

In conclusion, the aim of the study is to contribute to a better understanding of the relationship between BRI and sustainability goals and to assist in shaping future policies and strategies for achieving sustainability goals.

## 2 The BRI and sustainability

### 2.1 The sustainability goals of the BRI

The Belt and Road Initiative, often referred to as the modern Silk Road project, is China's global development strategy. BRI is built on a vast network of infrastructure development and investment projects that connect China with Africa, Asia and Europe. The sustainability goals of BRI are deeply intertwined with the 2030 Agenda for Sustainable Development Goals (SDGs) (Wang & Yang, 2022). In the initiative, according to Yang (2021),



sustainability is interpreted as maintaining a balance among three main pillars – economic, social and environmental sustainability.

### *Economic sustainability*

Economically, BRI aims to promote the economic growth and development of partners through trade and infrastructure expansion. The development of infrastructure and the promotion of investments in poorer countries can improve economic performance and contribute to poverty reduction. Furthermore, the BRI creates trade relations and investments that can increase employment and living standards in the countries involved.

### *Social sustainability*

Socially, BRI supports social integration, intercultural dialogue and community development. Cooperation promotes understanding and trust between countries, strengthens community connections and promotes social development. BRI supports education and workforce training, and also promotes gender equality and social integration of marginalised groups.

### *Environmental sustainability*

From an environmental point of view, BRI strives to minimise the negative environmental impacts of development projects and promotes green and clean technologies. Infrastructure development projects in participating countries often include the application of environmentally friendly technologies and solutions, such as green architecture and renewable energy sources, as well as the development of waste management and water management systems.

BRI also seeks to finance projects that apply environmentally friendly solutions, such as projects aimed at reducing CO<sub>2</sub> emissions, investments related to renewable energy and conservation projects. BRI also aims to encourage environmentally conscious behaviour and environmental education, and to develop environmental regulations and norms.

These endeavours are in line with the Sustainable Development Goals (SDGs) related to environmental sustainability, such as clean water and sanitation, affordable and clean energy, sustainable cities and communities, and climate action. However, BRI needs to continue to pay attention to the proper management and minimisation of the environmental impacts of projects, and to support the application of green technologies and sustainable development solutions in projects.

## 2.2 Interconnection of BRI projects and sustainability goals

The Belt and Road Initiative encompasses a wide scope of projects, ranging from traditional infrastructure development such as railway and road networks, ports and energy infrastructure to information and communications technology (ICT) projects (CICIR, 2018). Each project contributes to sustainability goals in its own way.

### *Infrastructure development and economic growth*

Traditional infrastructure development enables cross-border trade and economic cooperation. These projects contribute to economic growth by providing better market access, increasing trade flows and facilitating international investments. This aligns with the Sustainable Development Goals' aims of poverty reduction and economic growth.

### *Information and communications technology (ICT) projects*

ICT projects also play a crucial role in achieving sustainability goals. Projects such as digital infrastructure development contribute to education, job creation, economic growth, social inclusion and access to information. These projects align with several Sustainable Development Goals, including improving the quality of education, promoting gender equality, and enhancing innovation and infrastructure.

### *Green projects*

BRI also invests in “green” projects that promote environmental sustainability. These projects can involve investments in renewable energy sources, the use of eco-friendly technologies and measures against climate change. They are in line with several Sustainable Development Goals, such as combating climate change, ensuring clean and affordable energy, and sustaining life below water and on land. For example, solar and wind turbine projects financed by the BRI can promote the spread of renewable energy sources, reduce CO<sub>2</sub> emissions and contribute to the fight against climate change. Water management and afforestation projects, as well as projects aimed at biodiversity conservation, can contribute to preserving ecosystems and restoring natural habitats.

However, it is important to note that while BRI projects offer significant opportunities for achieving sustainability goals, these projects must continue to consider and address potential environmental and social challenges. For instance, infrastructure development projects need to minimise environmental degradation and biodiversity loss while ensuring the involvement and support of local communities and stakeholders in project planning and implementation.

In summary, the interconnection between the BRI and sustainability goals is a dynamic field that offers significant opportunities for addressing global sustainability challenges. Nonetheless, BRI must continue to act responsibly and carefully in achieving sustainability objectives, ensuring that the positive impacts of projects outweigh potential negative consequences.

## 3 BRI and financing sustainability goals

### 3.1 Financing models for BRI sustainability projects

BRI uses a wide range of models for financing sustainability projects, some of which are closely related to traditional infrastructure development projects, while others rely on more innovative, green financing solutions (Liu et al., 2020):

- One of the most frequently applied models is direct government financing. This model primarily relies on direct financial transactions between the Chinese Government and the government of the target country. This form of financing is usually used in large infrastructure projects, where the investment promises long-term return opportunities and structural developments.
- The second model mentioned is mutual financing. This model represents direct loans and loan guarantees between two or more parties, typically serving to finance joint projects. These projects are usually more complex and mutually beneficial as loan guarantees contribute to risk reduction.
- The third, and increasingly significant, model is the use of green bonds and other green financing tools. These tools serve to finance projects that explicitly contribute to sustainability goals, such as reducing CO<sub>2</sub> emissions or using renewable energy sources. The market for green bonds is growing dynamically and provides significant support for BRI's sustainable projects.
- The fourth model involves the application of public-private partnerships (PPPs). The PPP model allows for the involvement of the private sector in financing and implementing projects, bringing significant financial resources and expertise into sustainability projects. This form of collaboration between the public and private sectors allows for more efficient and innovative solutions as well as market-based risk management.

The diversity of BRI sustainability project financing models reflects the broad requirements and challenges of achieving sustainability goals. Balance between models and selecting the right financing tools are key in achieving the sustainability goals of BRI. All of this also indicates that a combination of traditional and innovative solutions is necessary in the field of sustainability financing to handle complex and composite challenges.

### 3.2 BRI and green financing

Green financing is of increasing importance within the BRI framework and is a key tool in achieving sustainability goals. Green financing refers to financing environmentally friendly, sustainable projects that minimise negative environmental impacts and contribute to the fight against climate change. Within the BRI framework, green financing appears in several forms (Belt and Road Portal, 2021):

- One of its most important tools is the issuance of green bonds. Green bonds are bonds whose proceeds are specifically used to finance green, that is, sustainable projects. These can be, for example, projects exploiting renewable energy sources, developing environmentally friendly technologies or steps taken to reduce CO<sub>2</sub> emissions. The market for green bonds is growing dynamically and greatly contributes to achieving the sustainability goals of the BRI.
- Another significant form is green bank loans, which are available through the banking sector. These loans also specifically serve to finance green projects. Several large state-owned banks in China, such as the China Development Bank and the Export–Import Bank of China, actively participate in green lending.
- Furthermore, within the BRI framework, various green funds have also been established, such as the China Green Fund, which specifically serves to finance green projects related to BRI. These

funds provide additional support and financing for projects targeting green infrastructure development.

In summary, green financing plays a key role in achieving the BRI's sustainability goals. Various green financing tools, such as green bonds, green loans and green funds, provide immense opportunities for BRI sustainability projects. However, it is important to note that special attention must be paid during the application of green financing to ensure the genuinely green nature of the funded projects and to prevent greenwashing, i.e. presenting unsustainable projects as green. The development and application of green financing standards and monitoring mechanisms are crucial in this process.

The relationship between BRI and green financing is not only a tool to support sustainable development, but also a fundamental component of the long-term economic and environmental sustainability of BRI. This relationship is becoming increasingly important in the context of global climate change goals and green economic growth, and requires further research and dialogue to promote efficient and responsible green financing solutions.

## 4 The role of AIIB and the Silk Road Fund

### 4.1 Introduction to AIIB and the Silk Road Fund

#### *The Asian Infrastructure Investment Bank (AIIB)*

AIIB is a multilateral development bank, established in 2015, primarily with the aim of supporting infrastructure development and economic growth in the Asian region. The bank is headquartered in Beijing and has over 100 member states worldwide. The mission of the AIIB is to promote the economic development of Asian countries, reduce poverty and improve quality of life by financing sustainable infrastructure investments in the region. AIIB places strong emphasis on environmental sustainability and social aspects, which are important components of sustainability goals (AIIB, 2023a).

### *The Silk Road Fund*

The Silk Road Fund is a state-owned investment fund established in 2014 in China to support BRI. The Fund's headquarters is located in Beijing and it started with an initial capital of over USD 40 billion. The aim of the Silk Road Fund is to support the economic cooperation and relationships of countries within the Belt and Road Initiative economic zone. The Fund's investment activities include direct investments, loans and capital funds, extending to infrastructure, energy, financial cooperation and other sectors. The Silk Road Fund actively supports green and sustainable developments, which align with sustainability goals. It concentrates on financing infrastructure development projects, such as energy and transportation projects, and encourages the application of technologies that help address environmental challenges, such as low carbon emissions and renewable energy sources. The Fund provides not only financial support but also technical and professional assistance to the projects it invests in. The aim is to improve the efficiency and effectiveness of projects, and to promote best practices in sustainable development and environmental protection. The Fund pays particular attention to environmental, social and governance (ESG) factors. The ESG approach is part of the Silk Road Fund's investment strategy, and it helps the Fund contribute to the achievement of sustainability goals (Silk Road Fund, 2023a).

In summary, the Silk Road Fund plays an important role within the BRI framework as it supports sustainable infrastructure, energy efficiency and environmental protection. However, the Fund is not only a financier but actively participates in investment projects and helps achieve sustainability goals.

## **4.2 The role of AIIB and the Silk Road Fund in financing BRI's sustainability goals**

AIIB and the Silk Road Fund play significant roles in achieving BRI's sustainability goals by providing financing sources and

solutions that promote sustainable infrastructure and economic development in BRI countries.

### *The role of AIIB*

AIIB finances numerous projects that directly contribute to the achievement of sustainability objectives. For instance, AIIB makes substantial investments in low-carbon and sustainable energy sources, including renewable energy, efficient energy use and climate-friendly technologies. Furthermore, AIIB finances various projects that promote education, healthcare and social inclusion. AIIB is committed to considering the environmental and social impacts of financed projects, as well as involving local communities and their participation in decision-making processes. This demonstrates AIIB's emphasis on achieving sustainability goals and promoting sustainable development (AIIB, 2022).

### *Role of the Silk Road Fund*

The Silk Road Fund also actively participates in supporting BRI's sustainability goals. The Fund's investments primarily focus on energy, transportation and infrastructure sectors, including several projects aligned with sustainability objectives. Investments of the Fund include green energy projects such as renewable energy sources, water management systems and green infrastructure development. Moreover, the Silk Road Fund places great emphasis on environmental sustainability and social impacts. The Fund aims to promote sustainable development and a green economy in BRI countries while supporting local communities in achieving sustainability goals (Silk Road Fund, 2023b).

In summary, both AIIB and the Silk Road Fund play key roles in financing BRI's sustainability goals. These institutions not only provide funding for sustainable projects but also actively encourage the achievement of sustainability objectives and the development of a green economy in BRI countries.



### 4.3 Concrete project examples

There are several BRI projects that support sustainability. To shed light on the activities of AIIB and the Silk Road Fund, let us examine at some specific projects financed by these institutions within the framework of BRI.

#### *AIIB projects*

AIIB has supported several projects that serve sustainability goals: AIIB focuses on green infrastructure (AIIB, 2023b) and the Sustainable Development Bond Framework that was published in 2021, and it presents a summary of the policies, strategies, processes and mechanisms that govern AIIB's commitment to sustainable financing activities within its mandate (AIIB, 2022). In 2021, AIIB approved a total of USD 9.8 billion across 11 sectors, with each AIIB project linked to at least one sector-related SDG and a few crosscutting SDGs. Nearly 60 per cent of the projects approved in 2021 have (at least) some portion of financing contributing to climate mitigation or adaptation, reflecting AIIB's commitment to climate action. Due to the continuing effect of the COVID-19 pandemic, over one third of the approved projects in 2021 (18 out of 52) were under the Facility. As such, many projects are aligned with SDG 3 and SDG 8. Mobilising financial resources for development and partnerships (SDG 17) are integral to AIIB's mandate. All AIIB-approved financing contributes to SDG 17 (AIIB, 2022).

AIIB projects include, for example, significant investments in the Bangladesh Sustainable Power Plant Project, which focuses on renewable energy sources. This project emphasises renewable energies instead of coal-fired power plants, reduces CO<sub>2</sub> emissions and contributes to the fight against climate change.

Another example of a project financed by AIIB is the Dushanbe–Uzbekistan Water Supply Project, which improves water services in the capital of Tajikistan and its surrounding areas, contributing to healthy living conditions and the development of sustainable cities.

There are several other examples for these projects (mostly from Asia):

Table 1. SDG projects of AIIB

Country	Project	
Kazakhstan	Zhanatas 100 MW Wind Power Plant	AIIB provided financing of USD 34.3 million for construction and operation. The project aims to provide a sustainable and environmentally friendly source of renewable electrical energy for the region and contribute to Kazakhstan's commitments under the Paris Agreement.
Indonesia	PLN (Perusahaan Listrik Negara - Indonesian State Electricity Company) East Java and Bali Power Distribution Strengthening	AIIB's USD 310 million loan to PLN aims to finance the implementation of the Electricity Supply Business Plan (Rencana Usaha Penyediaan Tenaga Listrik - RUPTL) (2019-2028) in East Java and Bali. The project consists of the installation of about 17,496 km of medium-voltage distribution lines and 14,947 km low-voltage lines. The project will improve the quality of power supply. Around 0.86 million additional households will be covered by grid electricity service and 13 million existing customers will benefit from the improved stability of the power supply.
Pakistan	Karachi Bus Rapid Transit Red Line Project	The project operations are intended to rely on a compressed natural gas hybrid fleet of buses and a waste-to-fuel scheme. A dedicated biogas plant will produce biomethane from local cattle dungs to power buses, providing a solution to the dual challenge of local waste management and emission reductions. The project is expected to reduce 77,979 tCO <sub>2e</sub> per year, while removing 40 per cent of cattle dung from nearby neighbourhoods' surfaces and creeks.
Uzbekistan	Rural Infrastructure Development Project (Previously: Prosperous Villages Project)	The project is expected to improve the quality of basic infrastructure, such as schools, roads, water supply and sanitation systems, and internet service. The project will target 21 districts in five regions classified as lagging by the Government of Uzbekistan. Approximately 300 villages out of a total of 408 villages eligible for the project will be selected, based on criteria including remoteness, resource availability and vulnerability to natural hazards.

Country	Project	
India	Punjab Municipal Services Improvement Project	AIIB is investing USD 105 million in the Punjab Municipal Services Improvement Project, aiming to support the strengthening of urban governance, financing and delivery of sustainable water services in Amritsar and Ludhiana. The project will finance the construction of water treatment plants to meet the 30-year demand forecast of both cities.
Multicountry	Lightsmith Climate Resilience Partners	AIIB has partnered with the Lightsmith Group to mobilise private capital and new technologies so that businesses and communities can withstand adverse weather and bounce back from climate-related disasters. Lightsmith Climate Resilience Partners is a specialist growth private equity fund focussing on global climate resilience solutions.

Source: Own compilation based on AIIB (2022) data

In recent years, AIIB has been investing large amounts in the energy sector (47 projects), water sector (15 projects), urban sector (13 projects), information technology sector (7 projects), transport sector (35 projects), etc., totalling more than 200 projects.

By 2025, AIIB's target is for climate finance to represent 50 per cent of all financing approvals. On 26 October 2021, AIIB announced that it would align its operations with the goals of the Paris Agreement by 1 July 2023. AIIB's current estimate is that its cumulative climate finance approvals will amount to USD 50 billion by 2030.

### *Silk Road Fund projects*

As a medium- to long-term development and investment fund, the Silk Road Fund is committed to promoting high-quality development of the Belt and Road Initiative. Its investments span key BRI regions such as South East Asia, South Asia, Central Asia, West Asia, North Africa and Europe, and a wide spectrum of fields such as infrastructure, energy and resources, industrial cooperation, financial cooperation and sustainable development. The Fund promotes the building of the Green Silk Road and the

Clean Silk Road through sustainable investment, thereby helping to realise the UN vision of sustainable development. By the end of 2022, the Silk Road Fund has committed over USD 20 billion to investments covering more than 60 countries and regions.

One of the most important projects of the Silk Road Fund is the Pakistani Karot Hydropower Project. This project utilises hydroelectric technology for sustainable energy production, reducing CO<sub>2</sub> emissions and contributing to the fight against climate change.

Another example of a project supported by the Silk Road Fund is the railway project from Nairobi to Mombasa in Kenya. This project enhances transportation infrastructure, reduces transportation costs and promotes regional cooperation and economic development. Additionally, it contributes to the development of sustainable cities and communities.

These projects illustrate how AIIB and the Silk Road Fund support the sustainability goals of the Belt and Road Initiative in practice. These institutions not only finance the projects, they also actively support and promote sustainable development and the green economy in BRI countries.

## 5 The impact of AIIB and the Silk Road Fund on sustainability

### 5.1 Contribution of AIIB and the Silk Road Fund to sustainable goals

The Asian Infrastructure Investment Bank and the Silk Road Fund are two influential institutions within the financing system of the Belt and Road Initiative. Both play a significant role in promoting sustainable goals at both regional and global levels.

AIIB has well-structured regulatory frameworks with a strong focus on sustainability goals. When supporting infrastructure

development projects, AIIB emphasises environmental protection and minimising social impacts. For instance, through the AIIB Green Finance Framework, it encourages financing of green projects, including those involving renewable energy sources, energy efficiency and pollution reduction. Furthermore, AIIB closely collaborates with partner countries to achieve sustainable development goals, such as poverty reduction and combating climate change.

The Silk Road Fund also actively contributes to sustainable goals. It possesses a highly specific investment portfolio that finances projects promoting sustainability and environmental protection within the BRI framework. Such projects encompass green energy, sustainable infrastructure and eco-friendly technologies. The Silk Road Fund contributes to the promotion of sustainable development goals by supporting green infrastructure, environmental conservation, community development and job creation.

In summary, both AIIB and the Silk Road Fund make substantial contributions to achieving sustainable goals. These institutions play a role in developing and implementing financing models and strategies that foster green development, environmental protection and social well-being. Thus, both institutions contribute to the attainment of sustainable development goals and the realisation of the BRI's sustainability objectives.

## 5.2 Analysis of the sustainability impacts of projects supported by AIIB and the Silk Road Fund

To gain a deeper understanding of the contributions of AIIB and the Silk Road Fund, we will examine in more detail the impacts of two key projects:

- **AIIB project** – The Bangladesh Sustainable Power Plant Project: AIIB has made a significant contribution to this project, which focusses on upgrading power plants and reducing CO<sub>2</sub>

emissions. At its core are technological advancements such as steps taken to improve energy efficiency, which can significantly reduce CO<sub>2</sub> and other greenhouse gas emissions in the long term. AIIB's financial support has also led to job creation, particularly for highly skilled workers who are essential for operating modern power plants. This has contributed to local economic development and improved living standards.

- **Silk Road Fund project** – The Sinohydro Zambia Solar Project: The Silk Road Fund supported this solar energy project in Zambia, promoting the use of solar energy among local communities. The project supported the use of renewable energy sources, contributing to the fight against climate change and ensuring energy security. The construction of a solar power plant as part of the project has contributed to local job creation and economic development, as jobs related to renewable energy were necessary for the operation and maintenance of the power plant.

Both projects have long-term impacts on the environment and local communities. The Bangladesh Sustainable Power Plant Project reduces CO<sub>2</sub> emissions and promotes sustainable energy management in the long run, while the Sinohydro Zambia Solar Project promotes the use of renewable energy sources, contributing to the fight against climate change and local economic development.

Furthermore, both projects have contributed to the development of local communities through job creation and promoting local economic growth. This indicates that the support from AIIB and the Silk Road Fund not only concentrates on environmental sustainability but also supports social and economic development.

Therefore, projects supported by AIIB and the Silk Road Fund contribute to achieving sustainability goals, both at the local and global levels. These projects take into account environmental, social, and economic impacts and focus on long-term sustainability goals. However, it is important to continue monitoring and

evaluating these projects rigorously to ensure the continuous achievement of sustainability goals and the minimisation of negative impacts.

## 6 Challenges and opportunities

### 6.1 Challenges

Financing the sustainability goals of BRI, AIIB and the Silk Road Fund involves significant challenges. The legal and regulatory environment often changes and is unpredictable, posing serious risks for long-term infrastructure projects. Compliance with human rights, labour laws and environmental regulations also presents a major challenge.

Among the economic and financial challenges, large capital mobilisation and long-term financial sustainability are at the forefront. Hedging exchange rate fluctuations and the long-term creditworthiness of projects are also major challenges, especially amidst deteriorating economic conditions.

Technological and infrastructure challenges often relate to specialised technical knowledge and significant infrastructure investments, such as the construction of roads, bridges and power plants. Furthermore, the social and environmental impacts of projects, such as resettlement of communities or exploitation of natural resources, also pose significant challenges.

Environmental challenges, including habitat disruption, pollution and greenhouse gas emissions, also present significant problems. Political risks, such as the lack of political stability and geopolitical factors, also pose significant challenges in terms of project timing, cost and ultimate success.

Nevertheless, these challenges are not inevitable obstacles but rather opportunities for development, innovation and cooperation, in the interests of sustainable development.

## 6.2 Opportunities

Despite the challenges involved, financing the sustainability goals of BRI, AIIB and the Silk Road Fund also holds enormous opportunities. New financing models and international cooperation can open up new paths that contribute to achieving sustainability goals.

One pioneering financing model is the use of green bonds. These bonds specifically serve to finance projects that contribute to environmental protection and sustainability. The green bond market is experiencing very dynamic growth and provides investors with an opportunity to contribute to sustainability goals while achieving competitive returns. Additionally, carbon credits and sustainable investment funds can also facilitate the financing of green projects.

International cooperation and partnerships are also crucial for financing sustainability goals. Multilateral development banks, such as the World Bank, regional development banks such as the Asian Development Bank, and nongovernmental organisations such as the Green Climate Fund, can be key players in supporting sustainable projects. These institutions can provide extensive expertise and resources to projects and facilitate the sharing of best practices.

Finally, innovation and technology hold immense potential for achieving sustainability goals. Increasing energy efficiency, adopting renewable energy sources, developing smart cities, and utilising information and communication technologies can all contribute to sustainable development objectives. The rapid pace of technological progress means that in the future, new and innovative solutions may emerge that further aid in achieving sustainability goals.



## 7 Summary and conclusions

### 7.1 Summary

This study thoroughly examined the role of the Belt and Road Initiative, the Asian Infrastructure Investment Bank, the Silk Road Fund and sustainability goals in financing sustainability objectives. Through our research, we have arrived at several key findings:

- Firstly, BRI plays a significant role in financing sustainability goals. The projects financed by BRI contribute to sustainable development by promoting infrastructure development, economic growth, and poverty reduction. However, BRI projects also need to address sustainability challenges, including ecological and social impacts.
- Secondly, AIIB and the Silk Road Fund also play important roles in financing sustainability goals. The projects financed by AIIB and the Silk Road Fund contribute to sustainable development by promoting infrastructure development, economic growth and poverty reduction. However, these projects also need to address sustainability challenges, including ecological and social impacts.
- Thirdly, the financing required to achieve sustainability goals significantly exceeds the currently available resources. This means that additional efforts are needed to increase financing for sustainability goals, including increasing private investments, enhancing international development financing and developing sustainable financing mechanisms.
- Fourthly, technological advancements have a significant impact on the achievement of sustainability goals. Technological progress can facilitate the attainment of sustainability goals by improving productivity, reducing environmental impacts and promoting social development. However, technological advancements also present challenges, including job

displacement due to automation, the widening digital divide and the social impacts of technological progress.

- Fifthly, the study points out that projects financed by BRI, AIIB and the Silk Road Fund need to pay greater attention to sustainability goals. While these projects contribute to sustainable development, it is important for project planning and implementation to place greater emphasis on sustainability goals, including environmental, social and economic objectives.
- Lastly, the study also concludes that technological advancements should play a larger role in achieving sustainability goals. Technological progress can facilitate the attainment of sustainability goals by improving productivity, reducing environmental impacts and promoting social development. However, it is important to prioritise sustainability goals during technological advancements, including environmental, social and economic objectives.

In summary, the study demonstrates that BRI, AIIB and the Silk Road Fund play significant roles in financing sustainability goals, but that further efforts are required for the comprehensive achievement of sustainability goals. Technological advancements should have a greater role in achieving sustainability goals, and future research should focus on these areas.

## 7.2 Recommendations for the future

Based on the findings of the study, several recommendations can be formulated for future research and policies:

- **Expanded research in the field of technological advancements:** Technological development has a significant impact on achieving sustainability goals, but further research is needed to understand the relationship between technological development and sustainability goals. It would be particularly important to examine the effects of technological advancements on education and healthcare and compare their impact on the labour market.

- **Integration of sustainability goals into BRI, AIIB and Silk Road Fund projects:** While BRI, AIIB and Silk Road Fund projects contribute to sustainable development, it is important that greater emphasis be placed on incorporating sustainability goals in the design and implementation of these projects. This includes integrating environmental, social and economic objectives into the planning and execution of projects.
- **Increase in financing for sustainability goals:** The financing required to achieve sustainability goals far exceeds the currently available resources. This means that additional efforts are needed to increase financing for sustainability goals. This includes boosting private investments, increasing international development financing and developing sustainable financing mechanisms.
- **Enhance the role of technological development in achieving sustainability goals:** Technological development should play a larger role in achieving sustainability goals. This involves promoting technological advancements to enhance productivity, reduce environmental impacts and facilitate social development.

In summary, future research and policies should focus on integrating sustainability goals into BRI, AIIB and Silk Road Fund projects, increasing financing for sustainability goals and enhancing the role of technological development in achieving sustainability goals. Furthermore, further examination of the effects of technological advancements can help us better understand how technology can be utilised to achieve sustainability goals.

### 7.3 Final thoughts

The study presents several important findings in relation to the role of the Belt and Road Initiative, the Asian Infrastructure Investment Bank, the Silk Road Fund, and sustainability goals in financing sustainability goals. However, the most crucial

conclusion we can draw is that while these entities play a significant role in achieving sustainability goals, further efforts are needed for the comprehensive attainment of these goals.

Technological advancement must play a larger role in achieving sustainability goals. Technological progress can facilitate the attainment of sustainability goals by enhancing productivity, reducing environmental impacts and promoting social development. However, it is important to pay greater attention to sustainability goals during technological development, including environmental, social and economic objectives.

Future research and policies should focus on integrating sustainability goals into BRI, AIIB and Silk Road Fund projects, increasing financing for sustainability goals and enhancing the role of technological development in achieving sustainability goals.

In summary, the achievement of sustainability goals is not solely the responsibility of the BRI, AIIB and Silk Road Fund: it is everyone's responsibility, including governments, the private sector, civil society and individuals. Everyone must contribute to the attainment of sustainability goals and take responsible action for a sustainable future.

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# Past Dynamics and Future Scenarios of China-EU Cooperation on Green Finance

Christoph Nedopil

*China and the European Union have played a leading role in shaping green finance policies, fostering innovation and promoting its application over the past decade. Their joint initiatives include the establishment of the Network for Greening the Financial System (NGFS) in 2017, a platform for global central banks and financial regulators, and the development of a common set of green finance standards known as the Common Ground Taxonomy, which was first published in 2021. Notably, issuers from the EU and China have been involved in 56 per cent of global green bonds issued since 2014.*

*The cooperation between China and the EU on green finance goes beyond economic interests; it is also driven by strong political support, particularly through the 2005 EU–China Partnership on Climate Change. This partnership has provided a high-level political framework for cooperation and dialogue, which has been reaffirmed and strengthened through various joint statements and commitments, such as the 2010 Joint Statement, the 2015 Joint Statement and the 2018 Leaders’ Statement.*

*However, escalating geopolitical tensions pose a risk to the progress of green finance cooperation between China and the EU, with potential adverse consequences for addressing climate change and promoting green development. While some tensions have caused temporary delays in EU–China green finance collaboration, broader economic and geopolitical uncertainties, as well as the assertive pursuit of national interests (e.g.*

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Christoph Nedopil is an Associate Professor of Practice in Economics at Fanhai International School of Finance (FISF), Fudan University.  
E-mail: nedopil@fudan.edu.cn

*the increasing use of the Chinese currency renminbi for international settlements) could further strain international cooperation on green finance between certain EU countries and China.*

*This article examines the opportunities and challenges for green finance cooperation between China and the EU. The analysis is based on the dissection of policy documents, a review of stakeholders' statements and articles, and insights from ten semi-structured interviews and a workshop. It addresses three dimensions of green finance development: first, past efforts in EU–China collaboration; second, an examination of domestic green finance priorities and corresponding political ambitions in both the EU and China; and third, the use of scenario building techniques to envision three potential collaboration pathways for the future ('Green ministry of the future,' 'Partnerships in multipolarity' and 'Choosing your allies'). Drawing from these scenarios, the article puts forward key recommendations to enhance green finance cooperation, aimed at achieving improved environmental and financial outcomes. These recommendations leverage green finance priorities to bridge gaps during a period of heightened geopolitical tensions, while simultaneously creating opportunities for investors and developers.*

**Journal of Economic Literature (JEL) codes:** F02, F30, F55, G28

**Keywords:** China, European Union (EU), green finance, cooperation, scenarios

## 1 Introduction

Green finance plays a pivotal role in addressing the interconnected challenges of climate change and biodiversity loss. Its primary objective is to incentivise investments in environmentally friendly economic activities while discouraging harmful ones. To effectively implement green finance, it is crucial to harmonise standards and practices for two key reasons. Firstly, environmental risks, particularly climate risks, are global in nature and require a level playing field for mitigation. Common

ambitions and standards are essential to prevent pollution havens (Cole et al., 2006) and carbon leakage (Jakob, 2021). Secondly, harmonised standards reduce transaction costs associated with cross-border capital flows (Nedopil et al., 2021), which are necessary to finance the green transition in both developed and developing economies.

China and the European Union (EU), as two of the world's largest economies and the world's first and third largest greenhouse gas emitters, have emerged as leaders in setting domestic green finance standards and promoting international cooperation in this field (Larsen, 2023; Nedopil & Larsen, 2022). However, "current understanding of the EU's and China's green finance approaches is piecemeal and sporadic" (Larsen, 2023, p. 62).

The literature has not adequately explained the historical development, functions or characteristics of green finance governance and not focused on the consequent cooperation pathways for China and the EU. The focus was on China's adoption of a top-down approach and the EU's adoption of a bottom-up approach. While this paper works with the existing literature, its primary objective is to conceptualise pathways for EU–China cooperation on green finance despite the differences between these systems.

China, considering itself the largest developing country, has established a comprehensive top-down green financial system encompassing various instruments such as green credit, bonds, taxonomies and emissions trading. Similarly, the EU has adopted a comprehensive mixed bottom-up and top-down approach to green finance, including the Sustainable Finance Taxonomy, Sustainable Finance Disclosure Regulation (SFDR) and the European Union Emissions Trading System (ETS). Both economies have joined forces to spearhead global efforts in harmonising and accelerating the development and application of green finance. Collaborative initiatives such as the International Platform for Sustainable Finance (IPSF) that has developed the Common



Ground Taxonomy defining green bonds in 2021 (IPSF Taxonomy Working Group, 2021) and the Network for Greening the Financial System (NGFS) have led to increased utilisation of green financial instruments in these regions. Notably, green bond issuances in the EU and China have seen substantial growth over the years.

Despite these endeavors, previous efforts to promote green finance at the domestic and international levels have been inadequate in reversing environmental degradation. Global greenhouse gas emissions continue to rise (IEA, 2023), and biodiversity loss remains unabated (Dasgupta, 2021). The ambitions have also not been able to close the financing gaps for a green transition, estimated at about USD 300 billion annually in China (beyond ‘business as usual’) (Ma, 2020) and about EUR 300 to 400 billion per year in the EU (Klaassen & Steffen, 2021). Insufficient action in making green finance more effective and efficient poses significant risks to the environment, societies and economies, including potential GDP loss and delayed transition costs. Recognising the urgency of addressing climate change risks as the world’s first (China) and third (EU) largest emitters (Crippa et al., 2022), China and the EU have intensified their commitments to ‘green’ their economies and reduce greenhouse gas emissions. China has announced the ‘dual carbon goals’ of peaking emissions before 2030 and achieving carbon neutrality by 2060, while the EU has introduced the ‘Fit for 55’ package to reduce net greenhouse gas emissions by at least 55 per cent by 2030 (compared to the 1990 baseline) (European Council, 2023).

To mobilise finance for this green transition and set standards for green finance, it is essential to strengthen the momentum of cooperation between China and the EU. However, rising geopolitical tensions between these regions pose challenges to expanding collaboration in green finance. Foreign investment and cooperation on green finance standards have faced obstacles (e.g. foreign ownership of Chinese bonds dropped from a low starting point of about 3.5 per cent at the beginning of 2022 to

under 3 per cent at the end of 2022) (Nedopil & Larsen, 2022), exacerbated by the COVID-19 pandemic.

This article aims to explore the opportunities and challenges of green finance cooperation between China and the EU. It utilises literature analysis and scenario building to analyse the dynamics of green finance ambitions and collaboration (Section 2). Data collection involves a range of sources, including policy documents, official statements, opinion pieces, research papers, media analysis and semi-structured interviews conducted in both English and Chinese. Based on ten semi-structured interviews and one workshop between January 2021 and December 2022, three scenarios are expanded in Section 3: ‘Green ministry of the future,’ ‘Partnerships in multipolarity’ ‘Choosing your allies.’ Building upon these scenarios, the article provides three core recommendations in Section 4 to enhance green finance cooperation, improve environmental and financial outcomes, and navigate geopolitical tensions.

By contributing to the broader literature on green finance (Desalegn & Tangl, 2022; Linnenluecke et al., 2016; Weber, 2012) and addressing the often-neglected aspect of the political economy of green finance cooperation, this article aims to offer valuable insights into this critical field. The conceptualisations can enhance academic research on green finance by providing researchers with a better understanding of the context and content of green finance policies. Furthermore, this work can support policy-making and foster collaboration between countries. The conclusions drawn from this study hold implications for EU–China cooperation in the realm of green finance, as effective coordination necessitates a level of clarity that is currently lacking.

## 2 Evaluating China-EU green finance cooperation dynamics

China and the EU have developed advanced, yet distinct green financial systems, based on their respective governance systems: China has adopted a top-down political economy approach to develop its green finance system. In this approach, central governments and regulators play a guiding role in setting the direction for green financing through policies, regulations and guidance. They also leverage public finance support, such as establishing green development funds, and create an enabling environment for the market through incentive policies (Larsen, 2023; Naughton, 2020; Wang & Zadek, 2018).

This top-down approach in China differs from the bottom-up market facilitation approach adopted by the EU and the US (Larsen, 2023; Nedopil et al., 2021). The EU's approach to green finance can be characterised as “bottom-up first, top-down second” (Larsen, 2023; Nedopil et al., 2021). In other words, the EU's green financial system is primarily driven by market-led initiatives, with government and regulators stepping in when necessary to supplement and facilitate the market in achieving policy objectives.

While both the EU and China have made significant progress in domestic green finance, they have also fostered close cooperation in further developing this field. EU–China cooperation on green finance can be understood in three distinct phases.

The first phase, which lasted until the early 2000s, revolved around development finance. European development banks like the European Investment Bank (EIB) and national development banks such as the French Agence Française de Développement (AFD) and the German Kreditanstalt für Wiederaufbau (KfW) provided financing for development projects in China that had environmental co-benefits. An illustrative example is the Ping

Hu Oil and Gas Project, where the EIB contributed a loan of EUR 55 million in 1995 to support the transition from coal gas to natural gas, which was considered a cleaner energy source at the time (ADB, 2004).

The second phase began in the early 2000s and was marked by high-level policy cooperation. During this period, the EU and China established a Strategic Partnership, elevating their relationship beyond economic matters to encompass politics and security (Maher, 2016). In 2005, both parties issued a joint statement on their partnership regarding climate change. The focus of this collaboration was on zero-emission coal technology, specifically carbon dioxide capture and geological storage (European Commission, 2005). The joint statement emphasised the commitment of both sides to deepen cooperation in developing a low-carbon economy and expand their efforts in the EU–China carbon emission trading capacity building project (European Commission, 2015).

Moving into the third phase of cooperation, the EU and China continue to work closely on green finance. A foundation was also the white paper published by the Green Finance Committee (GFC) of the China Society for Finance and Banking and the EIB, which highlighted the need to harmonise the green bond standards used by China and elsewhere (EIB & Green Finance Committee of China Society for Finance and Banking, 2017). Both parties recognise the importance of aligning their financial systems with sustainable development goals and have expressed a commitment to enhancing cooperation in this area. The EU's green finance taxonomy and China's Green Finance Initiative serve as frameworks for guiding investments toward environmentally sustainable projects.

Furthermore, the EU and China have engaged in dialogue and knowledge-sharing through various platforms, such as the EU–China Green Finance Dialogue and the EU–China Sustainable Urbanisation Partnership, to exchange experiences, best practices

and promote innovation in green finance. Specific areas of cooperation are analysed in the next sections.

## 2.1 EU-China green financial markets integration through green taxonomies

One important cooperation area is the common labeling of ‘green’ eligible activities. Since its initial publication in 2015, China’s green bond catalogue has encouraged ‘green’ investments in ‘clean coal’, which stood in contrast to the EU green finance taxonomy’s goal of reducing greenhouse gas emissions. To coordinate their green financial systems, the People’s Bank of China (PBoC) published an updated green bond catalogue in April 2021 that removed the construction of new ‘clean coal’ power plants but kept the upgrading of different types of coal usage (PBoC, 2020). The catalogue also adjusted the categorisation system to match the EU Taxonomy, and the adoption of the EU ‘Do No Significant Harm’ principle to avoid investing in climate-friendly but biodiversity-destroying assets was discussed. Yet, gaps still existed.

To overcome parts of the difference, China and the EU have led the development of the ‘common ground taxonomy’ (CGT), which was introduced at COP 26 in November 2021 (IPSF Taxonomy Working Group, 2021). First issuances using the CGT have taken place, particularly by Chinese issuers, such as China Construction Bank in December 2021 and Bank of China in June 2022 (issuing a USD 500 million three-year green bond) (Gong, 2022). However, at this stage, the CGT seems not to be able to fully address the concerns of European investors who have not issued any green bonds utilising the CGT. This might have to do with EU’s regulation on sustainability-related disclosures in the financial services sector (the SFDR). Other issues with the CGT might lie in the different scope: In the EU, the current taxonomy only covers green aspects, with social and broader sustainability aspects to be added over the next years. In China, taxonomies differ by the regulator, economic sector, financial instrument and sustainability

focus. For example, China has launched a climate taxonomy and an finance taxonomy for the Sustainable Development Goals (SDGs) with overlaps and differences compared to the green bond taxonomy (Nedopil Wang et al., 2020). The existence of multiple taxonomies might mean that the CGT is only a narrow comparison of the two most prominent taxonomies with limited consideration of the broader context.

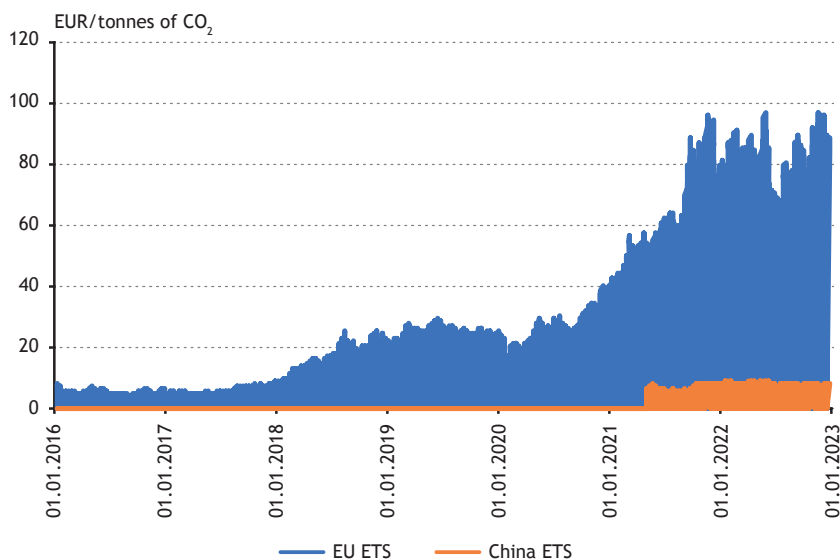
## 2.2 Emissions trading

One focus of EU–China cooperation has been emissions trading mechanisms. From 2014 to 2017, the EU supported the design and implementation of emissions trading in China (based on the 2015 Joint Statement). The EU provided technical assistance for capacity building and supported the seven regional pilot systems as well as the establishment of the national emissions trading system. The project has been extended into the ‘Platform for Policy Dialogue and Cooperation between EU and China on Emissions Trading’ (2017–2020), which supports the Ministry of Ecology and Environment (MEE) in its efforts to implement and further develop China’s national ETS and established a policy dialogue between the MEE and the European Commission. China and the EU signed an MoU to enhance cooperation on emissions trading at the 2018 EU–China Summit (European Commission, 2018).

In 2021, China’s national ETS was launched (MEE, 2023), coinciding with the EU’s announcement of its Carbon Border Adjustment Mechanism (CBAM) that would price the import of carbon emissions into the EU. While the launch of the China ETS was welcomed by the EU, the mechanisms of the Chinese and the EU ETS are not aligned: The Chinese ETS continues to be ‘intensity-based’ with fewer sectors, high allowances and no communicated pathway to emissions reduction. This compares to the EU ETS that is designed as a cap-and-trade system with a clearly communicated emissions reduction of

emissions allowances. The price of allowances varies by a factor of ten, making Chinese emissions much cheaper compared to EU emissions, even in the few sectors included in China's ETS (see Figure 1). This, potentially, has also led to China's resistance to the CBAM work to price the import of carbon emissions into the EU.

Figure 1. Carbon prices (EUR/tonnes) in EU and China (2016-2023)



Source: Own compilation based on International Carbon Action Partnership (ICAP) data

Harmonisation of the EU and Chinese ETS seems difficult based on these differences (Liu & Nedopil, 2021), while the potential of voluntary carbon markets seems so far untapped.

### 2.3 The relevance of EU-China green finance coordination beyond domestic borders

China and the EU are also cooperating in supporting green finance development globally. China and the EU, together with relevant authorities from Argentina, Canada, Chile, India, Kenya and Morocco, launched the International Platform for Sustainable Finance (IPSF) in October 2019 (European Commission, n.d.).

The IPSF aims to scale up the mobilisation of private capital towards environmentally sustainable investments and to offer a multilateral forum of dialogue between policymakers that are in charge of developing sustainable finance regulatory measures to help investors identify and seize sustainable investment opportunities that truly contribute to climate and environmental objectives. The IPSF now includes 18 members (European Commission, n.d.). Besides the IPSF, the PBoC and the EU Commission were founding members of the Network for Greening the Financial System (NGFS) (NGFS, n.d.). NGFS's goal is to contribute to the development of environment and climate risk management in the financial sector.

## 2.4 Outlook for China-EU cooperation

Despite important milestones, such as the Common Ground Taxonomy introduced in November 2021 under the leadership of China and the EU, frictions and challenges for the further development of green finance between EU and China continue to exist. Many of those are determined by non-aligned domestic interests.

Looking to the coming years, China seems to focus on accelerating economic growth to mitigate significant risks stemming from COVID-related lockdowns, real estate challenges and geopolitical shifts. China's ambition for technological self-reliance is expected to drive investments in high-technology products and green economy sectors, such as new energy vehicles and renewable energy. Simultaneously, China's economic policy may continue to support investments in fossil fuels to ensure energy security. Additionally, China aims to foster strategic collaboration with aligned countries, particularly through initiatives like the Belt and Road Initiative (BRI), while maintaining strategic independence from non-aligned countries in areas such as trade, investments and finance through its dual circulation strategy (García-Herrero, 2021; Nedopil & Song, 2023)



In the longer term, China is also pushing for the internationalisation of its currency, the renminbi (RMB), with potential goals of reducing trade frictions, diminishing the dominance of the USD in oil trade (Kamel & Wang, 2019) and increasing the RMB's prominence in global settlements (Eichengreen & Kawai, 2014). This pursuit may have implications for green finance, as currently no international players have used RMB to issue green bonds in China and even Chinese overseas green bond issuances have been denominated in EUR or USD. Thus, there may be potential frictions in green finance flows due to this ambition.

Furthermore, China is gradually exploring and advancing the role of technology in green finance, particularly in digital currencies and finance. This exploration aims to improve access to finance by reducing friction (Kong et al., 2022), enhance information disclosure quality and timeliness, and mitigate the potential for greenwashing (Chen et al., 2020). Given China's domestic governance of data and IT, protecting domestic data, especially sensitive or national property, is of the utmost importance. This has resulted in limited exchange of granular data across borders. Additionally, important Chinese academic research databases, such as the China National Knowledge Infrastructure (CNKI), have become inaccessible to overseas researchers since April 2023 (Yiu, 2023). Restricted access to international data, including news and opinions (Wang, 2020), raises concerns about technological decoupling and potential challenges in green finance cooperation.

Meanwhile, policymakers at the European Union level and in various member states, as well as private initiatives, have articulated clear ambitions to shape green finance in Europe in three key areas: monitoring, disclosure and transparency; capacity building within regulatory and financial institutions; and the development of green financial instruments, including transition finance (EBA, 2022; ESMA, 2022).

In terms of monitoring, disclosure and transparency, a significant focus has been placed on combating greenwashing. Both the

European Securities and Markets Authority (ESMA) and the German government's sustainable finance roadmap emphasise this issue. While regulations like the Sustainable Finance Disclosure Regulation (SFDR) have already enhanced transparency, there is a core ambition to strengthen data quality through improved monitoring and disclosure standards in the coming years. Private organisations such as the Task Force on Climate-related Financial Disclosures (TCFD), Task Force on Nature-related Financial Disclosures (TNFD), International Sustainability Standards Board (ISSB) and others are actively involved in developing clearly formulated non-financial disclosure standards for financial institutions and corporations.

Regarding capacity building, both private and public institutions need to adapt and learn. While climate and biodiversity risks are increasingly better understood, the capacity to manage these risks within financial markets is still being established. One suggested solution is multidisciplinary cooperation between financial institutions, regulators and scientists (ESMA, 2022). Similarly, capacity within financial institutions is being improved through the integration of sustainable finance criteria in hiring practices and changes in incentives.

Furthermore, the development of green financial instruments will continue to progress. Two crucial ambitions include the further application of a European Green Bond Standard and the establishment of the Carbon Border Adjustment Mechanism (CBAM) to reduce carbon leakage and set a price for imported carbon within the EU (European Commission, 2023). Improved transition finance is also expected to be an important aspect, considering the EU's support for the work of the G20 Sustainable Finance Working Group, which prioritises transition finance.

In addition to these specific trends, the EU has reevaluated its strategic dependencies on critical trade following Russia's invasion of Ukraine and subsequent supply shocks in fossil fuels. This reassessment has led to a review of dependencies on China as an import, export and investment market, focusing on "de-risking, not decoupling" (von der Leyen, 2023) as the guiding principle.

## 3 Future scenarios for China-EU green finance cooperation

Considering the urgent global need to accelerate efforts against climate change and biodiversity loss, it is imperative to redirect financial flows towards effective climate mitigation, adaptation and biodiversity protection. This necessitates the advancement of green finance, an area where China and the EU have a noteworthy history of cooperation.

To assess the potential further development of EU–China green finance cooperation, ten semi-structured interviews and workshops with 15 stakeholders from finance, policy and academia in China and Europe were conducted between January 2021 and December 2022, which enabled the development of three scenarios for the year 2035: ‘Green ministry of the future,’ ‘Partnerships in multipolarity’ and ‘Choosing your allies.’ It is important to recognise that these scenarios serve solely as a framework for understanding potential collaboration in the future, rather than precise predictions. Additionally, the scenarios are generalised representations and cannot fully capture the diverse dynamics that may shape green finance cooperation in various contexts.

### 3.1 Scenario 1: Green ministry of the future

#### *3.1.1 Rationale and description*

The urgent need to address the physical damages caused by climate change leads to a global agreement in 2025 that accelerates the transition towards green energy. While countries still have the autonomy to determine their emissions trajectories through Nationally Determined Contributions (NDCs), global funding and trade support for the energy transition have increased significantly beyond the annual commitment of USD 100 billion established in the 2010s. Both the EU and China have shifted their focus from measuring greenhouse gas emissions and emissions intensity

to measuring greenhouse gas inventories, providing a clearer trajectory for emissions reduction.

The EU has expedited the implementation of the Carbon Border Adjustment Mechanism (CBAM) and allocates 50 per cent of its revenues to support the energy transition in emerging markets, including the expansion of local manufacturing capacity. Global voluntary carbon markets have also emerged, calculating carbon credits based on the 2021 NDC scenario. Notably, the accelerated use of renewable energy compared to the 2021 NDCs generates additional carbon credits. The price of carbon credits in the voluntary carbon market is set at 50 per cent of the EU Emissions Trading Market (ETM) price.

Investment in non-renewable energy sources has declined significantly, as few investors benefit from financing coal-fired power plants due to their high associated risks. Insurance coverage for coal-fired power plants has become expensive and difficult to obtain. Despite existing trade barriers for certain high-tech products between China and Western countries, an agreement has been reached to exempt green technologies, such as solar, wind, batteries and hydrogen technologies, from such restrictions. Additionally, the availability of currency exchange between the EUR and the RMB has made both currencies equally attractive for transactions.

### *3.1.2 Practical consequences for China-EU green finance cooperation*

The integration and valuation of environmental risks, as well as the promotion of environmental protection, are seen as crucial aspects of green finance to finance the green transition in both the EU and China. Consequently, the EU and China have expanded their cooperation in green finance to ensure a level playing field for financial actors and facilitate cross-border financing of green technologies. Key areas of collaboration in green finance include standard-setting for financial products, the development of a 'red taxonomy' to identify environmentally harmful investments, environmental disclosure practices, and the implementation of incentive and restraint mechanisms.

To further support the green transition, China and the EU have established two joint green development funds in collaboration with major development banks and private financial institutions. These funds aim to support domestic green innovative companies in China and the EU, as well as companies in emerging markets engaged in green innovation. The progress achieved in this scenario is illustrated in Table 1, providing a comprehensive overview of the progress in China–EU green finance cooperation.

**Table 1. Impacts on green finance of Scenario 1 - Green ministry of the future in 2035**

Financial standards and products	Environmental disclosure	Incentive/restraint mechanisms
<p><b>Green finance classification</b> further improved to include clear environmental thresholds (e.g. 100g CO<sub>2</sub>/KWh for energy)</p> <p><b>Red finance taxonomy</b> developed that specifies goals of phasing out specific technologies with set timeframes, e.g. fossil fuels, high-intensity agriculture</p> <p>Mutual recognition of domestic taxonomies due to high overlap between taxonomies based on IPSF collaboration (extension of common ground taxonomy)</p> <p>Mutually agreed carbon pricing with fungible carbon credits</p> <p>China-EU Green Fund 1 and 2 are established to provide equity and concessional debt financing (also through guarantees) for domestic and emerging markets</p> <p>Direct access for EU green bond investors in China without bond connect</p>	<p>Agreed standards on greenhouse gas measurement including CO<sub>2</sub>, NH<sub>x</sub> etc. for major polluting sectors responsible for 80 per cent of greenhouse gases</p> <p>Agreed standards on disclosing greenhouse information in line with national greenhouse gas inventories</p> <p>Agreed standards on biodiversity metrics on both impact and dependency for financial institutions and major polluters (e.g. agriculture, energy, mining, water-intense industries)</p>	<p>Mutually recognised support and subsidy schemes for green financial products (e.g. financial support for green innovation funds)</p> <p>Total phase out of fossil fuel subsidies implemented to level playing field</p> <p>Mutually recognised carbon prices based on national conditions and carbon inventories allowing for easy trading of green goods</p> <p>Mutually recognised climate stress testing through central banks</p>

Source: Own compilation

### *3.1.3 Governance conditions and policy coordination*

The realisation of the ‘Green ministry of the future’ scenario relies on proactive engagement from Chinese and European stakeholders in finance, industry and policymaking. While much of the global green finance cooperation is driven by stakeholders from China and Europe, international actors from other Western and developing countries are fully involved. Collaborative efforts are facilitated through organisations such as the International Platform on Sustainable Finance (IPSF), Network for Greening the Financial System (NGFS) and the International Sustainability Standards Board (ISSB). This inclusive approach allows for strong participation from Chinese top-down green finance governance, in contrast to voluntary associations like the Task Force on Climate-related Financial Disclosures (TCFD) or the Task Force on Nature-related Financial Disclosures (TNFD), which require greater autonomy for market actors.

Additionally, the EU actively supports green finance research and collaboration in China by sponsoring Chinese partners from finance, academia, government and civil society. This sponsorship fosters a vibrant exchange of ideas and helps build trust between the EU and Chinese stakeholders. EU financial institutions and partners are encouraged to invest in Chinese green finance pilot zones and provide recommendations for specific policies. For instance, they may contribute to the evaluation of environmental risks, the development of measurement standards and the establishment of disclosure frameworks.

## **3.2 Scenario 2: Partnerships in multipolarity**

### *3.2.1 Rationale and description*

In this multipolar world, the nations of the EU have established robust high-level security policies under the guidance of the European Parliament. Simultaneously, the EU embraces openness and cooperation, and respects national sovereignty, particularly

in areas of future growth such as green finance. This allows EU member states, and consequently the EU as a whole, to accelerate innovation in green finance and the green economy, aiming to become global leaders in green technology and policies. EU member states enjoy the flexibility to choose their partners for cooperation in green finance. As a result, some EU countries opt to work closely with China on developing green finance standards, investments and instruments. Although this approach may not be universally embraced by all member states, practical cooperation has proven fruitful for those engaged in such collaboration. The EU has also introduced the Carbon Border Adjustment Mechanism (CBAM), where a portion of the proceeds is allocated to the specific EU country importing the goods. EU regulations allow for the utilisation of these funds to support green economy cooperation, including green finance. This enables individual EU countries to allocate additional resources to foster green finance cooperation with China.

China, on the other hand, promotes its concepts of openness and inclusiveness and engages in trade and cooperation with nations that do not strongly align with the US and do not undermine China's national and international objectives. Internationally, China seeks to present an alternative model of governance, development and cooperation, drawing from its successful experiences in lifting millions of people out of poverty.

As other countries also strive to assert their power in international negotiations, including developing country blocs, the English-speaking world, and smaller regional blocs, the overall demand for cooperation has significantly increased, albeit with limited progress on various fronts.

### *3.2.2 Practical consequences for China-EU green finance cooperation*

China collaborates with different EU countries to expand the application of green finance, establish common standards and promote cross-border investments. While the EU sets overarching limits on cooperation to reduce dependencies on non-EU economies, green finance cooperation between multiple EU member states and China has thrived. Each EU member country has forged partnerships with Chinese stakeholders in government, finance, business and research based on their specific needs and priorities. For instance, countries with strong financial sectors have cooperated with China to develop standards that elevate China's green finance regulations to a level acceptable by the EU, setting the groundwork for further cooperation between institutions such as the European Investment Bank (EIB) and the Asian Infrastructure Investment Bank (AIIB) in sustainable activities. Meanwhile, countries with underutilised manufacturing sectors have welcomed Chinese-led development bank lending, Chinese investments aligned with environmental, social and governance (ESG) principles, and green field investments in their domestic green industries.



Table 2. Impacts on green finance of Scenario 2 - Partnerships in multipolarity

Financial standards and products	Environmental disclosure	Incentive/restraint mechanisms
<p>While various green finance standards exist, (Chinese national classification, EU classification, as well as a joint classification), issuers choose the classifications that most suit their investment needs</p> <p>Chinese Certified Emission Reduction (CCER) credits can be used as voluntary carbon credits to offset EU CBAM cost for up to 10 per cent of the emissions</p> <p>Overseas investments between EU and China in green financial products are possible, within limitations based on volume, instrument and sector</p> <p>EU member countries set up specific task forces to cooperate with China on specific standards and products (e.g. EU countries with strong finance sector on green bond connects and standards; EU countries with strong manufacturing sector on green equity finance)</p>	<p>Shared understanding of the importance of environmental disclosure</p> <p>General cooperation on working to align international disclosure standards continues, but without agreement on measurement standards and reporting formats, as well as on third-party verification requirements</p>	<p>Strong support for domestic companies' green technologies through fiscal support and limited disclosure requirements leads to mild frictions that can be mostly solved through political agreements</p> <p>Threat of challenges through the World Trade Organization (WTO) on green subsidy schemes between China and the EU (similar to EU and US <i>Inflation Reduction Act</i> [IRA] in 2023), but general respect for WTO rulings</p> <p>General agreement to phase down fossil fuel subsidies, yet often subsumed to national energy independence goals that favour fossil fuels</p>

Source: Own edition

### 3.2.3 Governance conditions and policy coordination

The cooperation between EU member states and China primarily relies on bilateral national agreements, which then facilitate collaboration among various stakeholders, including finance, business and academia. However, due to differing opinions among EU member states regarding cooperation with China, this framework is regularly challenged, with some states raising

concerns about violations of the framework through national policies and practices.

China, on the other hand, follows high-level guiding principles of openness and inclusiveness, allowing for cooperation with countries that support their national and international agendas. China's pragmatic policy approach enables cooperation even with countries that may not explicitly endorse China's policies but hold significant importance, such as in terms of technological development or financial depth.

Cooperation in green finance primarily occurs at the national level, involving select universities that are authorised to share data and engage in regular academic exchanges. Additionally, specific market exchanges, such as Shanghai, Luxembourg, Hong Kong, Frankfurt, collaborate to facilitate standardised financial products and cross-border investments. These cooperative efforts often rely on voluntary standards and practical implementation without significant oversight, aiming for ease of adoption. Strong mutual benefits in finance and information access underpin such forms of cooperation.

While higher-level cooperation continues through initiatives such as NGFS, IPSF and G20, new multilateral forums for green finance cooperation have emerged within various frameworks, including China–Africa cooperation, China's South–South cooperation, China–Latin America cooperation, BRICS (Brazil, Russia, India, China and South Africa) cooperation, SCO (Shanghai Cooperation Organisation) cooperation and regional cooperation forums such as ASEAN (Association of Southeast Asian Nations). However, the proliferation of these forums can dilute their impact, requiring increased cooperation and leading to finger-pointing among forums when progress in green finance is lacking.

### 3.3 Scenario 3: Choosing your allies

#### 3.3.1 *Rationale and description*

In the current geopolitical landscape, military conflicts remain localised, but economic and political blocs are gaining prominence, with the G7 and most EU countries forming a bloc of self-declared democracies, while other countries align with the enlarged BRICS bloc.

The EU and G7 prioritise a liberal development model with a strong emphasis on green growth as a unifying force among their economies. With limited fossil fuel resources, the EU and G7 have made significant investments in renewable energy development and provide substantial support for the green transition of allied countries through technology and financial transfers. Additionally, the EU has implemented a Carbon Border Adjustment Mechanism (CBAM) that charges 60–80 per cent of the EU Emissions Trading System (ETS) price for imported emissions.

On the other hand, the SCO countries, many of which are still developing economies with abundant fossil fuel reserves, prioritise the ‘inalienable right to development’. While they aspire to green development and climate protection, the consensus is that historical emissions are primarily caused by the G7 countries, which should bear the responsibility. To ensure stable economic growth and social development, SCO countries support each other through the buying and selling of fossil fuels, benefiting both fossil fuel-exporting countries and energy-importing countries through low-cost energy. This trade is facilitated by a new currency based on the BRICS currency proposal made by Brazilian President Lula in 2023, with strict exchange rate controls akin to the negotiated monetary order of the Bretton Woods System.

Global cooperation, particularly in the development and trade of high-tech products, is limited, and trade barriers are increasingly prevalent. To avoid explicit or implicit sanctions from either bloc, most countries have chosen to collaborate with one side.

While both major blocs recognise the importance of green development as climate change risks become more evident, economic competition and trade barriers necessitate reliance on existing power sources to a large extent. Despite the political signaling favoring new energy development, entrenched interests and ‘economic realities’ prioritise local economic development, including mining, and require high levels of local content for manufacturing. Consequently, many SCO countries, despite green virtue signaling, support both energy sources to ensure energy security and mutual energy dependence.

### *3.3.2 Practical consequences for China-EU green finance cooperation*

Green finance cooperation between China and the EU has become more limited compared to the past. While forums like the G20 and organisations such as IPSF and NGFS still discuss the need to accelerate green finance for climate change mitigation and the well-being of our planet, progress on joint initiatives relies more on the dedication of motivated individuals rather than high-level political engagement. Nevertheless, green finance cooperation serves as an important opportunity to build bridges between non-aligned blocs, allowing for research and exchanges to take place. Limited progress can still be achieved on specific issues related to financial products, environmental disclosure and incentive/restraint mechanisms.

Furthermore, cooperation on green finance continues at the level of multilateral development banks, where the European Investment Bank (EIB) and European Bank for Reconstruction and Development (EBRD) represent European interests, while the Asian Infrastructure Investment Bank (AIIB) and New Development Bank (NDB) represent BRICS interests. These institutions provide avenues for collaboration on green finance initiatives.

Table 3. Impacts on green finance of Scenario 2 - Choosing your allies - tehát nagyköötőjellel

Financial standards and products	Environmental disclosure	Incentive/restraint mechanisms
Green finance standards apply locally and are specific to address 'local realities' and might involve specific fossil fuels	Environmental disclosure cooperation on a policy level is limited with all sides claiming strong green progress, while comparability of standards is lacking	Strong support for domestic green companies in EU and China as defined in the green finance standards (which might include fossil fuels)
Green financial investors are confined to local markets, due to differences in standards	Research projects can evaluate climate risks of select companies in the EU/China to compare standards, but access to data is strictly limited	Strong support for domestically developed products (high local content requirements); and high tariffs for import of overseas products
Regular investors can still invest in Chinese/EU green financial products with limitations on volume, sector and instruments (no equity investments in green technology companies) and only through specific bond/stock connects		Limited opportunities and high scrutiny for green equity investments, due to national security considerations
		Regular complaints at the WTO for violation of trade rules, while WTO rulings have little practical effect

Source: Own compilation

In practice, for those with continued interest in EU–China green finance cooperation, establishing trust, navigating political scrutiny and demonstrating diplomatic finesse in not favouring one side over the other (despite potential political risks) are crucial.

### 3.3.3 Governance conditions and policy coordination

Although mutual trust and policy integration may be lacking in this scenario, it is important to maintain discussion forums such as the NGFS, IPSF, BRICS and similar institutions to uphold cooperation potential. These forums allow for a basic mutual understanding of the work and ambitions in green finance and

the green economy. Additionally, specific and narrow issues of mutual interest in green finance can be selected for deeper but less high-profile cooperation, such as methane accounting or biodiversity measurement and reporting in specific biomes. However, cooperation on projects that require in-depth economic, technological or financial data, such as climate stress testing for major banks, may become less likely. It is advisable to support individuals who have established strong trust on both sides through long-standing cooperation experiences to lead specific projects. Furthermore, in the event of limited exchange and cooperation between the two blocs, independent and less aligned states could play a bridging role, fostering cooperation projects to enable EU–China bridge-building efforts.

## 4 Conclusion and recommendations

China and the EU have a significant stake in cooperating on green finance as they strive to decarbonise their economies and mobilise substantial financial resources to achieve their goals. While both economies have made progress in expanding their domestic green finance initiatives, harmonised approaches are needed to reduce transaction costs in cross-border financing and trade.

Cooperation between China and the EU has encompassed various aspects of green finance development, including the establishment of common ground taxonomies, climate stress testing through initiatives such as the Network for Greening the Financial System (NGFS) and the development of carbon markets. However, as global conflicts escalate and both China and Europe pursue increased independence, the future of green finance cooperation may face volatility. The scenarios presented in this article indicate that this volatility can lead to significant ruptures ('Choosing your allies'), but also present substantial opportunities ('Green ministry of the future') for green finance and broader economic cooperation between the EU and China.

To ensure continued cooperation on green finance, several recommendations can be derived from the analysis. While this list is not exhaustive (more comprehensive recommendations can be found in the grey literature [Anthony et al., 2021; von Rottenburg, 2021]), it serves as a baseline for cooperation priorities under all scenarios.

Firstly, China and the EU should leverage green finance as a shared interest to strengthen broader collaboration. Both economies recognise the risks posed by climate change and potentially biodiversity loss, as well as the need to shift financial flows from brown to green. While differences may exist in practice, shared learning on the application of instruments, stress testing, reporting and other areas can foster collaboration based on a shared understanding among investors and policymakers. This shared understanding is crucial for driving the green transition and promoting broader economic cooperation.

Secondly, the EU, with its more open channels of consultation, can engage with various Chinese partners and provide support to specific Chinese institutions that have strong access to decision-makers in China's central government. Financial and practical support, such as facilitating visa processes, should be provided for scientific and practical exchanges. These 'people-to-people' exchanges can ideally enhance the outcomes of green finance initiatives and maintain connections, even when higher-level political engagement may be challenging.

Thirdly, policymakers, researchers and financial professionals from the EU and China should initially focus on areas of cooperation with the most overlap and strongest shared interests. By prioritising these areas, trust and rapport can be built, and subsequently, less-interesting areas for one side (such as financing coal retirement or disclosure) can be addressed through more passive engagement, such as introducing best practices in workshops rather than through shared projects.

In summary, this article aims to illuminate past developments in Chinese and European Union green finance and cooperation, as well as to explore potential future pathways for strengthening cooperation ‘for a shared green future’ in times of uncertainty.

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# Financial Centres Driving Innovation - Delivering the SDGs

*Michael Mainelli – Simon Mills – Mike Wardle*

*We face enormous challenges as a world and as individual economies. These challenges are encapsulated in the UN Sustainable Development Goals (SDGs) and require constant innovation to address them. Financial centres have the capacity to drive innovation across the economy. By building a cluster of expertise, financial centres create an environment where skills and talent are attracted into the centre, and new products and industries can thrive. This provides opportunities for social engagement and for harnessing new technologies and products. Successful financial ecosystems create the potential for investment across the economy and enable a focus on sustainable and equitable development.*

**Journal of Economic Literature (JEL) codes:** O31, O44

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Michael Mainelli is the Chairman of the Z/Yen Group.

E-mail: [michael\\_mainelli@zyen.com](mailto:michael_mainelli@zyen.com)

Simon Mills is a Senior Associate at the Z/Yen Group.

E-mail: [simon\\_mills@zyen.com](mailto:simon_mills@zyen.com)

Mike Wardle is the Chief Executive Officer of the Z/Yen Group.

E-mail: [mike\\_wardle@zyen.com](mailto:mike_wardle@zyen.com)

# 1 Introduction

The first three decades of the 21<sup>st</sup> century have not given cause for optimism for those engaged in international development. Since the financial crisis of 2008, fundamental weakness in the international economy has seen the retrenchment of globalisation, the rise of authoritarianism and the erosion of democracy. 2022 in particular was turbulent for the European economy with Ukraine war-driven shocks, including surging energy prices and crises involving food supply, combined with faster-than-expected monetary tightening, subsidies and inflation emerging as major economic issues facing the continent. Globally, it has been a period of flux in the international order, with the hegemony of western democracies losing ground to a muscular China, flexing its economic might, and firmly taking its place as a world power.

At the same time, life for the world's poorest has worsened. According to The State of Food across the globe are at risk of falling into famine or a severe hunger crisis. Globally, almost one in ten people do not have enough food to eat. Greenhouse gas emissions have reached an all-time high (Earth's CO<sub>2</sub>, 2022), COP27 ended in failure (UCL, 2022), and wildfires and heatwaves hit Spain in April. Meanwhile, a report published in the journal *Biological Conservation* (Sánchez-Bayo & Wyckhuys, 2019), reported on the catastrophic collapse of global insect populations, and the UN Food and Agriculture Organisation estimates that 10 million hectares of forest are cut down each year (Our World in Data, 2023).

The world desperately needs development in technology, medicine, engineering, agriculture and industry to cope with a rising population and increasing social and environmental pressures. To deliver this development, innovation in financial services is critical.

## 2 The United Nations Sustainable Development Goals

In 2015, United Nations Member States adopted a set of 17 Sustainable Development Goals (SDGs), designed to provide a guide for a planetary course correction. The SDGs call for action by all countries – poor, rich and middle-income – to promote prosperity while protecting the environment. At the core of the goals is a recognition that the challenges facing mankind are interlinked. Ending poverty goes hand in hand with addressing education, health, equality and job opportunities; and economic growth cannot be delivered without tackling climate change and working to preserve the natural environment. Interest in the SDGs has built steadily in the eight years since their adoption. Whilst policy makers have yet to catch up, increasingly business leaders are looking to the SDGs as a model for corporate strategy. A recent report from the Global Reporting Initiative (GRI, 2022) reveals that four-in-five companies assessed now include a commitment in their sustainability reports to the SDGs (although fewer than half set measurable targets for how their actions contribute towards fulfilling the Goals).

## 3 Progress towards the SDGs

So how is the world doing? Well according to the UN's *Sustainable Development Goals Report 2022* (UN, 2022), progress is mixed to say the least:



More than 4 years of progress against poverty has been erased by COVID-19, rising inflation and the impacts of war in Ukraine further derail progress.



Conflict, Covid-19 and rising inequalities are converging to undermine food security, worldwide.



The stress placed on public health systems by Covid-19 disrupted essential healthcare in 92 per cent of countries and threatens decades of progress in healthcare.



Although many countries are improving school infrastructure, 25 per cent of primary schools worldwide still lack electricity and running water, and 50 per cent have no access to computers or the internet.



Women and men will not achieve equal representation in national political leadership for another 40 years.



733 million people live in countries with high and critical levels of water stress. Meeting drinking water, sanitation and hygiene targets by 2030 will require a fourfold increase in the pace of progress.



Total renewable energy consumption increased by one quarter between 2010 and 2019, but progress in energy efficiency needs to speed up to meet the global climate goals.



Global economic growth is recovering, although it is hampered by the Russian invasion of Ukraine and further waves of Covid-19 variants. Global unemployment levels are set to drop below pre-pandemic levels by the end of 2023.



Global manufacturing has rebounded from the pandemic, although developing nations have been left behind, and small- and medium-sized businesses lack financial support.



The pandemic caused the first rise in between-country income inequality in a generation. Meanwhile, the number of refugees outside their country of origin increased by 44 per cent between 2015 and 2021.



The number of countries with local disaster risk reduction strategies nearly doubled between 2015 and 2021. However, 99 per cent of the world's urban population breathe polluted air above World Health Organisation guidelines.



Most of the world's electronic waste is not being safely managed or recycled. 13.3 per cent of the world's food is lost after harvesting and before reaching retail markets. A further 17 per cent of total food is wasted at the consumer level.



Energy-related emissions increased 6 per cent in 2021. Climate finance falls short of the required USD 100 billion a year commitment. Rising global temperatures continue unabated, leading to more extreme weather and weather-related losses.



Over 17 million metric tons of plastic entered the ocean in 2021. Overfishing threatens the world's largest fisheries.



10 million hectares of forest are destroyed every year, with nearly 90 per cent of global deforestation caused by agricultural expansion. Around 40,000 species are documented to be at risk of extinction over the coming decades.





With the wars in Ukraine and Sudan, as well as other conflicts around the world, a record-setting 100 million people have been displaced worldwide. Corruption is found in every region with almost one in six businesses having received bribe requests from public officials.



The world is being brought together through internet access: 54 per cent of the world had access to the world wide web in 2019 and this increased to 63 per cent in 2021. However, rising debt burdens threaten developing countries' pandemic recovery and several recent UN conferences on environmental protection have ended inconclusively.

## 4 The role of financial services in delivering the SDGs

Financial services have a critical role to play in the delivery of the SDGs, as they direct the flow of finance into more, or less, sustainable activities and set the boundaries of national development paths. In February 2016, the United Nations Environment Programme published a report on the design of a sustainable financial system which:

serves the long term needs of a healthy real economy, an economy that provides decent, productive and rewarding livelihoods for all, and ensures that the natural environment on which we all depend remains intact and so able to support the needs of this and future generations (UNEP, 2016, p. 4).

The report identified four criteria that identify whether a financial system is contributing to sustainable development:

- the encouragement of long-term investment;
- reflection of pricing signals and risk;
- the encouragement of development and growth; and
- resilience to shocks.

Using these criteria as a yardstick, the following observations can be made:

1. Financial systems are failing to encourage long-term investment, despite a long period of low interest rates in most OECD countries, and there a significant gap in infrastructure finance (OECD, 2019).
2. Financial systems are failing to reflect pricing signals and risk effectively – financial systems do not routinely take account of environmental costs or environmental limits. Four out of nine “planetary boundaries” have been crossed: climate change, loss of biosphere integrity, land-system change and altered biogeochemical cycles (Stockholm Resilience Centre, 2019).
3. Financial systems are failing to encourage development and growth – there is a funding gap of approximately USD 3.5 trillion for SMEs in developing economies (IFC, 2010).
4. Financial systems have not increased their resilience to shocks (NEF, 2015).

A fifth criteria can be added to the four described by the UN, that of inclusivity. Inclusive finance is the range of banking products and financial services made available to poor populations (ADA, 2020). These people are usually locked out of the conventional banking system due to their low income. Inclusive finance helps the disadvantaged to save money, support their families, hedge against the risks of everyday life (UNSGSA, 2016) and most importantly find a route out of poverty.

## 5 Financial centres: Unlocking innovation

Financial centres influence their host city and state economies, both directly and indirectly. The direct effect is higher GDP growth, increased investment and tax revenues, as well as new jobs in the financial and related professional sectors. Indirect benefits from the financial centre's activities include financial market development, a higher quality of business environment, better institutions, macroeconomic stability and urban development. The nature of financial centres, generally located in country capitals, or significant secondary cities, means that they are a magnet for highly skilled and talented individuals. Employers compete for the brightest and best, with mathematical or science degrees particularly sought after (Higginbotham, 2022). Financial centres host a range of financial and professional services functions such as law, accountancy, audit, consulting, financial and corporate PR, often clustered in a specific geographical location.

The constituent underpinnings or foundations of a financial centre are:

- Human capital.
- Business environment, including a regulatory framework, the rule of law, competition policy, and trade and investment policy.
- Finance, including the breadth of services offered and the depth and liquidity of capital pools.
- Digital and physical infrastructure.
- Reputation.

The resulting cluster of highly numerate, educated, creative individuals, combined with deep pools of liquid capital, has attracted interest beyond financial services: in London, the Canary Wharf Group and Kadans Science Partner are developing Europe's largest commercial laboratory building which will be populated by a mix of startups, academics, clinicians and

established pharmaceutical companies. In New York, lab space developer Taconic Partners recently launched a new life sciences venture, investing with Nuveen Real Estate in Manhattan lab space (JLL, 2022). Other financial centres cities have attracted their own clusters for life sciences, engineering, AI, remote sensing and communications – it is no coincidence that Silicon Valley is located a stone's throw from the financial centre in San Francisco. This talent and creativity concentrated in the world's financial centres is a resource which, if unlocked and properly focussed, could solve any problem facing mankind – from climate change to delivery of the SDGs (see Box 1).

### Box 1

#### The London Accord

Following the City of London Corporation's 2002 submission to the Johannesburg Earth Summit, and subsequent work on sustainable finance, Professor Michael Mainelli convened an informal group of researchers, financial services organisations and investors to discuss how investment research expertise could help inform policymakers on issues such as climate change. The discussion crystalised around the idea of combining Socolow's wedges (Socolow & Pacala, 2004) with the Copenhagen Consensus method (an influential, but controversial project that sought to establish priorities for advancing global welfare using methodologies based on the theory of welfare economics, using cost-benefit analysis). The premise was that a roadmap could be produced for policy makers, showing where investment would have the biggest impact on reducing greenhouse gas emissions.

Financial services organisations across the City of London were invited to contribute research (pro bono) and the resulting 800-page report, published in 2007 and known as The London Accord (Mainelli et al., 2007), was composed of over 20 submissions from some of the City of London's leading

financial services organisations. The report examined in depth the role that the financial services sector could play in tackling climate change and influenced the *Stern Review* and investment policy around the world.

## 6 Adapting and responding

Following the shocks of the 2008 financial crisis, the global pandemic and the war in Ukraine, the global financial industry is in turbulent waters. Rapid changes in technology, the demand for sustainable finance and the challenges presented by the pandemic have exacerbated this. Sustainable Finance, Financial Inclusion, Digital Transformation, FinTech Artificial Intelligence and Big Data have become hot policy issues and are having a profound effect on the industry.

International financial centres in their role as the hubs of the global finance industry have responded to these challenges by moderating and shaping the dialogue between societies, companies and financial service providers on addressing and implementing large scale change. A culture of ‘co-opetition’ has emerged, where centres continue to compete for international business whilst working together to exchange best practice, remove barriers to trade and align regulatory regimes to enhance cross border flows of capital and talent. Networking organisations, such as the World Alliance of International Financial Centers (WAIFC)<sup>9</sup> and Financial Centres for Sustainability (FC4S),<sup>10</sup> are providing platforms to address common challenges and opportunities. This new approach means that financial centres are a driving force in the creation of change, bringing together

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<sup>9</sup> For more information on World Alliance of International Financial Centers, please visit <https://waifc.finance/>

<sup>10</sup> For more information on Financial Centres for Sustainability, please visit <https://www.fc4s.org/>

the private and public sectors to support innovation for socio-economic improvement. Nowhere is this more apparent than in the FinTech space.

## 7 Innovation for the common good

Financial technology (FinTech) is a generic term used to describe information and communication technology approaches that seek to enhance and automate the delivery and use of financial services. Originally focussed on streamlining “backroom” operations and commercial transactions, in the last few years FinTech has shifted its focus to more consumer-oriented services such as retail banking, insurance, fundraising and investment management.

FinTech has had a seismic effect on the retail banking sector:

- A recent survey by PwC revealed that almost 46 per cent of today’s consumers use digital channels exclusively for their personal banking (PwC, 2019).
- Between 2014 and 2019, worldwide mobile payment revenues more than doubled to reach over USD 1 trillion (Statista, 2019).
- Asia is currently leading the field in FinTech innovation and adoption – in 2019 an Ernst and Young survey revealed that in China and India 87 per cent of adult consumers active online regularly use FinTech services (EY Global Financial Services, 2019).
- In 2018, over USD 4 billion flowed into venture capital-backed FinTech in Asia (excluding the USD 14 billion raised for China-based Ant Financial Services Group) (Bloomberg, 2019).

FinTech can make a significant contribution to the Sustainable Development Goals as it has the capacity to:

- **Disintermediate transactions** – by providing a direct conduit between service providers and clients, FinTech can eliminate the

need for third parties in transactions, drastically cutting time and costs. This characteristic makes previously uneconomic areas of business, such as providing financial services to the poorest members of society, a valid proposition.

- **Enhance the efficiency of processes** – the automation of certain backroom functions, for example in insurance, can reduce friction and significantly reduce costs and processing time. As with disintermediation, this aspect enhances the capacity of the financial services sector to increase access to financial services.
- **Manage and analyse large quantities of data** – the advent of AI has enabled the development of new products and services specifically designed to enhance understanding of risk and assist in identifying fraud. This aspect enables investors to better understand the impact of their investment decisions on society and the environment, whilst strengthening institutions by reducing fraud and money laundering.
- **Enhance security** – the structure of ‘blockchain’ enabled smart ledgers makes unauthorised or fraudulent transactions much more difficult.
- **Provide transparency in processes and transactions** – smart ledgers, distributed ledger systems with in-built automated “smart contracts,” enable complete transparency in transactions and provide a permanent audit trail to unpick and rectify disputes if problems arise. This can enhance the flow of finance into sustainable infrastructure programmes, enable provenance to checked-in supply chains and establish new, equitable markets for subsistence farmers and small and medium-sized businesses.

When FinTech is harnessed in service of delivery of the SDGs it can have a substantial impact on improving outcomes (see Table 1).

Table 1. Impact of FinTech on the SDGs

Innovation	SDG	Scale	Scope
Digital Currencies	3, 5 & 16	Global	Following the launch of Bitcoin in 2009, a large number of other crypto currencies have been developed (CoinMarketCap reported that as of 15 March 2023 there were approximately 22,932 cryptocurrencies, with a total market capitalisation of USD 1.1 trillion.). Whilst crypto currencies themselves may have poor links to the SDGs, and in fact may be counter to them, their emergence has spurred discussion and experimentation with central bank digital currencies.
Land Registries	1, 2, 5, 10 & 16	National	Many developing nations do not have a functioning ledger of land ownership. This can contribute to issues of unclear ownership and tenure, which lock land into unproductive use. The development of secure registries helps facilitate market transactions and unlock access to finance for poor people. Increasingly countries are turning to 'blockchain' (independent, immutable shared data) solutions to help solve this issue.
Active Ownership	5, 10, 11 & 16	National	Facilitating proxy voting (the means for shareholders to participate in a company's annual shareholders meeting, by allowing them to propose or vote on resolutions without attending the meeting) is important to sustainable or green finance, as it allows shareholders to hold companies to account for their ESG (environmental, social and governance) performance.
Trading Infrastructure	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13 & 16	Global	A recent report estimated that, on its own, smart ledger technology could boost world trade in goods by at least USD 5 billion per annum, increasing world GDP by USD 10 to 20 billion and potentially adding between 450,000 and 900,000 to worldwide demand for labour, boosting wages and living standards worldwide.
Employee Share Ownership Programmes (ESOP)	1, 3, 4, 5, 10, 11 & 16	Local	Research shows that ESOP companies are more productive, faster-growing, more profitable and have lower turnover - benefits that accrue to all stakeholders including the retirement accounts of the employee-owners. In addition, an ESOP is a great way to enhance the company's ability to recruit and retain top talent.
Metaverse Modelling	1, 2, 3, 6, 7, 9, 10, 11 & 12	Global	Recent advances in Augmented Reality, Virtual Reality, and Artificial Intelligence enhance the ability of insurance companies to model risk and improve disaster management.



Innovation	SDG	Scale	Scope
Smart Ledgers and Microinsurance	1, 2, 3, 4, 7, 8 & 9	Global	Although the microinsurance market is growing (the global microinsurance market is expected to expand at a compound annual growth rate of around 7 per cent during 2019-2024, it is still small scale. It is likely to grow rapidly through the catalyst of smart ledger enabled peer-to-peer insurance (see Box 2).

Source: Own compilation based on Kriticos (2019), McWilliams et al. (2018), Mainelli & Mills (2022), IMARC (2019) data

## Box 2

### Microinsurance

The insurance sector experienced early disruption by FinTech, and the disappearance of high street insurance brokers can be directly attributed to the rise of call centres and later internet comparison sites. More recent examples of FinTech intrusion in the day-to-day lives of insurance customers are the proliferation of ‘black boxes’ placed inside motorists’ cars, the development of wearable technology such as FitBit, and internet-connected household appliances.

However, in developing economies two developments have the potential to extend insurance cover to the vulnerable – peer-to-peer insurance and peer-to-peer derivatives. Peer-to-peer insurance is similar to peer-to-peer lending. Peer-to-peer insurance offers the potential for lower-cost insurance through a “shareconomy” approach. Policy owners with the same insurance type form small groups. A part of their premiums is paid into a cashback pool. If no claims are submitted, the members of the group get some of their money back at the end of the year. In case of claims, the cashback decreases for everyone. Small claims are settled with the money in the pool. Bigger claims are settled via standard insurance and if there is insufficient money left in the pool to cover a claim, stop-loss insurance covers the rest. The benefit of this approach is that moral hazard decreases as individuals are less likely

to make fraudulent claims if they will be taking money from friends and neighbours. Examples of organisations using this approach include Friendsurance<sup>11</sup> and Lemonade.<sup>12</sup>

Derivatives are already used in the form of crop yield insurance in developed economies. Traditional agricultural insurance schemes are known to be plagued by problems of asymmetric information and systemic risk (Stoppa & Hess, 2003). Promotion of weather derivatives in developing economies is being undertaken by several international organisations working in partnership with national governments. The World Bank has undertaken pilot programmes in Nicaragua, Morocco, Tunisia, Ethiopia, India, Ukraine, Malawi, Peru and Mongolia (Bush, 2012). FinTech, in particular, the application of mobile platforms, remote sensing and modelling has the potential to allow groups of farmers or small businesses access to this product. Peer-to-peer insurance and the use of derivatives have the potential to extend insurance coverage to some of the world's poorest people, greatly enhancing resilience to disasters and vulnerability to hunger and famine. Financial centres have flocked to the FinTech space, establishing sandboxes (regulatory walled gardens that allow innovation within bounded risk environments supported by light touch regulation) and developing a spider web of FinTech Cooperation Agreements between different jurisdictions (for example, the Monetary Authority of Singapore (MAS) has, to date, signed 37 FinTech Co-operation Agreements with its international counterparts designed to foster closer cooperation on FinTech and to promote innovation in financial services) (MAS, 2023). Innovation is also taking place in the field of debt-based instruments, and this area has the potential to have a major impact on the delivery of the SDGs (See Table 2).

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<sup>11</sup> For more information on Friendsurance, please visit <http://www.friendsurance.com/>

<sup>12</sup> For more information on Lemonade, please visit <http://www.lemonade.com/>

Table 2. Debt based instruments and the SDGs

Innovation	SDG	Scale	Scope
Green Loans	3, 6, 7, 8, 9, 11, 12, 13, 14 & 15	Global	Green Loans are offered by banks at preferential interest rates linked to the achievement of specific environmental targets. The Loan Market Association (LMA) has issued a set of <i>Green Loan Principles</i> to guide both issuers and clients, and volumes have risen dramatically over the past few years, to over USD 99 billion in 2018.
Green Bonds	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 & 17	Global	Green bonds are negotiable assets with a fixed maturity and a return based on interest rates, exchange rates or ESG performance. Green bonds are issued by corporations or governments to raise finance for specific projects or infrastructure (use of proceeds). The first corporate green bond was issued by Vasakronan, a Swedish real estate company in 2013. The market boomed, reaching almost USD 0.5 trillion by the end of 2021. 2022 saw a contraction in bonds issuance, but the market has since recovered, and by the end of 2023 more than USD 1 trillion of green bonds are likely to have been issued.
Sovereign Sustainability-Linked Bonds	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 & 17	Global	Sustainability-linked bonds (SLBs) are a subset of green bonds however, they differ from green bonds, social bonds, or sustainability bonds in several crucial ways: The funds raised are not tied to a specific project, but a corporate or national objective - for example improving literacy rates or meeting carbon reduction targets. Liberating the proceeds from a specific project frees the issuer to deliver improvements using a wide range of means - this may include education and training and the recruitment of specialist staff as well as more traditional avenues such as the purchase of plant, machinery, intellectual property or land. Second, SLBs are issued with specific sustainability performance targets (SPTs), which contain key performance indicators (KPIs), for example: “A 10% reduction in 16-20-year-olds not in employment education or training by 2030” (Bouzidi & Mills, 2022, p. 4). Third, if the SPT is missed the bond is subject to a “step-up” clause, meaning the bond interest increases. To date only two countries have issued Sovereign Sustainability-Linked Bonds, namely Chile and Uruguay, totalling USD 3.5 billion in 2022, however an increasing number of developing nations are currently considering issuing them.

Source: Own compilation based on LMA (2018) data, Linklaters (2019) data, Vasakronan (2022) data, BNP Paribas (2023) data, Bouzidi & Mills (2022)

## 8 Challenges

Despite these innovations, the international financial community lacks a comprehensive strategy to raise the amount of transition finance required to deliver the SDGs or support the Paris Agreement on climate change. Climate change poses a particular risk to financial institutions, not just in terms of physical impacts, loss of value or disruption to supply chains. Investors are particularly exposed to carbon risk.

In 2006, the Long Finance<sup>13</sup> team questioned the sense of having fossil fuel assets on balance sheets at full value. Some straightforward calculations at that time, not taking account of fracking or shale gas, showed that burning the total fuel reserves then shown as assets on the balance sheets of listed companies, would result in CO<sub>2</sub> levels in the atmosphere around 1,200 parts per million (ppm). This is well above any 2 °C scenario, which at the time projected that CO<sub>2</sub> levels would need to be restricted to around 450 ppm.

In 2011, Carbon Tracker, a London-based financial services think tank, published *Unburnable Carbon* (Leaton, 2011). This ground-breaking piece of research calculated that all proven fossil fuel reserves owned by governments, and public and private companies were equivalent to 2,795 gigatonnes of CO<sub>2</sub>. The report noted that if the world was to meet the objective of keeping global warming below 2 °C, the total amount of CO<sub>2</sub> which could be released globally could not exceed 565 gigatonnes for the 40 years to 2050 – a fifth of this ‘carbon budget.’

The market valuation of fossil fuel company stocks is tied to their reserves. If 80 per cent of these reserves have to remain in the ground, the value of their stocks will require readjustment. With some of the world’s leading stock exchanges having a significant fraction of their market capitalisation connected to fossil fuels, this raised the spectre of an unsustainable carbon bubble and trillions

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<sup>13</sup> For more information on Long Finance, please visit <https://www.longfinance.net/>

of dollars-worth of fossil fuel assets becoming ‘stranded.’ This risk extends beyond fossil fuel companies. Any large energy user is likely to be affected as the world transitions from fossil fuel use. Transition risk refers to the exposure firms and investors face as jurisdictions accelerate the adoption and implementation of policies to cut CO<sub>2</sub> emissions. Carbon reduction policies will asymmetrically affect different national and supra-national regions, as well as different industry sectors and individual companies. Some, such as EV battery manufacturers, may flourish. Others, such as airline caterers, may face an increasingly hostile fiscal environment as margins are squeezed and carbon costs rise. Transition risk can be subdivided into:

- Policy risk: Policy actions regarding climate change mitigation and adaptation are fluid, and subsidies and tax breaks are subject to the whims of politicians and change frequently, often with little notice (see Policy Performance Bonds).
- Legal risk: This is a relatively new risk and involves litigation against organisations perceived to be failing in their duty of care to tackle climate change effectively. In 2021, 38 lawsuits were filed against private sector companies (LSE, 2022) (often in combination with government actors). All but one of these cases were filed in the United States, Australia and Europe.

The result is an increasingly complex operating environment with very high stakes – damage to financial centres can have catastrophic consequences not just for national economies, but for global economic stability. It is no longer enough for financial centres to harness their innovative potential individually. Collective action and leadership by financial authorities is required to overcome these existential threats. The twin challenges of urgency and complexity define the climate finance challenge. It has already required new concepts, new terms, new measures, as well as new mandates, standards and regulations. This work now needs to be extended across a range of frontiers within finance and across all sectors in the real economy.

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# Summary of the Roundtable Discussion on “Financial Infrastructure and Services in the Digital Era” at the 2023 Boao Forum for Asia Annual Conference

## *Boao Forum for Asia Academy*

*The Boao Forum for Asia Annual Conference 2023 held a roundtable discussion on “Financial Infrastructure and Services in the Digital Era” on 31 March. Zhou Xiaochuan, Vice Chairman of the Boao Forum for Asia and former Governor of the People’s Bank of China, György Matolcsy, Governor of Magyar Nemzeti Bank, and Doni P. Joewono, Deputy Governor of Bank Indonesia, delivered keynote speeches. Moderated by Huang Yiping, Deputy Dean of the National School of Development of Peking University, over 20 top officials from governments, central banks and international organisations, and CEOs in the financial industry shared their rich insights and experiences in digital financial infrastructure and services.*

**Journal of Economic Literature (JEL) codes:** E58, F30, F55, G15

**Keywords:** financial infrastructures, digitalisation, central bank cooperation, central bank digital currency, cross-border payment systems

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Boao Forum for Asia Academy is the intellectual arm of Boao Forum for Asia (BFA) and aims to identify the theme and sub-topics for the Boao Forum for Asia Annual Conference; to develop and provide economic forecasting on issues consistent with the goals and policies of BFA; to provide intellectual resources for BFA conferences, seminars, and workshops; to provide human resource development programmes for members and other partners of BFA; and to establish a virtual network and a clearinghouse for other research and training institutes in Asia and elsewhere. E-mail: wangqianzheng@bfoforum.org

The paper is a summary of the roundtable discussion titled “Financial Infrastructure and Services in the Digital Era,” held at the Boao Forum for Asia Annual Conference 2023.

# 1 Digital financial infrastructure with public-private partnership and robust development of payment system across South East Asia

Zhou Xiaochuan, Vice Chairman of the Boao Forum for Asia and former Governor of the People's Bank of China (PBoC), pointed out that financial infrastructure could be divided into three categories. The first category is of a competitive nature, which allows and encourages various entities to compete as long as they are licensed and benefits users through competition. The second is of a hundred per cent public type, owned by public entities and not suitable for competitive operation. In between, there is a third intermediate category – competitive and public, which can be undertaken through public-private partnership (PPP), especially in resource funding.

Zhou Xiaochuan stated that one way to run infrastructure is for all parties to join forces, to benefit all, not just for one group. An example is when one private company builds a road, it cannot just allow its own cars to get access, otherwise, a second company will build a new road and so will a third one. That said, this kind of financial infrastructure can be run based on a broad membership or led by an association, in which the central bank may play a certain role to keep the infrastructure running. Banknote issuing and cross-bank clearing systems are typical public financial infrastructures, while institutions such as stock exchanges and foreign exchange trading centres are obviously the third type. The latter can be organised in the form of PPP and can be membership-based or association-led. While in the United States, the credit reference system is operated mainly by three private companies, in most countries, credit reference systems are run as infrastructure led by central banks. For the sake of the public interest, the credit reference system should not take too

much account of the interests of private companies, nor should it exclude other participants.

Regarding the rapid development of cross-border payments within the Association of Southeast Asian Nations (ASEAN), Doni Joewono, Deputy Governor of Bank Indonesia from the 2023 ASEAN chairing country, pointed out that Bank Indonesia has been working with the Bank of Thailand, Bank Negara Malaysia and the Monetary Authority of Singapore to launch the cross-border payment system QRIS (Quick Response Code Indonesia Standard). In the future, Bank Indonesia will cooperate with the Bank for International Settlements (BIS) Innovation Hub to promote five ASEAN countries to sign the “Regional Payment Connectivity Agreement” (Project Nexus), aiming to provide a model for global cross-border payment cooperation. In addition, Bank Indonesia is actively working with market leaders, central and local governments, banks and payment industry associations to accelerate the establishment of the digital economy and related ecosystems.

Joewono also summarised the measures taken by Bank Indonesia (BI) in recent years to accelerate the digital transformation of the payment system. First, Bank Indonesia introduced the “2025 Indonesian Payment System Blueprint” (BSPI 2025), aiming to establish a healthy ecosystem and serve as a guide for the development of Indonesia’s digital economy and finance. Second, Bank Indonesia has been advancing the retail payment infrastructure through BI-FAST, providing real-time settlement and operating 24/7 to meet the increasing demand for retail transactions. Third, regarding the central bank digital currency (CBDC), Bank Indonesia has launched “Project Garuda” as a step toward maintaining the sovereignty of the rupiah in the digital ecosystem.

Deputy governors from the central banks of Thailand, Lao PDR and Cambodia shared the new developments in digital financial infrastructure in their respective economies. Mathee Supapongse,

Deputy Governor of the Bank of Thailand, introduced the Bank of Thailand's "3 Open" plan. First, "Open Competition" aims to foster competition through an expansion of business scope, entities and access to critical infrastructure. Second, "Open Infrastructure" aims to make key infrastructure accessible to more players at a fair and reasonable cost. Third, "Open Data" aims to promote appropriate data-sharing mechanisms to improve financial access and enable more innovation. He noted that to address inefficiencies such as high costs, low speeds and limited access to cross-border payments in the retail sector, the Bank of Thailand, in collaboration with ASEAN central banks under the "Payment Connectivity Agenda," has driven linkages between national payment systems through standardised and interoperable QR codes and fast peer-to-peer fund transfers. In the field of CBDC, the Bank of Thailand launched pilot programmes for wholesale and retail digital currency markets.

Vathana Dalaloy, Deputy Governor of the Central Bank of Lao PDR, noted that the country has seen deep development and application of Fintech, especially during the COVID-19 pandemic. But Laos' domestic payment system has many shortcomings, most notably in its financial infrastructure. In addition to inadequate internet coverage, efforts are also needed to enhance financial literacy among the public. From the aspect of cross-border payment systems and cooperation, Laos is in the process of connecting retail payments with neighbouring countries such as Thailand, Vietnam, Cambodia and China. Last year, Laos approved the Vientiane branch of the Industrial and Commercial Bank of China to become an RMB clearing bank, allowing RMB settlement. These bilateral and multilateral connectivity projects have facilitated cross-border payment and settlement through the coordination of hardware, software and rules, which can be mutually beneficial and complementary to other countries.

Serey Chea, Deputy Governor of the Central Bank of Cambodia, identified three problems facing Cambodia's financial system: the dollarisation of the economy, the fragmentation of the banking system and the low penetration of financial services. She described Bakong as a backbone payment system launched by Cambodia's central bank and noted that the system could facilitate and promote interoperability between different institutions. The system allows different players to interact with each other, making payments more efficient and reducing transaction costs. The Bakong system, probably the first successful payment system using blockchain technology backed by a central bank, now has almost 11 million users, a considerable number compared with Cambodia's population of roughly 16.5 million. Bakong makes financial services more inclusive, because instead of going to an ATM to withdraw cash, users can use mobile devices to scan simple QR codes to make secured, instantaneous transactions. It is important to note that using blockchain or another type of technology should not be the main consideration for innovations. All innovations should serve society and benefit the people. Identifying problems that need to be solved must be the primary consideration in relation to the selection of the technology used.

## 2 The position and nature of digital currency

The Hungarian central bank governor, György Matolcsy, summarised three financial cycles in modern history. The first cycle was ushered in by the signing of the Bretton Woods Agreement in 1944. The financial cycle embarked on a new stage in 1996, with the development and popularisation of the internet. The third cycle started in 2021 and may last for 25 years. In this new cycle, digital currencies will play an important role, calling for strong oversight from regulators. The CBDC will have a role to play. In a targeted way, the CBDC can support the SME sector and

the property market. The importance of recognising the cyclical nature of things, he stressed, is that there are lessons to be learned from different cycles. Lessons should be learned from the turmoil of the financial cycles from the 1940s to the 1970s that a new Cold War must be avoided.

György Matolcsy also noted that from the perspective of Hungary and Europe as a whole, the status of the RMB as an international currency was gradually rising, and the internationalisation of the RMB would be a long and gradual process. Before the end of the new financial cycle, the RMB will achieve its internationalisation transformation and become a real-world currency alongside the US dollar. Central banks will play an important role in accelerating the transition to the new cycle.

On the nature and definition of digital currency, Zhou Xiaochuan mentioned that it is no longer fashionable to argue that only currencies blockchain-based, decentralised and outside the jurisdiction of central banks are digital currencies. When defining digital currencies, practitioners should not take an overweening attitude, as the pace of technological evolution is very fast. Every three to five years, iteration in technology and applications could lead to a tremendous change in market architecture, which has been a new feature of the digital age. Even for institutions enjoying a dominant position and gaining the “winner-takes-all” status, their market share may change within several years. Those digital currencies claiming themselves extremely safe have also been exposed to the risk of being stolen.

Zhou Xiaochuan broadly divided the evolution of payment systems into three stages, i.e. the traditional stage – mainly featured in manual and physical means of payments, the electronic and the digital. In the traditional stage, posting was the main method of communication, and bookkeeping and clearing were done by hand. Then payment systems went electronic, followed by the digitalisation of accounts, transactions and

communications. Therefore, the whole evolution of the payment system was accompanied by the gradual digitalisation of payment tools. Money can be classified into M0, M1 and M2, and with the digitisation of account handling, the digitisation process of M1 and M2 has also began.

There are arguments that money in commercial bank accounts is commercial banks' money, not that of the central bank. Zhou Xiaochuan disapproved of that view. With a clearing system established by the central bank, capital adequacy ratios strictly supervised by regulatory authorities and prudent operation of large commercial banks, money in the accounts of large commercial banks, M1 money, can be 99.9 per cent equivalent to central bank money. Of course, some small and medium-sized commercial banks may be less competent. In this vein, CBDC ought not to be understood as a monetary tool that excludes commercial bank money in a narrow sense, but be viewed under the context of digitalisation progress.

Zhou Xiaochuan pointed out that retail applications were the major domain of digital currency, including the digitalisation of booking, transaction processing and communication. Although many traditional banks are going digital, the gap in the application of digital payments in retail is still large. While paper money is still in high demand in some places, credit card businesses have already been digitalised, such as transaction process, communications, encryption, settlement and clearing. That said, when the digitisation of money is under discussion, people need to look back on money evolution and at the same time look ahead at how multiple technologies compete with each other, resulting in the landscape totally changing every three to five years. Overall, the digital currency will embrace many future outcomes and applications. There is no need to exclude others at a very early stage.

### 3 Regulation as an important financial infrastructure to meet a sea change in financial service provision

Xuan Changneng, Deputy Governor of the PBoC, also noted that, although digital technology has changed the forms, scenarios and methods of financial services delivery, the nature of finance has not changed. He stressed that effective financial regulation is an important financial infrastructure and needs to be improved and adapted to suit the digital economy. He also pointed out that when supporting the positive application of digital finance, it is necessary to place all sorts of financial activities under regulation according to the principle of “same activities, same regulation and supervision”. Moreover, rather than simply accepting digital finance at its face value through the hypes and fancy characterisations by the industry, the substance of these activities needs to be examined and all kinds of new models and products need to be verified. In short, regulatory concepts, technologies and capabilities must be kept up-to-date, to ensure that financial innovation does not come at the cost of financial stability.

Lu Lei, Deputy Administrator of the State Administration of Foreign Exchange of China, noted that Generative AI was changing production, manufacturing, trade and other related links from the bottom up, and thus may affect financial service delivery, price discovery and risk management. The digital age has cut the cost of information transfer to zero and brought sea changes to cross-border financial services. Decentralisation, i.e. a blockchain-dominated processing framework, has advantages in factoring in accounts receivables and cross-border trade financing. With the development of digital technology, cross-border arbitrage financial investment via mobile Internet has also risen in recent years. These kinds of highly risky cross-border financial services, together with lacking consumer protection in some areas, as well as difficulties in the implementation of overall



requirements for guarding against financial risks, are all worth close attention. In particular, he cautioned against some foreign exchange digital trading platforms which provide extremely high leverage margins for foreign exchange trading to Chinese residents, with the margin ratio reaching one to hundreds or even thousands. He emphasised that even in the digital age, all financial services must be regulated by law.

Joewono also mentioned that Bank Indonesia has been pursuing regulatory reform by reinforcing the supervisory function within Indonesia's payment system regulatory framework and simplifying the licensing process.

## 4 International organisations' thinking and efforts in digital financial infrastructure

Bo Li, Deputy Managing Director of the International Monetary Fund (IMF), shared three observations on cross-border payments. First, cross-border payments are expensive, slow, opaque, exclusive and fragmented, and thus there is a lot of dissatisfaction with them. Second, to address these challenges and improve cross-border payments, governments and the private sector need to work together. Third, IMF staff are proposing to establish a multicurrency wholesale digital platform to facilitate cross-border payments globally. Such a platform has several characteristics, such as wholesale, multicurrency, multifunction, tokenisation and a common ledger. Such a platform could also help improve the efficiency and security of the global foreign exchange markets.

Zhang Tao, BIS Chief Representative for Asia and the Pacific, noted that over the past few years, the BIS has worked closely with central bank partners and other partners to explore the best possible ways to improve financial services and develop financial infrastructures in the digital era. A BIS analysis based on World

Bank data showed that bank accounts did not solve all problems and that access to financial services varied widely among groups. Thus, in the last few years, people have turned to big tech companies to find solutions, but these big tech companies have their own problems. One is the adverse competitive effect, which happens when a single or a few big tech companies control a large chunk of consumer data. Providing digital public infrastructure (DPI) is a policy that can be considered for improving financial services and financial inclusion in particular. Basically, the DPI provides one form of solution to the problems of big tech by ensuring the platforms' essential services, including those collecting data related to commercial activities, are accessible to many firms.

Ahmed Saeed, Vice President of the Asian Development Bank (ADB), noted that over one billion adults in Asia still lack access to formal financial services. Booming payment solutions, such as Alipay and WeChat in China and other solutions elsewhere, demonstrate the great potential to accelerate financial inclusion at scale across regions. CBDCs also provide an opportunity to move more towards a cashless society, with benefits for those who have been most excluded from financial systems. The ADB has been working to establish a real-time settlement system and a central depositary receipt system between the "10+3" monetary authorities. Against this background, in 2021, the Bank of Japan and the Hong Kong Monetary Authority announced the first cross-border delivery-versus-payment (DvP) link for cross-currency securities transactions under this initiative, which would allow banks to obtain funds in Hong Kong dollars immediately by using Japanese government bonds as collateral via repos. Finally, the ADB is working with ASEAN countries to create an ecosystem for a sustainable local currency bond market that incorporates ESG (environment, social, governance) considerations.

Leslie Maasdorp, Vice President of the New Development Bank (NDB), believed that the digital economy was a major driver of

innovation and growth. The NDB sees the telecommunications sector as a fundamental determinant of financial inclusion. Developing countries, emerging markets and low-income countries stand to benefit most from the advances in the digital economy. Erik Berglof, Chief Economist of the Asian Infrastructure Investment Bank, pointed out that the financial revolution can help the world cope with the challenges brought by climate change. Climate Fintech presents significant opportunities to understand changes in people's behaviour. By far, the most transformational pressure on global value chains comes from decarbonisation. Smart climate technology can help create opportunities for green power, green multimodal transportation systems and so on.

## 5 International exchanges, commercial banks and payment institutions coping with opportunities and risks brought by digitalisation

Nicolas Aguzin, CEO of Hong Kong Exchanges and Clearing Ltd, identified three disruptive forces to traditional exchanges. The first is the financial impact of digital assets, tokenisation and decentralised finance. The second is blockchain, which is important for clearing, settlement, custody, digital accounts and so on. The third is cloud computing. These new tools can quickly process multiple assets for instant settlement. Especially when combined with features such as smart contracts, it can optimise the user experience at a very low cost. He mentioned that the system should be regulated effectively, or it can present significant risks for the system and for the participants. The importance of regulation is constant. When practitioners integrate everything from trading, clearing, settlement, custody and post-trade, a clear regulation system is even more important. Now exchanges such as NASDAQ (National Association of Securities Dealers

Automated Quotations) are cooperating with cloud computing service providers such as Amazon and Microsoft, bringing about systemic change.

Renat Bekturov, Governor of Astana International Financial Centre, stated that, in the process of catching up with the largest financial centres, technology is vital, as is infrastructure. Astana International Exchange was actually one of the first regulated exchanges to launch a trading system in the cloud with Amazon Web Services, allowing for remote trading and remote access. At the same time, Astana International Exchange recognises the risks of digitisation and is very concerned about the related issues of cyber security and personal data protection.

From the perspective of one of the major state-owned commercial banks of China, Gu Shu, Chairman of the Agricultural Bank of China (ABC), noted that 40 per cent of ABC's loans and 45 per cent of its deposits came from rural areas, where more than 400 million permanent residents live. He highlighted three aspects worth attention to when applying digital technology in rural areas: helping farmers to obtain good access to financial services, broadening the application scenes and promoting products. The ABC has set up a platform to pool up and help mobilise all available capital, assets and resources in rural areas in China, already signed up by more than 1,600 counties.

Ip Sio Kai, Deputy General Manager of the Bank of China Macau Branch and Chairman of the Macau Association of Banks, ranked cyber security as the number one challenge in the digital era to financial services, followed by new model risks, iterative risks and parametric risks. Additionally, clients themselves are also challenged by how to understand and use data financial products. Finally, regulatory cooperation challenges arise when digital financial products continue to expand beyond the borders of a country.

Hannah Qiu, Global Senior Vice President and China CEO of PayPal, shared concerns over cross-border regulation in the age of data. PayPal serves more than 200 markets around the world and is subject to the regulatory guidance of different countries. These countries have paid more and more attention to the regulation of the digital economy, especially in financial services, with rules varying. Bridging the differences among countries and increasing the flows of data are very important for promoting effective circulation of the real economy.

Xu Nuojin and Zhao Zhihong, executives at two Chinese regional banks, Zhongyuan Bank and Bohai Bank, pointed out that in the digital era, the landscape and ecology of finance are changing. Big banks have technical and talent advantages, while small and medium-sized banks find it difficult to get involved in new businesses. Therefore, the central bank needs to rethink the regulatory policy, ensuring a level playing field for small and medium-sized banks. A new generation of ecologically-oriented, open financial digital systems and agile governance of financial infrastructure is important for small and medium-sized banks.

*Roundtable Speakers (in the order of speaking):*

Moderator, Huang Yiping, Deputy Dean of the National School of Development of Peking University

Zhou Xiaochuan, Vice Chairman of the Boao Forum for Asia, former Governor of the People's Bank of China

György Matolcsy, Governor of Magyar Nemzeti Bank

Doni Joewono, Deputy Governor of Bank Indonesia

Liao Min, Deputy Head of Office of the Central Committee for Finance and Economy and Vice Minister of Ministry of Finance of the PRC

Xuan Changneng, Deputy Governor of the People's Bank of China

Mathee Supamongse, Deputy Governor of the Bank of Thailand

Vathana Dalaloy, Deputy Governor of the Central Bank of Lao PDR

Chea Serey, Deputy Governor of the National Bank of Cambodia

Lu Lei, Deputy Administrator of the State Administration of Foreign Exchange of the PRC

Bo Li, Deputy Managing Director of the International Monetary Fund

Zhang Tao, Bank for International Settlements Chief Representative for Asia and the Pacific

Ahmed Saeed, Vice President of the Asian Development Bank

Leslie Maasdorp, Vice President of the New Development Bank

Erik Berglof, Chief Economist of the Asian Infrastructure Investment Bank

Gu Shu, Chairman of the Agricultural Bank of China

Nicolas Aguzin, CEO of the Hong Kong Exchanges and Clearing Ltd.

Renat Bekturov, Governor of the Astana International Financial Centre

Hannah Qiu, Global SVP and China CEO of PayPal

Xu Yiding, Vice President of the Agricultural Development Bank of China

Ip Sio Kai, Member of the 14<sup>th</sup> CPPCC National Committee, Deputy General Manager of the Bank of China Macau Branch and Chairman of Macau Association of Bank

Xu Nuojin, Chairman of Zhongyuan Bank

Zhao Zhihong, Vice Governor of China Bohai Bank, gave comments on market practices

## Chapter 3

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Technology and complexity  
- Sustainable solutions  
on the global technological  
stage





# Technological Sovereignty and World Order

Glenn Diesen

*The foundation of the modern world order was established with the Peace of Westphalia in 1648 as a fragmented Europe formerly based on hegemony and Catholic universalism was replaced with a balance of power between sovereign states. Following the destructive Thirty years' War, it became evident that there was no possible outcome in which a hegemon would establish itself in Europe. Peace in Europe would instead depend on establishing order in the international anarchy. This order envisioned a balance of power between sovereign equals, and with this decision at the Peace of Westphalia modern diplomacy was born.*

*The unipolar era that emerged after the collapse of the Soviet Union placed the world order at a crossroads – the US could facilitate a more cooperative and benign balance of power between sovereign states, or establish itself as a new Pax Romana in which hegemonical power would ensure peace, order and prosperity. The contemporary US definition of world order is inherently revisionist as a hegemonic system cancels the balance of power and sovereign inequality as liberal democratic values are cited arbitrarily to interfere in the domestic affairs of other states and even the use of military force. The unipolar system was unavoidably temporary as it depended on preventing the rise of rivals, which exhausts US resources and incentivises rising power to collectively balance the US.*

*Global primacy relied on perpetuating military and economic primacy, which relies on technological dominance. States that aspire to reduce dependence on a hegemon have therefore historically pursued technological sovereignty, which is achieved by a combination*

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Glenn Diesen is a Professor at the University of South-East Norway (USN):  
Department of Business, History and Social Sciences.  
E-mail: [Glenn.Diesen@usn.no](mailto:Glenn.Diesen@usn.no)

*of technological self-reliance and diversification of technological partnerships. The object of technological sovereignty is not to “defeat” the US and replace one hegemon with another, rather the goal is to restore a “balance of dependence” in the international system in which no major power can aspire for hegemony.*

*Eurasian integration has become the leading format for pursuing technological sovereignty and thus restoring the world order of sovereign states. The new industrial revolution, defined largely by digitalisation and automation of the cognitive, is a driving force for cooperation across Eurasia as these new technologies are transforming the international economy. A hegemon in decline will with greater frequency use sanctions and limit access to vital technologies to prevent the rise of rivals, which further incentivises the diversification of economic partners.*

*A balance of dependence within a multipolar Eurasia enhances a stable world order based on a balance of power and sovereign equality as it disincentivises efforts of advancing hegemony and sovereign inequality. Excessive asymmetrical economic interdependence translates into political influence that can be abused, which motivates states to enhance technological sovereignty by increasing their domestic technological ecosystem and diversifying their partnership. Thus, hegemonic aspiration is balanced, and a new equilibrium asserts itself. While the US still attempts to salvage the unipolar moment, the other major powers of the world are pursuing multipolarity. Europe is confronted with a dilemma as it can either subordinate itself as the junior partner of the US for a system based on collective hegemony but then see its technological sovereignty and sovereignty diminish. Alternatively, Europe can establish itself as an independent pole of power based on technological sovereignty by embracing diversification of technological partnerships within Eurasia.*

**Journal of Economic Literature (JEL) codes:** A12, B19, B29, F50, N40, P00

**Keywords:** Eurasia, technological sovereignty, world order, integration, interdependence

# 1 Westphalia and world order

The modern world order was established with the Peace of Westphalia in 1648, which resulted in a hegemonic system being replaced by a balance of power between sovereign states. Europe had previously been dominated by the Holy Roman Empire, and the centralisation of political power was largely legitimised by universal values of the Catholic Church. Yet, the fragmentation of power and Reformation challenged both the power and legitimacy of hegemony. During the Thirty years War from 1618–1648, even Catholic France supported Protestant Sweden to balance the excessive power of the Catholic Hapsburg Empire. Without the prospect of a decisive victory that would restore a new hegemony, the war ended with the Peace of Westphalia, which laid the foundation for a new European/world order.

The Peace of Westphalia marked a shift toward a decentralised system of power where states were the highest sovereign. International anarchy is defined by the absence of a higher sovereign that can govern international affairs. The peace would be ensured by a balance of power among the sovereign equals as any expansionist policies or hegemonic aspirations would be collectively balanced by the other powers. One of the key underlying principles of the peace of Westphalia was to avoid zero-sum politics by promoting indivisible security, which is based on the recognition that increasing one's own security requires ensuring the security of the adversaries.

Without a balance of power and preservation of indivisible security, one state or a group of states will ascend above others and subsequently encroach on the interests and sovereignty of other states. States do not constrain themselves, and a balance of power is thus required to constrain all states in the international system as a condition for preserving stability and peace. Wars or the collapse of states can severely skew the balance of power

in which states can aspire for hegemony, yet states seeking to preserve their sovereignty will seek to restore equilibrium.

Yet, the Westphalian principle of sovereign equality was limited to the Europeans as they had the technological superiority to defend or violate political sovereignty. For four centuries, international relations entailed the subordination of other societies to the West due to technological superiority in military and economic affairs. Samuel Huntington argued that the Western narrative suggests its predominance was due to its ideals, while the rest of the world identifies military superiority as the source:

The immediate source of Western expansion, however, was technological: the invention of the means of ocean navigation for reaching distant peoples and the development of the military capabilities for conquering those peoples. . . . The West won the world not by the superiority of its ideas or values or religion . . . but rather by its superiority in applying organized violence. Westerners often forget this fact; non-Westerners never do (Huntington, 1996, p. 51).

## 2 Technology and the balance of dependence

Following the industrial revolution, technologies obtained a greater role in economic power. Nation-building required industrialisation as the preservation of political sovereignty relied on technological sovereignty. Technological sovereignty refers to a country's ability to exercise control over its own technological infrastructure and to develop and use technology in ways that serve its own interests. Technological sovereignty is based on the idea that technological dependence on foreign entities can limit a country's ability to make decisions and shape its own future, as well as expose it to potential security risks and vulnerabilities.

As countries become more dependent on technology for their development and security, they may become vulnerable to the influence of foreign actors who control the technology. Von Schmoller (1896, p. 76) recognised that excessive dependence could be weaponised, and there was a need for “shaking off commercial dependence on foreigners which was continually becoming more oppressive.” Friedrich List cautioned that liberal economics had to be tempered by the realities of an international system organised by a balance of power between sovereign equals. “As long as the division of the human race into independent nations exists, political economy will as often be at variance with cosmopolitan principles” (List, 1827, p. 30).

Economic interdependence under international anarchy inevitably becomes an instrument for power politics, as opposed to the liberal assumption that economic interdependence is a tool for transcending power politics. A key dilemma in political economy is that states must accept a certain degree of economic dependence to enhance market efficiency and thus prosperity, yet economic dependence creates vulnerabilities and reduces political autonomy (Gilpin, 2011). This dilemma can be resolved by skewing the symmetry in an interdependent relationship. In any interdependent relationship, one side is always more dependent than the other. Case in point, the US and Canada are interdependent, yet the asymmetrical interdependence results in the US gaining influence while preserving its full autonomy.

The geopolitical concept of a balance of power thus manifests itself as the geoeconomic concept of a “balance of dependence” (Diesen, 2017). A balance of dependence refers to the systemic incentives for skewing the symmetry of dependence to enhance both autonomy and influence. Under asymmetrical interdependence, the stronger and less dependent side in a dyad is able to convert asymmetrical economic interdependence into political influence (Hirschman, 1945). The weaker more dependent side consequently has great incentives to reduce dependence on the more powerful

state. The weaker states have a greater willingness to accept economic pain to enhance political autonomy, while the stronger state will be preoccupied with a multitude of relationships and therefore have less ability to prevent the weaker states from decoupling (Hirschman, 1978). Excessive reliance on an asymmetrical interdependent partnership can be mitigated with increased strategic autonomy, diversifying economic partnerships and establishing geoeconomic regions for collective bargaining power.

Economic cooperation is stable and sustainable when there is an equilibrium since it prevents economic power from being utilised to extract undue political concessions and envisions economic statecraft as a key lever of power to restore global equilibrium. The geoeconomic equivalent expects that peace is possible under a balance of dependence. In the first half of the 19<sup>th</sup> century, Friedrich List (1841) posited:

the ultimate aim of rational politics is . . . the uniting of all nations under a common law of right, an object which is only to be attained through the greatest possible equalisation of the most important nations of the earth in civilisation, prosperity, industry and power, by the conversion of the antipathies and conflicts that now exist between them into sympathy and harmony (p. 96).

Technological sovereignty is imperative in the competition for a balance of dependence. High-tech industries are strategic industries as they are defined by scarcity and their importance to socio-economic development. States must accept a certain degree of dependence on foreign strategic industries to have efficient economies, and there is a very limited ability to diversify. Geoeconomic dominance is enhanced by “develop[ing] exports in articles enjoying a monopolistic position in other countries and direct trade to such countries” (Hirschman, 1945, p. 34).

### 3 Technological sovereignty versus British hegemony

The British used its technological leadership following the first industrial revolution to dominate the international system. The British repealed the Corn Laws and promoted free trade largely to cement its technological dominance. Free trade would prevent the industrialisation of other countries as their infant industries (low quality, high costs) would be unable to compete with British mature industries (high quality, low costs). David Ricardo's theory of comparative advantage envisioned a liberal international economic system that would maximise market efficiency and cement British technological superiority: "It is this principle [comparative advantage] 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, p. 139).

It was argued in the British parliament that under free trade "foreign nations would become valuable Colonies to us, without imposing on us the responsibility of governing them" (Semmel, 1970, p. 8). Joshua Gee opined, "First, that manufactures, in American colonies, should be discouraged, or prohibited" (Mallory, 1844, p. 21). Friedrich List warned against becoming technological colonies of the British by failing to industrialise. "The mother nation supplies the colonies with manufactured goods and obtains in return their surplus produce of agricultural products and raw materials" (List, 1841, p. 269).

In *The Report on the Subject of Manufactures*, Alexander Hamilton argued that the US had to develop technological sovereignty in the form of manufacturing capabilities as an intrinsic part of nation-building. These ideas laid the foundation for the American System in which reducing technological dependence on Britain was required to preserve political independence (Mott, 1997).

The US subsequently developed its domestic technological base with temporary subsidies and tariffs until its infant industries (low quality, high costs) had reached the required maturity (high quality, low cost) to compete against British industries in international markets. The subsequent technological sovereignty and industrial rise of the US obstructed British attempts to transform the American Mid-West and Central America into informal dependencies (Gallagher & Robinson, 1953).

France, Germany and other states followed the American lead, which enabled them to prevent British hegemony and preserve the balance of power system. China's failure to modernise led to its defeat in the Opium Wars and the subsequent Century of Humiliation. Learning from the destruction of China, Japan embraced the American System in the 1870s as it recognised technological sovereignty and productive power to be imperative to preserve its sovereignty (Hudson, 2010). Russia similarly suffered a humiliating defeat in the Crimean War in 1856 largely due to its technological backwardness, which thereafter motivated the great reforms and rapid industrialisation in the second half of the 19<sup>th</sup> century. The greatest push towards technological sovereignty in Russia occurred under Sergey Witte towards the end of the 19<sup>th</sup> century, who sought to reduce the excessive technological dependence on the West as it resembled "the relations of colonial countries with their metropolises" (Witte, 1954, p. 66).

## 4 The rise and fall of Pax Americana

The American System aspiring for technological sovereignty was so successful that the US eventually developed technological superiority as a foundation for global hegemony. Furthermore, wars tend to disrupt both the balance of power and the balance of dependence. The Second World War contributed to the technological rise of the US and the destruction of other



technological centres in the world, which enabled a US hegemon to assert itself in the capitalist world. The Cold War offered a brief break from geoeconomics and thus the illusion of liberal economics as the main rivals of the capitalist states were communists seeking complete self-sufficiency, while the capitalist allies limited their balancing of the US due to the security dependence.

The US rise to technological dominance was the result of a “hidden developmental state” as the US government provided direct and indirect subsidies to fund cutting-edge technology and also ensured these technologies could be used for commercial dominance (Block, 2008). The US sold technological innovations and patents from publicly-funded institutions to private enterprises at low cost (May & Sell, 2005). Many military technologies were contracted to Silicon Valley, which also had commercial applications (Benner, 2002).

In the late 1980s and early 1990s, the US pursued neoliberal economics in what could be conceptualised as a repeal of the Corn Laws 2.0. The US sought to further extend and enforce intellectual property rights for digital industries to cement its technological dominance globally, while in return opening its manufacturing industry to low-wage competitors. Extending and enforcing patent protection has the purpose of slowing down the diffusion of technologies and thus enhancing the first-mover advantage of innovators. The US was also successful in taking down technological rivals, such as the Japanese semiconductor industry in the late 1980s. Washington could also convert the world’s technological dependence into political power through sanctions and extraterritorial jurisdiction.

After the Cold War, Washington challenged the Westphalian world order based on a balance of power among sovereign equals and sought to replace it with a global hegemony. Washington’s revisionism likely had the benign intentions of establishing a Pax Americana, referencing the 200-year long period in Roman history which became a golden age due to the lack of rivalry. Yet, restoring

pre-Westphalian unipolarity was destined to be a temporary phenomenon as it required the US to suppress the rise of potential rivals and preserve bloc discipline among allies, which would then inadvertently incentivise collective balancing by these rising powers. Thus, President John F. Kennedy cautioned against Pax Americana in 1963. “What kind of peace do I mean? What kind of peace do we seek? Not a Pax Americana enforced on the world by American weapons of war. Not the peace of the grave or the security of the slave.”

An underexplored phenomenon in international relations is the absence of a shared narrative concerning the inclusion of China and Russia in the US-led world order. Every American administration since the 1970s has claimed to have reached out to China, and then since the 1990s, reached out to Russia. Yet, both China and Russia consider the US containment policies to have endured (Diesen, 2021). As the main challengers to US hegemonic ambitions, both China and Russia are working toward territorialising the digital realm and give preference to domestic tech giants to develop autonomous digital ecosystems.

China initially pursued an industrial strategy committed to “catching up” by encouraging the diffusion of technologies and climbing global value chains. Yet, China has reached technological parity with the US, which undermines the foundation for the unipolar world order. While China’s late entry into the First Industrial Revolution contributed to its humiliating defeat in the Opium Wars, Chinese current technological leadership can make it the leading power in the international system.

China’s technological rise comes at a critical time, as the world has entered the Fourth Industrial Revolution. The Fourth Industrial Revolution is commonly defined by digital technologies integrating with the physical world, which disrupts every industry. China largely emulated the American System with its Made in China 2025 initiative, an ambitious industrial policy that aims to establish technological leadership in critical

digital technologies. China's national strategy recognises artificial intelligence (AI) as a key domain of great power rivalry. Technological sovereignty is thus imperative for political sovereignty as digital technologies are revolutionising production, transportation, agriculture, medicine, finance, energy and all other industries.

Economies of scope refer to a situation in which it is less costly for a corporation to combine two or more product lines than to produce them separately (Panzar & Willig, 1981). Economies of scope “are based upon the common and recurrent use of proprietary know-how or the common and recurrent use of a specialized and indivisible physical asset” (Teece, 1980, p. 223). The “railroad economics” of the 19<sup>th</sup> century demonstrated that monopolies emerge when there are high fixed costs to developing and managing railway infrastructure, but that the variable cost of increasing the freight on the railway are minimal (Perelman, 2006).

Free market principles similarly seem not to apply in modern and high-tech industries because digital platforms have high fixed costs and low variable costs. These same forces are in play with digital technologies due to the synergy effects between what are seemingly unrelated industries. Some tech giants in the US, China and Russia are subsequently following similar paths of absorbing the entire supply chain. For example, in the food delivery industry, digital giants are getting involved in developing food with smart agriculture, automating restaurants for food preparation, operating self-driving cars to support their food delivery industry, developing the batteries to operate the self-driving cars, and finally providing online transaction systems and even digital currencies for the payment. The comparative advantage is therefore the ability to do “everything” due to the synergy effects from the economies of scope.

With the end of US technological dominance, there will predictably be an end to neoliberal economics. Irrespective of who will reside in the White House, it is unavoidable that its political

class will work towards ensuring that what benefits Silicon Valley must also benefit the US. A hegemon will have incentives to preserve a liberal economic system that cements the dominant position of its advanced technologies and mature industries. In contrast, a declining hegemon will increasingly use coercive economic statecraft to weaken adversaries and ensure compliance by allies. 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 authority and preservation of sovereignty is elevated above market forces (Ruggie, 1982, p. 381).

The subsequent US economic war against China primarily focusses on constraining its technological development and pushing back its industrial power. The US imposed export controls to deny China certain high-tech products such as semiconductor chips, while directly targeting leading Chinese companies such as Huawei and ZTE. Furthermore, the US has implemented restrictions on Chinese investment in certain US industries, especially those related to technology. While the economic war and efforts of repatriating supply chains were initially attributed to the Trump presidency, these industrial policies have largely continued under the Biden administration. Even Hillary Clinton cautioned in 2020 that “industrial and technological strength has atrophied,” and thus called for “rebuilding self-sufficiency” with “ambitious industrial policies” and “impos[ing] stronger ‘Buy American’ provisions” (Clinton, 2020, Rebuilding Self-Sufficiency section).

Russia also prioritises technological sovereignty after reversing its liberal economic policies of the 1990s. Russia initially fell into the “liberal division of labour trap” by embracing David Ricardo’s free-market principle of competitive advantage, which entailed exporting natural resources and importing manufactured goods. Russia subsequently failed to develop technological sovereignty and gradually deindustrialised. Russia developed excessive

reliance on an increasingly asymmetrical economic partnership with the West, which was recognised as a security threat as Western states could exploit Russian weakness by constructing a new Europe without Russia. Moscow has since changed its policies, by using the revenue from its natural resources to temporarily subsidise infant industries. Technological sovereignty in the digital sphere has thus become a key priority to preserve its great power position (Diesen, 2021).

Washington's increasing economic coercion against both allies and adversaries has created an incentive for other states to reduce their technological dependency by pursuing self-sufficiency and diversification of partnerships. As digital technologies increase their footprint in the economy, the US can also extend its extraterritorial jurisdiction further. Case in point, the US *Cloud Act (Clarifying Lawful Overseas Use of Data)* of 2018 allows US corporations to extract data from foreign companies stored by US cloud service providers.

## 5 A Eurasian Westphalia with a global balance of dependence

Concerns about US global hegemony being replaced by Chinese global hegemony are not justified, as China's technological rise has instead set in motion a transition to a multipolar system. Large- and medium-sized states around the world do not seek to replace their dependence on the US with China, rather they aspire to act as autonomous pillars in a multipolar order. This requires states to obtain technological sovereignty to preserve their position as independent poles of power.

Even Russia, which considers China to be its most indispensable partner, is apprehensive about excessive dependence on such an asymmetrical partnership. Unlike in the 19<sup>th</sup> and 20<sup>th</sup> century, Russia neither has the intentions nor capabilities to pursue

hegemony in Eurasia. Russia accepts China's geoeconomic leadership on the Greater Eurasian continent, yet rejects Chinese dominance in which excessive economic dependence would enable China to undermine Russian sovereignty. The solution for Russia has been to develop greater technological self-sufficiency and diversify its technological partners. China has not obstructed Russia's efforts of establishing a balance of dependence in Eurasia as this would make Russia more apprehensive of dependence on China. Thus, China appears to recognise the benefit of being the "first among equals" rather than aspiring for hegemony.

Beijing appears to take a similar approach to the rest of the world by not pressuring states to be either "with or against us." Without hegemonic ambitions, China has avoided developing exclusive blocs that divide the world into allies versus adversaries. Instead, the key geoeconomic institutions such as the Shanghai Cooperation Organisation (SCO) and BRICS (Brazil, Russia, India, China and South Africa) include adversarial member states such as India and Pakistan, which implies that the objective is to pursue security *with* other members rather than security *against* non-members. As a case in point, China has sought to deepen its economic connectivity with both Iran and Saudi Arabia without alienating either, which incentivised Beijing to promote peace between the two conflicting sides.

Washington's self-defeating aspirations to restore global primacy stands out as a cautionary tale for China as it incentivises the collective balancing of the US. Threats of sanctions that limit access to key US technologies make dependency on the US an unacceptable risk for both adversaries and allies, which only incentivises states to enhance their technological sovereignty.

The diffusion of technology is a major factor in shaping the international distribution of power, which is faster under a multipolar distribution of power. Under a technological hegemon, the dominant state can slow down the diffusion of

technology to extend its first-mover advantage. A technological rivalry between the US and China reduces their ability to establish a monopolistic position and slow down the diffusion of technology. Thus, multipolarity is advantageous to large- and medium-sized states seeking to enhance the diffusion of technologies and reduce the advantage of the innovator.

The technological followers have an incentive to pursue “technological preparedness,” which entails developing the required know-how and domestic technological platforms to produce domestic spin-offs of foreign innovations. Because only a relatively few countries develop the overwhelming majority of disruptive technologies, other countries must often prioritise imitations and spin-offs to avoid falling too far behind or becoming excessively reliant on other states (Keller, 2010). If the technology diffuses rapidly, the follower need not bear the heavy research and development cost of the innovator (Gerschenkron, 1963). Followers can even increase their competitiveness vis-à-vis the technological leader if they can quickly imitate and implement new technologies and direct funds normally devoted to research and development into capital-intensive investments instead such as complex hardware as a barrier to entry.

Disruptive technologies such as AI, automation and robotics also offer developing states a historical opportunity to leapfrog technologies, climb global value chains and transition away from excessive dependence on foreign states. For example, mobile phones enabled underdeveloped regions to leapfrog costly investment in landline infrastructure, the Internet improved financial services in regions without bank branches and made online education available for the development of a skill-based economy, and smart agriculture technology helped inefficient agricultural communities become competitive. Digital technologies can also enable states to develop a new production industry, car industry and other industries where the former leading technologies are disrupted and become obsolete. In other

words, the diversification of economic partners enables greater technological sovereignty.

## 6 The Europeans adjusting technological sovereignty and multipolarity

The Europeans aspired to develop greater symmetry with the US by pursuing collective bargaining power in the EU. In the early 1990s, Western European states recognised that excessive reliance on US and Japanese technologies threatened “technological colonisation” of Europe (Keller, 1992, p. 112). However, the failure to sufficiently modernise the Single Market with a Single Digital Market has contributed to the absence of EU equivalents to Google, Amazon, Apple, Facebook, Microsoft and other digital giants.

The Europeans have also struggled with adjusting to multipolarity. European unity was established under the bipolar distribution of power during the Cold War, which resulted in a subordinated position to the US due to security dependency. During the unipolar era, European unity was to a large extent premised on the objective of equal status with the US for collective hegemony through the dual pillars of the EU and NATO. With the emergence of multipolarity, the foundation for European unity is eroding as interests no longer align. The US is shifting its focus and priority to Asia, while simultaneously demanding greater geoeconomic loyalty from the Europeans. In other words, the US demands more but has less to offer.

The US pressures on the Europeans to display bloc discipline and geoeconomic loyalty entails limiting the diversification of partners by for example cutting themselves off from Chinese technologies such as 5G and Russian energy required for competitive energy-intensive industries. US Vice President Mike Pence argued at the



Munich Security Conference in 2019 that “we cannot ensure the defense of the West if our allies grow dependent on the East” (White House, 2019). The consequence is that the Europeans become excessively reliant on the asymmetrical interdependency with the US, and thus lose much of their political sovereignty. The EU appeared to counter this development by advocating for “strategic autonomy” and “European sovereignty” over the past years. However, the war in Ukraine has increased the EU’s security dependence on the US, which enabled the US to restore bloc discipline and convert the security dependence into geoeconomic loyalty. The European allies have agreed to sever themselves from Russian resources and are also under pressure to decouple from Chinese technologies, which cements US technological dominance and political influence over Europe.

## 7 Conclusion

The post-Cold War era was defined by a revisionist attempt to replace the Westphalian world order based on a balance of power and sovereignty equality, with liberal hegemony defined by US dominance legitimised by universal liberal values. The inherently temporary phenomenon of unipolarity relied on technological dominance, which has gradually eroded with the rise of the non-Western world. While most of the world is adjusting to the end of unipolarity and benefiting from the multipolar distribution of power, the Europeans have to a large extent failed to grasp the opportunities. The irony is that Westphalia was initially a European order in which sovereign equality was the prerogative of the technologically advanced Europeans, while in the current restoration of a new global Westphalian order, it is the Europeans that will likely have to accept limited sovereignty due to the failure of asserting technological sovereignty.

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# New Climate Economics as Driver of Clean Energy Transition for Net Zero 2050

Raekwon Chung

*Four major persistent structural problems of the current climate-economy paradigm have to be rectified if a clean energy transition for Net Zero 2050 is to be achieved.*

*Firstly, carbon pricing can no longer be ignored and delayed. The current climate-economy paradigm focusing mainly on mobilising finance and technology without touching on the issue of the carbon price signal is an uphill battle, since finance and technology will not flow if the price signal is not right. The urgent construction of a new climate-economy nexus that focuses on carbon pricing as the driver of financial flows and technology innovation is critical. As long as the climate-economy paradigm relies on a market that treats carbon as free goods, a carbon-free future will not be feasible.*

*Secondly, to ensure a global net reduction, carbon emissions data has to be calculated based on consumption, not solely on production (GDP). Carbon emissions calculated based on GDP confuse carbon leakage from developed countries to developing countries as climate mitigation. Much of the emission reduction of the EU is in fact carbon leakage by relocating energy-intensive heavy industry to developing countries like China, not climate mitigation. If the embedded emission of imported goods is added, the EU's consumption-based emissions were about 17 per cent higher in 2020 than production emissions. For a global net reduction, emissions have to be calculated based on consumption. It is only natural that consumers – not just producers – have to be responsible for the emissions of the products they consume.*

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Raekwon Chung is a Board Director at the Ban Ki-moon Foundation For a Better Future. E-mail: [greengrowthrkc@naver.com](mailto:greengrowthrkc@naver.com)

*Thirdly, the current global climate-economy paradigm has to provide options for consumers to join and share climate actions. We are stuck in an impossible situation where governments and businesses are tasked with achieving the NDCs (Nationally Determined Contribution) of the Paris Climate Agreement, while the governments and businesses have limited room to manoeuvre due to restricted fiscal resources and profitability constraints. Consumers are simply left out, watching and waiting for the outcome. The new climate-economy paradigm must provide opportunities for consumers to share the responsibility of the NDCs by making their own PDCs (Personally Determined Contribution). A clean energy price that allows consumers to buy and consume renewable energy at a higher real price has to be provided. Since we cannot afford to wait for a social consensus to emerge on a single fixed price of renewable energy for all of society, we need to start with the consumers who are concerned about the climate crisis and willing to pay the real price of renewable energy.*

*Fourthly, the negative message that “carbon mitigation will reduce GDP” based on “cost-benefit analyses” using static general equilibrium macroeconomic modelling exercises of conventional economics has to be replaced by positive multiplier effects for economic growth and job creation that could be triggered by investment in a clean energy transition. Gradual, step-by-step internalisation of carbon pricing must be the integral basis for economy-wide systemic change for a carbon-free future. Maximising the positive impact for technological innovation and minimising the negative burden of carbon pricing on the economy should be the main focus of constructing new climate economics.*

*General equilibrium models used to quantify long-term cost and the benefits of emission reduction are mostly based on unrealistic, static and over-simplified assumptions that cannot internalise dynamic structural change of industry and technical innovations. Unfortunately, too much trust is placed in the validity of such negative GDP projections for the next 20, 30 or 50 years produced by macroeconomic models. In reality, even the best economic modelling cannot pinpoint the GDP growth rate for next year, not to mention the next 50 years. Negative messages*

*produced by macroeconomic models that cannot even pinpoint next year's growth rate are widely accepted as irrefutable truth around the world, and pose serious obstacles in raising climate ambitions as they scare away policymakers, business leaders and consumers alike.*

*Spending on a clean energy transition can be costly in the short run. Yet if we spend money on the energy transition consistently for decades to come, spending for the energy transition will be an investment in the long run for new markets, products and innovation that will open up economic growth and job creation. Cost in the short run means investment in the long run, so the multiplier effect of the investment for a clean energy transition rather than a cost-benefit analysis should be the basis for the new climate-economy nexus. In fact, a cost-benefit analysis is a tool for short-term or at best medium-term forecasts, not for long-term projections.*

*Green Growth was proposed in 2005 as a new paradigm to offer clean energy transition as an opportunity for economic growth that is green and sustainable. However, Green Growth is largely treated as an anecdote at project level, and is not yet ready to provide a systematic economy-wide strategy for the clean energy transition.*

*Moving away from a conventional cost-benefit analysis towards New Climate Economic thinking focusing on maximising the multiplier effect of clean energy investment for positive long-term growth and technical innovation, and minimising the negative short-term burden from carbon pricing, should provide the backbone for the new effective climate-economy paradigm.*

*There is a wide range of policy options that could gradually internalise the price of carbon into the market with minimum political and social resistance and maximum positive economic and climate impact; such as, voluntary consumption of renewable energy, differentiated prices for renewable energy and products, carbon accounting to make invisible carbon visible, applying the social cost of carbon in major infrastructure investment, ecological tax reform to shift the tax base from income towards carbon emissions, emissions trading and ultimately carbon tax.*

*Applying the social cost of carbon for major investment decisions and business performance assessments of large public and private companies will greatly enhance resource allocation towards low-carbon green infrastructure, such as mass transit and improved carbon efficiency of production patterns. Gradually shifting the tax base from income to carbon will provide a basis for a double-dividend hypothesis of increasing growth, whilst reducing emissions.*

*For a soft-landing of New Climate Economics, social innovation to promote consumer acceptance of carbon pricing has to be promoted as a critical part of the new climate-economy nexus. The PDC is not just an economic policy, it is also a social innovation that could transform all of society towards a carbon-free future.*

**Journal of Economic Literature (JEL) codes:** Q5, O3, E2

**Keywords:** carbon pricing, multiplier effect, cost-benefit analysis, climate-economy paradigm, green growth, PDC, new climate economics, social innovation

## 1 Introduction: Limits of conventional climate-economy paradigm and need for new climate economic thinking

Persistent structural problems have been paralysing the global climate-economy paradigm during the last three decades. This article aims to identify four structural problems of the current climate-economy paradigm arising from the conventional economic approach to the climate and the economy, and to propose alternative solutions to address these problems by constructing a new synergistic win-win perspective on the relationship between climate and the economy based on new climate/economy thinking.

As extreme climate damage looms over us, it is increasingly evident that in spite of many pronounced political pledges, actions on the ground to meet the Net Zero 2050 target are faltering without much decisive and concerted momentum. While warnings and appeals for urgent action abound, no clear action plans and practical strategies are put forward, since concerns about energy security triggered by the recent geopolitical situation override the urgent need for a clean energy transition. Carbon emissions from fossil energy consumption continue to rise and are showing no signs of a substantial downwards curve, which is a critical condition for achieving the Net Zero 2050 target.

The NDC of the Paris Climate Agreement is not the first time that countries have pledged ambitious targets. Countries have already made and broken pledges and commitments. In 1992, developed member states of the United Nations (UN) legally committed and ratified a target to stabilise their 2000 emissions to the level of 1990 as stipulated in the UNFCCC (UN Framework Convention on Climate Change). In 1997, developed countries committed to reducing their emissions by 5.2 per cent below the 1990 level by 2012, as agreed in the Kyoto Protocol. Once again, more than 100 member states of the UN pledged ambitious targets to reduce their emissions by 20 to 40 per cent by 2020, as presented in the Copenhagen Accord announced in 2009. All of these commitments and pledges have been repeatedly made, and forgotten.

Structural problems that persisted throughout the last three decades in the history of the climate-economy paradigm are rooted in conventional thinking on the negative climate-economy nexus.

The following four points based on conventional climate-economic thinking have been blocking the progress in laying out a solid, proactive climate-economy policy roadmap for carbon neutrality:

- Firstly, focusing mainly on mobilising finance and technology without touching on the price of carbon; providing no options



to engage consumers to share the responsibility of the clean energy transition.

- Secondly, counting emissions from GDP/production, not from consumption.
- Thirdly, treating the clean energy transition as a cost and applying a cost-benefit analysis as the basis for responses to address the climate crisis.
- Fourthly, applying general equilibrium macroeconomic modelling and projecting negative long-term GDP growth.

Firstly off, the problems of focusing on mobilising finance and technology without touching on the issue of carbon pricing, leaving consumers as outsiders. The current global climate-economy paradigm emphasising the need for financing and technology without touching on the issue of carbon pricing is destined to be an uphill battle, as it defies the price signal of the market. It is quite natural that finance and technology will not flow for the clean energy transition if the price signal is not right.

The pivotal agenda of the UN's Climate Conference is the transfer of climate financing and technology to developing countries. In spite of the agonising, decades-long debating at the United Nations since 1991, the prospect of a tangible transfer of finance and technology to developing countries, sufficient enough to meet their needs, remains slim and unrealistic.

For many developing countries with limited financial and technological capacity, carbon pricing can be the only option available to mobilise finance and technology to improve the carbon efficiency of their production and consumption patterns.

Though most economists agree that carbon pricing is the most effective option and can play a critical role in the clean energy transition, the reason why carbon pricing is avoided so much in designing the climate-economy paradigm is the fear and concern

that a carbon tax will trigger huge political and social backlash as it increases the burden and cost on people and businesses.

This is due to the misperception that carbon pricing only means a carbon tax. In fact, there is a wide range of policy options that could gradually internalise the carbon price into the market price of energy in a step-by-step process, without causing too much of a burden and cost, such as a voluntary green energy pricing system, the social cost of carbon, ecological tax reform, etc.

To dispel fears and concerns about carbon pricing, further research is needed on the policy options that could minimise the negative impact of the burden and cost and maximise the positive impact of carbon pricing for financial flows and technological innovations, which in the long run could even provide the basis for green economic growth and job creation.

As carbon pricing is ruled out, the responsibility for mobilising finance and technology remains with governments and businesses. Consumers are left out as bystanders, having to wait and see what the governments and businesses can do to mitigate carbon emissions.

The NDCs of the Paris Climate Agreement are regarded as the remit of governments and businesses, not of consumers. There is no option for consumers to share the responsibility of the NDCs. Consumers are just watching and waiting for decisive actions from governments and businesses to carry it out, but governments have clear constraints in allocating fiscal resources, while businesses also have tight profitability requirements as the competition in the free market is getting more and more intense. Though ESG has recently become a strong imperative for doing business, companies cannot shoulder the responsibility of the NDCs over and above the priority of making a profit to survive on the market.

The current global climate-economy paradigm is trapped in an impossible situation where governments and businesses are expected to shoulder the responsibility of the NDCs whilst

not having much room to manoeuvre due to tight fiscal and commercial limitations.

What makes the situation worse is that consumers are left out in sharing the responsibility of the NDCs. In fact, it should be consumers, not governments or businesses, who should bear the ultimate responsibility for the NDCs. After all, consumers are the ones who enjoy the benefits of cheap fossil energy.

So far, the global environmental campaign for the climate has been blaming governments and accusing businesses for their failure to take decisive action. Finger-pointing at governments and businesses, however, did not produce many changes. Even now, global attention is focused on the commitments of governments and businesses, but not on how consumers should pay for the clean energy transition.

This is why PDCs (Personally Determined Contribution) of consumers have to be put forward as the basis for the NDCs. In any society, there are consumers concerned about the impending climate crisis and ready and willing to share the responsibility by paying the real price for a clean energy transition. Many consumers concerned about the climate crisis are frustrated that there are no options and opportunities available for them to join in and share the responsibility of the NDCs. In some countries, green prices for renewable energy services are offered at a higher price than fossil energy for consumers willing to pay a higher price on a voluntary basis.

Imposing a higher fixed flat price of clean energy for all of society is not an easy task anywhere. This is why it is a relatively easy option to start with the consumers who are ready and willing to pay the real price of clean energy without provoking much political difficulty and social resistance.

To provide actual opportunities for PDCs, a system of differentiated prices for clean energy has to be designed and offered to consumers. Household electricity can be offered at

different prices; a green price for renewable electricity at a price higher than fossil-produced electricity. Certain consumers could opt to pay the green price. Extra payments should be channelled to buy renewable electricity, and extra payments for green train tickets can be used to buy renewable energy.

This system can be applied for businesses as well. Companies willing to join the RE100 campaign<sup>14</sup> can choose to pay the green price of electricity. Paying for renewable energy could provide them with a powerful marketing edge in increasingly climate-sensitive market competition. They might find it could be cheaper than paying for TV adverts, and more effective. Thus the idea of voluntary contributions can be applied for businesses as well: this could be called the CDC (Corporate Determined Contribution).

As the younger generations, even in developing countries, are becoming more conscious about the climate crisis, PDCs and CDCs can offer options for consumers and businesses in the developing world to share the responsibility for climate action.

Secondly, the problem of carbon leakage from counting carbon emissions from GDP/Production; the need to count emissions based on consumption for a global net reduction.

As emissions from internationally traded goods are increasing, counting carbon emissions based on GDP/production is posing serious problems. Since GDP is closely linked with carbon emissions, reducing production-based emissions is perceived to be strongly correlated with reducing GDP, which is politically impossible to accept for the politicians of any government. This is why politicians find it difficult to tackle emission reductions in earnest.

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<sup>14</sup> The global corporate renewable energy initiative RE100 unites hundreds of significant, forward-thinking companies committed to generating all of their electricity from renewable sources.

Another serious problem is carbon leakage. According to a study entitled *Growth in emission transfers via international trade from 1990 to 2008*, “the net emission transfers from non-Annex B to Annex B has grown from 0.4 Gt CO<sub>2</sub> in 1990 to 1.6 Gt CO<sub>2</sub> in 2008 (17% per year average growth). . . . Because estimated Annex B emission reductions from 1990 to 2008 are only ~2%, representing 0.3 Gt CO<sub>2</sub>, the net emission transfers from non-Annex B to Annex B countries is 520% higher in 2008. Cumulatively, we find that international trade has relocated 16 Gt CO<sub>2</sub> from Annex B to non-Annex B countries from 1990 to 2008. If historic trends continue linearly . . . , the net emission transfers from the group of non-Annex B countries to Annex B countries will be around 2.3 Gt CO<sub>2</sub> per year in 2020, representing 16% of Annex B emissions in 1990. This finding is comparable to the most optimistic 2020 emission limitations offered by Annex B countries in the Copenhagen Accord” (Peters et al., 2011, p. 8904). “Annex B countries” are developed countries listed in Annex B of the Kyoto Protocol with specified emission reduction targets, while “non-Annex B countries” are developing countries not listed in Annex B of the Kyoto Protocol. In other words, carbon leakage from developed to developing countries is five times greater than the production-based mitigation of developed countries.

The case of the UK shows a dramatic contrast. According to UK Government data, GHG (greenhouse gas) emissions embedded in imported goods and services to the UK have been consistently greater than GHG emissions from UK-produced goods and services consumed by UK residents since 2002. In other words, terrestrial GHG emissions of the UK are smaller than GHG emissions embedded in imported goods and services during the last two decades.

According to a study entitled *Consumption-based GHG emission accounting: a UK case study*, “growth in consumption-based GHG emissions grew by 20% between 1990 and 2008, followed in 2008–2009 by a 9% reduction, predominately due to the global financial

crisis. . . . The UK GHG emissions reported to the UNFCCC (i.e. their ‘territorial emissions’) show a 27% reduction in territorial GHG emissions between 1990 and 2009, which represents an annual decline of around 1.4% per annum. GHG emissions are 212 million tonnes lower in 2009 than in 1990, and the UK Government achieved its target established under the Kyoto Protocol. The production-based GHG emissions reduced by 24%. There has thus been a greater reduction in emissions as accounted for under the Kyoto Protocol than in those that are not. . . . From a consumption perspective, the UK’s GHG emissions rose at a rate of over 1% per annum between 1990 and 2008 (with a 9% reduction from 2008 to 2009). These figures stand in stark contrast to the 1.4% decrease each year in territorial GHG emissions. The gap between consumption-based and territorial emissions has continued to grow year on year with the exception of 2009 (when a comparatively large reduction was recorded)” (Barrett et al., 2013, p. 454).

“The UK has adopted a consumption-based emissions system as an official government indicator and . . . a number of statistical offices and other government agencies have started to calculate consumption-based emissions, predominately in Europe, Australia, and Canada. However, these are rarely treated as ‘official statistics’ and few countries, with the exception of Australia . . . and the UK, have committed to either annually updating the indicator or providing an official statistical release of the data” (Barrett et al., 2013, p. 453).

It is ironic that only China is blamed for the emissions of their energy-intensive manufactured goods exported to developed countries, while consumers of developed countries using imported energy-intensive goods from China are not responsible for the emissions of their imported goods. For a global net reduction, emissions have to be counted from consumption, not production. This is the most urgent action to take if we are genuinely committed to Net Zero 2050.

Thirdly, treating the clean energy transition as a cost and applying cost-benefit analyses as the basis for a response to address the climate crisis; need to focus on multiplier effects of clean energy transition investment to align climate goals with economic growth and job creation goals.

Starting from the landmark report entitled *The Economics of Climate Change: Stern Review*, a study that was published on 30 October 2006 concluded that “using the results from formal economic models, the Review estimates that if we don’t act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – can be limited to around 1% of global GDP each year” (LSE, 2006, p. 6).

Though the *Stern Review* rightly emphasised that it is perfectly justifiable to invest 1 per cent of global GDP to prevent at least 5 to 20 per cent of damage from climate disasters, it is never easy to sacrifice short-term interests in return for long-term returns.

While the *Stern Review* emphatically encourages decisive and strong actions to prevent climate damage, a study entitled *Welfare in the 21<sup>st</sup> century: Increasing development, reducing inequality, the impact of climate change, and the cost of climate policies* by Bjorn Lomborg released on 24 April 2020 presented a dramatically contradicting summary of the cost-benefit analysis presented in Assessment Report 5 (AR5) of the IPCC (Inter-Governmental Panel on Climate Change) that “climate-economic research shows that the total cost from untreated climate change is negative but moderate, likely equivalent to a 3.6% reduction in total GDP. Climate *policies* also have costs that often vastly outweigh their climate benefits. The Paris Agreement, if fully implemented, will cost \$819–\$1,890 billion per year in 2030, yet will reduce emissions by just 1% of what is needed to limit average global temperature

rise to 1.5 °C. Each dollar spent on Paris will likely produce climate benefits worth 11¢” (Lomborg, 2020, p. 1).

It is alarming to note that cost-benefit analysis messages could differ so starkly: from USD 1 spent saving USD 5–20 from the *Stern Review*, and USD 1 spent saving only 11 cents from the study concluded by Bjorn Lomborg.

The message from the *Stern Review* based on a cost-benefit analysis sparked huge global attention in 2006 and played a pivotal role in raising the social awareness and political commitment to cope with the climate crisis. Though cost-benefit analyses could play a critical role in justifying the cost of climate action and a clean energy transition, it is not the job of a cost-benefit analysis to roll out an action plan on how to mobilise finance and technology.

In spite of the immense global alarm triggered by the *Stern Review*, this close attention did not translate into concrete actions on the ground. Global carbon emissions continued to rise even after the release of the *Stern Review*.

While cost-benefit analysis initially succeeded in raising awareness, it not only fell short of rolling out a roadmap for early action, it also ended up in an unlikely argument that USD 1 spent on mitigation could produce only 11 cents of climate benefit, as was concluded by Bjorn Lomborg.

Vindicating either one of these two categorically opposed conclusions is not the purpose of this article. A critical lesson we should draw from the numerous studies based on cost-benefit analysis is that simply arguing that early action can save huge damage in the long run is not enough to mobilise global climate action. President Obama once said in his meeting with climate ambassadors attending the Major Economies Forum in April 2009 at the White House: “One of the most difficult jobs for the politicians is to persuade the public to sacrifice short-term interests in return for long-term return.”



Cost-benefit analysis has two intrinsic limitations. Firstly, cost-benefit analysis is a tool primarily designed for short to medium-term analysis, not long-term. Second, counting climate action as cost; it should be treated as investment, not cost. This is all because of a short-term perspective on climate action. Now is the time to shift from short-term cost-benefit analysis towards long-term multiplier effects of clean energy transition investment.

The passive message based on cost-benefit analyses asking people to sacrifice short-term interests to avoid future damage is not enough. Rather, we have to come up with a more proactive discourse that USD 1 invested in climate now will generate USD 5–20 investment return in the near- to medium-term. We badly need this kind of positive message to mobilise political commitment and social support.

This is why we need to focus more on the multiplier effect of USD 1 spent now, rather than on cost-benefit analyses. New climate-economy thinking should focus on how to maximise the multiplier effect of money spent for the clean energy transition, and present the message that such a clean energy transition is an opportunity for growth and job creation. New positive messages are already starting to come forward.

An IMF Working Paper entitled *Mitigating Climate Change: Growth-Friendly Policies to Achieve Net Zero Emissions by 2050* in July 2021 presented a finding from the G-Cubed global macroeconomic model that “an initial green investment push combined with initially moderate and gradually rising carbon prices can deliver the needed emission reductions at reasonable output effects. The policy package has a net positive impact on global output for the initial 15 years, raising output on average by about 0.7 percent of baseline global GDP each year. . . . Preannounced and gradually rising carbon prices are an essential policy to deliver the quick and substantial reductions in carbon emissions required to reach net-zero emissions by 2050” (Jaumotte et al., 2021, p. 6). This IMF working paper shows that depending on the assumptions, long-

term estimates of GDP growth can change anywhere, from minus to positive numbers.

The OECD (Organisation for Economic Co-operation and Development) report entitled *Investing in Climate, Investing in Growth* released in May 2017 prepared in the context of the German Presidency of the G20 summarised that “with the right policies and incentives in place – notably strong fiscal and structural reform combined with coherent climate policy – governments can generate growth that will significantly reduce the risks of climate change, while also providing near-term economic, employment and health benefits. Such a climate-compatible policy package can increase long-run GDP by up to 2.8% on average across the G20 in 2050 relative to a continuation of current policies. If the positive impacts of avoiding climate damage are also taken into account, the net effect on GDP in 2050 rises to nearly 5% across developed and emerging economies of the G20” (OECD, 2017, p. 15). This report is one of the few attempts to look at the climate and growth agenda together in line with the new positive climate-economy thinking proposed in this article.

Many more studies for a positive climate-economy nexus are available. However, elaborating those studies is not the aim of this article. Rather, the critical point to note is that the climate-economy paradigm should be based on studies that focus on the positive impact of the multiplier effect of a clean energy transition, rather than on cost-benefit analyses.

Fourthly, projecting negative long-term GDP growth from the energy transition based on static general equilibrium modelling; the need to get away from static negative academic projections and grasp positive win-win messages from dynamic multiplier effects.

Negative messages from the first version of Bjorn Lomborg’s aforementioned study released in 2015 headlined global media and shocked the minds of politicians, business leaders and

ordinary people. It is possible that this shocking message deeply ingrained in the minds of many politicians may have triggered President Trump's withdrawal from the Paris Climate Agreement.

Highlights of the negative messages that shook the world from Lomborg's study, concluded in Chapter 4.1. (Costs of the Paris agreement) that "policies that would attempt to achieve reductions of 2 °C or 1.5 °C. This would be a devastating policy for the world, eradicating at least \$250 trillion in welfare, or 5.4% of all future global GDP" (Lomborg, 2020, p. 2). "NDC of the US will result in \$154 to \$172 billion annual GDP loss based on the EMF24 model of the Stanford Energy Modelling Forum while US GDP in 2022 stands at 25,462.70 billion; NDC of EU will result in 1.6% of GDP loss in 2030 based on the EMF28 model of the Stanford Modelling Forum; based on Asia Modelling Exercise <AME>, China can reduce 1.9Gt CO<sub>2</sub> for about \$200 billion in annual GDP loss; based on the CLIMACAP-LAMP project that estimated costs throughout Latin America and the peer-reviewed analysis for Mexico . . . , Mexican cost in 2030 is about 4.5% of GDP or about \$80 billion annually" (Lomborg, 2020, p. 22).

Assessment Report 5 (AR5) of the IPCC summarised the projections from numerous general equilibrium models that assuming all countries of the world begin mitigation immediately, there is a single global carbon price, and all key technologies are available, mitigation scenarios reaching atmospheric concentrations of about 450 ppm CO<sub>2</sub>eq by 2100 entail losses in global consumption of 1 per cent to 4 per cent (median: 1.7 per cent) in 2030, 2 per cent to 6 per cent (median: 3.4 per cent) in 2050, and 3 per cent to 11 per cent (median: 4.8 per cent) in 2100 relative to consumption in baseline scenarios that grows anywhere from 300 per cent to more than 900 per cent over the century.

These negative messages about reducing GDP produced by professional and authoritative institutions like the IPCC sound so intimidating and enjoy authority that cannot be questioned by the general public at large, including the media, politicians

and business leaders. Whenever these negative numbers are published, they immediately hit the headlines of major global media, as was the case of the study by Lomborg that was first released in 2015.

It is not just the validity of these negative projections for GDP reduction, the information imbalance between the negative messages and the positive ones are alarmingly lopsided towards negative messages, since the media is eager to amplify sensationalising news that climate action will cause serious negative damage to growth, while the positive messages are often ignored and go unnoticed.

The aforementioned positive messages from the IMF and the OECD that clean energy investment could drive GDP growth higher did not reach the headlines and disappeared without being noticed much by the public.

As long as these negative messages produced as a result of static, simplified and academic modelling exercises are not replaced by positive win-win messages that climate action is an opportunity for growth and job creation, the climate-economy paradigm will continue to have difficulty in mobilising political commitment, social consensus and practical actions on a global scale.

In conclusion, the current global climate-economy paradigm with many persistent structural problems has to be replaced by a new climate-economy paradigm based on a positive win-win synergistic climate-economy nexus, which could be termed New Climate Economics.

The major features of this new climate-economy paradigm, which could be effective in mobilising finance and technology, should focus on carbon pricing, providing opportunities for consumers to share responsibility, and target emission reductions from consumption rather than production. A new climate-economy paradigm should focus on realising the double dividend of continuing economic growth while reducing carbon emissions.

Lomborg criticised the 2 °C target in the abstract of his report as “the popular 2 °C target . . . is unrealistic and would leave the world more than \$250 trillion worse off” (Lomborg, 2020, p. 1). He also pointed out that “using carbon taxes, an optimal realistic climate policy can aggressively reduce emissions and reduce the global temperature increase from 4.1 °C in 2100 to 3.75 °C. This will cost \$18 trillion, but deliver climate benefits worth twice that. . . . The most effective climate policy is increasing investment in green R&D to make future decarbonization much cheaper. This can deliver \$11 of climate benefits for each dollar spent” (Lomborg, 2020, p. 1).

Though Lomborg emphasised that green R&D is the most effective climate policy, he did not elaborate how green R&D could be increased. Green R&D will not be increased if the price of carbon is not right, in other words, without carbon pricing.

The mission of New Climate Economics is to build confidence that a win-win synergy of a climate-economy nexus is feasible and possible, if proper policies are put in place.

## 2 Policy options for shifting towards an effective win-win climate-economy nexus driven by New Climate Economics

For the first time at the level of the UN, the idea to change the climate-economy discourse from a negative zero-sum trade-off towards a win-win synergy was officially adopted in March 2005 at the 5<sup>th</sup> Ministerial Conference on Environment and Development for Asia and the Pacific hosted by the UN ESCAP (Economic and Social Commission for Asia and the Pacific) which was held in Seoul, South Korea.

As director of the environment and development division of UN ESCAP, I personally drafted the concept paper for the idea of

Green Growth, which was officially adopted for the first time by a UN Agency. In spite of initial resistance from certain major developing countries, the Ministerial Declaration for Green Growth became a milestone in turning the climate-economy discourse from trade-off to win-win synergy.

Green Growth paradigm was welcomed by many other organisations such as the OECD, the World Bank, UNEP (United Nations Environment Programme) and UNDP (United Nations Development Programme) and triggered a chain reaction to promote the Green Economy by the UNEP and the Green New Deal by the G20 in 2009.

A number of meaningful developments were made in spreading the idea of a win-win synergy of the climate and economy; the establishment of the GGKP (Green Growth Knowledge Partnership), GGGI (Global Green Growth Institute), GGSD Forum (Green Growth and Sustainable Development Forum) of the OECD, Inclusive Green Growth of the World Bank, the Global Green Growth Forum by Denmark, Green Growth Alliance by South Korea and Denmark, the New Climate Economy Report by the Global Commission on the Economy and Climate, etc.

In spite of these developments, it is hard to deny that current global climate-economy discourse is still dominated by the negative messages of trade-off and zero-sum game between the climate and the economy.

Initiatives promoting green growth fail to grasp carbon pricing as the key driver of a win-win synergy of the climate-economy paradigm. It also failed to present an actionable roadmap to put green growth into economy-wide systemic practice.

Green growth and a win-win synergy for the climate-economy nexus are largely treated as anecdotes that can only happen for countries with financial and technological capabilities, and cannot instill confidence in developing countries that green growth is a systematic economy-wide paradigm applicable for them.

While conventional climate-economy thinking consistently churned out numerous negative messages from economy-wide static modelling exercises based on cost-benefit analysis, green growth initiatives did not focus on the economy-wide multiplier effect of a clean energy transition.

The aforementioned OECD report *Investing in Climate, Investing in Growth* in 2017 is one of the few systematic attempts to come up with an economy-wide positive message for long-term positive GDP growth.

In addition to the lack of attempts to focus on multiplier effects of climate investment, another serious drawback of the green growth approach was the failure to focus on carbon pricing. This is largely due to the fear that carbon pricing, though potentially the most effective and efficient option for climate action, could be politically devastating and socially unacceptable due to the burden and cost for the people and the economy.

Thus the main task of New Climate Economics is firstly to focus on the multiplier effects of climate investments, and secondly to present practical policy options that could internalise carbon pricing into the economy in a step-by-step gradual approach so that the burden and cost on the economy could be minimised, while maximising the positive impact for enhancing the carbon efficiency of production and consumption patterns and mobilising financial resources and technological innovations for climate action.

Carbon tax is not the only policy option for carbon pricing. Carbon pricing can be introduced in gradual and sequenced steps that are consistent and predictable to give enough time for businesses and consumers to adapt. There can be many intermediate policy options that could slowly introduce price incentives to mobilise private investment and to stimulate technological innovations. Feasible policy options for introducing carbon pricing that could be considered for new climate economics are presented below.

## 2.1 Voluntary contributions by consumers (PDC) and businesses (CDC)

Firstly, start with those who are willing to pay for clean energy; develop policy options to take advantage of the huge swell of consumer and business willingness to contribute to and share the responsibility to cope with the impending climate crisis. As climate crisis exacerbates, an increasing number of consumers are voluntarily paying and buying green tickets at a higher price to travel on renewable energy and consume renewable electricity offered at a higher price to avoid carbon emissions in their lifestyle. A voluntary green energy pricing system can provide an option for consumers to make their PDCs (Personally Determined Contribution). For businesses, they can also make a CDC (Corporate Determined Contribution) as an option for ESG (environment, social, governance) action.

Consumers concerned about the climate crisis can choose green energy prices purely for their personal peace of mind. But for businesses, paying and using renewable energy could improve the marketability and consumer appeal of their products, since many consumers prefer products produced by green energy. Paying green energy prices could be cheaper than paying for expensive TV adverts, and a more effective marketing tool. Many companies have already signed up to the RE100 campaign, and these companies will be the first to pay the green price of renewable energy.

Offering differentiated green energy prices for consumers and businesses as a voluntary choice is an option that can be introduced without much political difficulty. It can also reduce and share the burden on governments and businesses to achieve the NDC (Nationally Determined Contribution).

The additional merit of this voluntary green price scheme is that developing countries at a certain level of consumer awareness



about the climate crisis could increase renewable energy consumption without subsidies.

The costs of the energy transition cannot be borne by governments and businesses alone. Consumers concerned about the climate crisis must volunteer to pay the real price of renewable energy.

The idea that consumers should have a choice in paying the real price of non-fossil green energy is a social innovation. Environmental NGOs, media and youth groups can lead the “Me First” social innovation to encourage concerned consumers to be the first to pay the real price of the green energy transition. Voluntary consumption of renewable energy at a higher price might not be substantial from the beginning, but it could rise to a meaningful proportion of energy consumption as social awareness improves.

As introduced in Section 1, PDCs should be enhanced as the basis for NDCs. The success of NDCs will depend on the strength of the PDCs by consumers. NDCs without PDCs will be short-lived and destined to fail to meet their goals.

There are so many active environmental and climate NGOs around the world. millions among the young generations are asking for strong climate action. The really strong action has to be taken by those demanding firm climate action by voluntarily paying the real price of renewable energy. Volunteering to make PDCs will be more powerful and effective in addressing the climate crisis than just levelling blame and finger-pointing at governments and businesses to shoulder the responsibility of the NDCs.

## 2.2 Applying social cost of carbon (SCC) to make invisible carbon visible

Secondly, use the social cost of carbon (SCC) in major investment decisions and business performance assessments; make invisible carbon visible. To facilitate low-carbon investments, carbon

emission reductions expected from major investments should be calculated as a return on investment by applying the social cost of carbon benchmarked at the price of carbon credits on the emissions trading market. Additional carbon emissions expected from any carbon-intensive investment should be counted as cost. The level of the social cost of carbon can be decided by governments depending on the level of economic development. Many developed countries apply varying degrees of the shadow price of carbon to facilitate low-carbon investments. In order to align resource allocation along the investment priorities for Net Zero in national development planning, systematic accounting of the cost of wasted carbon emissions is needed.

The transport sector is a classic example, where there is a huge volume of wasted carbon emissions posing a serious challenge for the Net Zero target. Many countries are facing a difficult challenge in reducing emissions from the transport sector. Worsening traffic jams are causing a huge volume of wasted carbon emissions around the world.

In South Korea, according to a paper of the Korea Transport Research Institute (2021), the economic cost of traffic congestion in 2019 amounts to 3.67 per cent of its GDP. The economic cost of traffic congestion is only the sum of the economic value of wasted fuel and working hours from the traffic jam. If the social cost of negative health impacts from air pollution and the ecological cost of unnecessary carbon emissions are added, the sum of economic, social and ecological costs of traffic jams would be much higher.

In spite of such a huge cost from traffic jams, investment in mass transit and public transport remains far below the level required to minimise the emissions from traffic congestion. In South Korea, investment plans for express urban mass transit in the metropolitan area of Seoul have been repeatedly rejected due to the insufficient profitability. Investment schemes for connecting local cities around the country with high-speed trains also failed to be approved due to low level of profitability.

To facilitate investment schemes for mass transit and public transport, return on investment should include not only economic profitability but also the amount of emissions reduced as revenue. This would stimulate green infrastructure investments.

Further analysis on the systematic application of the SCC in major investment decisions is needed. Applying the SCC in the performance assessments of large public and private corporations could stimulate financial flows for low-carbon business operations. Many public corporations for mass transit metropolitan mobility suffering from underinvestment are being pressured to reduce their deficits. If the SCC is applied to the amount of carbon emission reduction made possible by the mass transit, and registered as revenue, many mass transit corporations are in fact running huge surpluses rather than deficits.

The impact of applying the SCC to the reduction or increase of the carbon emissions of business operations of major corporations could stimulate financial flows towards low-carbon business performance. Further systematic analysis on applying the SCC for business operations is needed as a critical agenda point in constructing new climate economics.

The application of the SCC in major investment decisions and business operation assessments will make the invisible carbon visible, thus facilitating informed decision-making towards low-carbon investment and business operations.

### 2.3 Ecological tax reform for double dividend

Thirdly, ecological tax reform (ETR), revenue neutrality and the double dividend gradually shifting the tax base from income towards carbon emissions while maintaining revenue neutrality could reduce emissions while stimulating growth. One of the most serious challenges in introducing a carbon tax is the increasing tax burden, which makes it very difficult to win political support in any democratic society. This is why the idea of the ETR deserves

careful attention. The ETR aims to reduce income tax whilst increasing the tax on carbon emissions, thereby maintaining tax revenue neutrality, in other words, keep the total sum of tax revenue collected unchanged. This is called revenue neutrality. As the total sum of tax revenue remains unchanged, taxpayers will find it difficult to complain about the ETR as there is no additional tax burden. The ETR is simply changing the tax base from income to carbon emissions without increasing the tax burden. Shifting the tax base from income to carbon will incentivise consumption and production patterns to transition towards a low-carbon green economy.

If the ETR is introduced gradually, it can reduce carbon emissions and at the same time potentially also increase economic growth. This is called a double-dividend hypothesis. Carbon emissions will be reduced as the tax on carbon is increased. The reduction in income tax will increase disposable income, which could drive GDP growth higher. Germany experimented with an ETR by increasing tax on fossil energy while reducing social security tax, from 1999 till 2003. The result was reported to have reduced emissions while increasing employment, as the double-dividend hypothesis suggested.

If the ETR could reduce emissions and increase growth and employment at the same time, the ETR could be a powerful policy tool to promote the paradigm of green economic growth and a synergistic win-win climate-economy paradigm. Unfortunately, so far not enough attempts have been made to firmly establish and operationalise the ETR double-dividend hypothesis. While considerable papers were produced on the practicality of the double-dividend hypothesis, not many actual experiments were conducted. Further research on how to introduce the ETR and realise the double-dividend hypothesis should be an essential foundation for new climate economics.

## 2.4 Carbon pricing options: Emissions trading and carbon tax

Fourthly, emissions trading and carbon tax are the ultimate policy options for carbon pricing. These policy options will make important topics for new climate economics. However, this article will not elaborate on these options as sufficient research results and information are already available.

In general, emissions trading is not an easy scheme for many developing countries to manage and realise the desired carbon emission reduction. The track records of managing emissions trading schemes in the EU and South Korea reveal that the complexity of the administration involves considerable costs, and a lot of time is needed to mature the system operation. Carbon tax could be simple and easy to administer, yet not many experiments are available, though there is plenty of theoretical research based on static general equilibrium models regarding the expected impact on GDP.

Most of the completed studies based on static CGE (computable general equilibrium) modelling projected that GDP would fall. However, depending on how the revenue from carbon tax is recycled, carbon tax could drive GDP growth up as well. If revenue from the carbon tax is invested in technology innovation and provides financial support for households and businesses, GDP growth could be positive. The main task of new climate economics will be developing dynamic modelling that could dispel the fear generated by static CGE modelling exercises and provide a vision that a carbon tax could open up in the long run new opportunities for higher growth and job creation.

### 3 Constructing positive climate-economy paradigm based on New Climate Economics

The unprecedentedly devastating climate events around the world recently are sounding an alarm bell that the climate crisis is accelerating much faster than most climate models have projected, reminding us once again of the fallibility of modelling exercises, whether for physical climate change or for long-term GDP growth for a clean energy transition.

The image of wildfire smoke billowing from Quebec shrouding the high-rise skyscrapers and the Statue of Liberty in Manhattan, and the Lincoln monument and the White House in Washington D.C., is emblematic of an impending climate disaster. The famous phrase from Albert Einstein that “we cannot solve our problems with the same thinking we used when we created them” couldn’t be more apt than now.

According to Nicholas Stern, author of *The Economics of Climate Change*: “Climate change is a result of the greatest market failure the world has seen.” To be more precise, climate change is a failure of a market that treated carbon as free goods. So traditional diagnosis based on conventional free market economics that treated carbon as an externality cannot solve the problem of climate change. Old thinking that triggered climate change cannot solve the problem of the future. Now is the time to construct new economic thinking that treats carbon as an economic good with a price, and move on to a long-term perspective that treats the energy transition as an investment, not a cost. Refining policy options and elaborating strategies that could align the clean energy transition with growth and job creation has to be the main focus of New Climate Economics. The success or failure of the clean energy transition and forestalling a climate disaster will depend on the positive climate-economy paradigm that has to be bolstered by the New Climate Economics.

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# Global Universities in an Age of Complexity

Eng Chye Tan – Adrian WJ Kuah

*Surprises often occur in a complex world, such as the global financial crisis or the pandemic. Indeed, the grand challenges of these times, including climate change, health and social solidarity, are complex. They require talented people who can see things in different ways and make sense of the issues holistically. They require solutions that harness different mental models – cognitive diversity. To overcome these grand challenges, societies and institutions might need to organise themselves differently.*

*The National University of Singapore (NUS) offers an example of how a global university is trying to organise itself differently, so it can perform its roles of education, research and innovation more effectively, amidst complexity. It has encouraged interdisciplinary learning and lifelong learning – to cultivate talented people who can deal with complex issues. It has also developed platforms to encourage collaboration across disciplines, sectors and borders – to tap cognitive diversity and develop solutions to grand challenges.*

*By no means is it the case that NUS offers the only way forward; it has faced challenges, such as a tradition of disciplinary specialisation and of educating high-school graduates, as well as changes in the external environment. This outline of NUS's experimentation and learning journey is intended to spark a discussion of how global universities*

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Professor Eng Chye Tan is the President of the National University of Singapore. Dr Adrian WJ Kuah (corresponding author) is the Director of the Futures Office at the National University of Singapore. E-mail: [adriankuah@nus.edu.sg](mailto:adriankuah@nus.edu.sg)



*and societies can adapt to these complex times, and hence contribute to sustainable futures.*

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## 1 Living with surprise

“Why did no one see it coming?” the late Queen Elizabeth asked economists at the London School of Economics during the global financial crisis (Giles, 2008). Similarly, the Covid-19 pandemic surprised people: fewer than half of the experts polled accurately predicted the number of deaths or infections (Recchia et al., 2021). Just as the world is learning to live with Covid-19, perhaps it will also need to learn to live with all manner of surprises.

This essay seeks to answer two questions. First, what explains this state of endemic surprise? In Section 2, it is argued that complexity lies at the heart of such surprises and characterises the grand challenges that societies face today, including climate change, public health and social solidarity. Second, what roles can global universities play in helping people understand and live in a complex world? Section 3 argues that global universities ought to continue cultivating talent, generating insights and developing solutions. They will be able to perform these roles more effectively by changing *how* they work: global universities will need stronger collaboration across academic disciplines, with government, business and communities, as well as across borders. This essay uses the National University of Singapore (NUS) as an illustration of how a global university is changing its approach to fulfilling its roles. In Section 4, some observations are made about NUS’s experiences in encouraging collaboration, along with reflections on how global universities might evolve.

## 2 Age of complexity

In 2021, some Singaporeans were frustrated by *perceived* policy reversals in relation to the pandemic. In May, the government had said that Singapore would live with Covid-19. In July, however, it tightened safe management measures (e.g. caps on the size of social gatherings) (Government of Singapore, 2023). One reason was that the virus evolved in surprising ways. A Duke-NUS Medical School professor said that scientists can predict how a mutation affects the virus's ability to bind to human cells, but not its overall behaviour, because changes in one part of a virus are accompanied by changes in others (Lai, 2021). The virus demonstrates a characteristic of complex systems: there are many moving parts, each of which affects others, shaping overall outcomes. In short, emergence.

Drawing on Richard Bookstaber, a former research principal at the US Department of the Treasury, it can be argued that emergence applies to bigger systems as well (Bookstaber, 2017). During the global financial crisis, for example, investors sold assets to curb risks, depressing asset prices and encouraging others to sell the asset to curb risks – a cycle of selloffs and declining prices. To Queen Elizabeth's question, economists may have failed to anticipate the 2008 financial crisis because they assumed that individuals and markets were rational. They failed to consider that the system may behave irrationally at times, even when each part is behaving rationally.

Adding more complexity, systems interact with one another. First, the micro system affects the macro system, and *vice versa*. For example, the evolution of the Covid-19 virus affected the number of patients hospitalised, public health measures, the revenue of businesses and the well-being of individuals and families. Second, systems shape one another, such as social solidarity and climate change. In 2018, the Yellow Jackets protested after the French government raised taxes on petrol as part of its efforts

to curb emissions (Smith, 2018). Since 2008, Democrats and Republicans in the USA have diverged further about whether environmental protection should be a top government priority (Kennedy & Johnson, 2020). The age of complexity means that grand challenges, entangled with systems and issues, cannot be solved in isolation.

The implications of the above examples for universities, as they have been configured for the longest time, are profound. On the one hand, these emerging complex challenges speak to messiness, non-linearities, non-obvious interdependence and the blurring of disciplinary boundaries. On the other, the modern university, in the main, is structured in a way that privileges disciplinary specialisation often to such an extent that interdisciplinary conversation, much less collaboration, is the exception rather than the norm. Yet interdisciplinarity is the key to solving complex challenges that make a mockery of disciplinary boundaries.

## 2.1 Implications of complexity

One implication is that it will be insufficient for societies to view complex systems, issues and grand challenges through only one lens. Societies must tap cognitive diversity – varied methods and mental models – to make better sense of complex issues. In 2006, for example, Netflix ran a competition to predict how consumers would rate movies; it offered USD 1 million to anyone or any team whose algorithm was 10 per cent more accurate than Netflix's. In 2009, a team won the prize – but only after merging a few times with other teams and integrating their insights into the eventual algorithm (Page, 2017).

Another implication concerns how societies and institutions organise themselves; it is assumed that how a society or institution organises itself must be adaptive to its external environment (Boisot & McKelvey, 2011). Writing in the early 1900s, pioneering sociologist Max Weber argued that societies were once governed by charismatic leaders, but increasingly came to be governed via

bureaucracies – hierarchies with rationally delineated roles and responsibilities (Weber, 2009). Bureaucracy was an adaptation to an industrialising society.

It remains an open question how societies and institutions ought to organise themselves for an age of complexity. Electrical appliance maker Haier Group, based in Qingdao, China, offers one possible path: a former state-owned enterprise, Haier has turned itself into thousands of microenterprises. When a business opportunity arises, microenterprises (e.g. research and development, manufacturing, sales and marketing) join up to create a product, make it and sell it, such as a washing machine that cleans potatoes. Haier sees itself as an incubator, a large platform that provides the enabling conditions for the microenterprises to grow (De Smet et al., 2021). If the product flops, they disband; if it takes off, they continue working as a team (Cao, 2018). Self-organised microenterprises may be a way forward or not. Haier nevertheless offers an example of how an organisation is adapting its structure to its external environment.

### 3 Global universities in an age of complexity

Section 3 asks two main questions: what roles should global universities play in an age of complexity? How might global universities adapt their organisational structures and ways of working to fulfil those roles?

Before addressing the first question, it would be useful to outline the roles universities play. Historically, universities educated people, e.g. medieval universities in Europe, such as the University of Bologna. Later, universities started to conduct research alongside education. Founded in 1810, the Humboldt University of Berlin exemplified this turn toward research-intensive universities with specialisation. More recently, universities translate research

into innovations, patents and start-ups, as part of a broader turn toward “entrepreneurial universities” (Clark, 1998). These roles coexist in a modern comprehensive research university. To paraphrase Clark Kerr, ex-University of California President, the comprehensive research university is a “city of intellect,” enriched by diverse groups (e.g. educators, researchers, undergraduates and postgraduates) pursuing diverse purposes (Kerr, 2001).

In broad strokes, this has been NUS’s journey too. NUS started as a medical school in 1905 and added an arts and sciences college in 1928. From the colonial era through the first three decades of independent Singapore, NUS continued to function largely as a teaching university. In the mid- and late-1990s, NUS grew into a comprehensive research university and entrepreneurial university. This change came as Singapore sought to become the “Boston of the East,” as then Deputy Prime Minister Dr Tony Tan said in 1997 (Tan, 1997, p. 2). Higher education changes were enmeshed with the national strategy to turn Singapore into a knowledge-based or innovation-led economy.

Today, NUS educates more than 30,000 undergraduates and 11,000 postgraduates from Singapore and abroad, while conducting research in fields ranging from anthropology to zoology and translating that research into patents and start-ups. In the last 20 years, close to 4,000 students joined an entrepreneurial education programme, NUS Overseas Colleges (NOC). They have set up more than 1,000 start-ups. Around half are currently active and they have raised more than SGD 3.5 billion (equivalent to USD 2.6 billion as at 30 June 2023). Two of NUS’s unicorn start-ups are founded by NOC alumni – Carousell and PatSnap.

### 3.1 Unchanging why, changing how

In this essay, it is argued that these triple roles – to educate, research and innovate – remain salient. Indeed, they may grow more salient in an age of complexity. After all, societies will continue to need talented people who can work, live and play with

complex grand challenges; research insights that elucidate the grand challenges; and solutions to address climate change, public health, social solidarity and other complex grand challenges.

Universities, however, will need to change their approaches to education, research and innovation. Given the need to tap cognitive diversity, global universities will need greater collaboration across academic disciplines, with government, business and communities, as well as across borders. No single discipline, entity or nation holds a monopoly of insights into complex challenges, precisely because one part affects another and one nation another, creating hard-to-predict emergent outcomes. Illustrating how knowledge creation increasingly occurs across sectors, industry hired nearly 70 per cent of Artificial Intelligence (AI) PhDs in 2020, up from 21 per cent in 2004; research papers with both academic and industry authors accounted for 38 per cent of presentations at leading conferences in 2020, up from 22 per cent in 2000 (Ahmed et al., 2023).

In this essay, NUS is used as an illustration of how global universities could evolve their approach. NUS believes that it will be able to perform its triple roles more effectively by changing *how* it works: greater collaboration across academic disciplines, with government, business and communities, as well as across borders. In research and innovation, NUS has introduced platforms to tap cognitive diversity. These encompass hardware, such as a place where people gather and collaborate, and software, such as shared problem statements. In education, NUS has created space for interdisciplinary teaching and expanded lifelong learning; these cultivate the habits of mind to grapple with complex issues and specific skills to perform tasks, e.g. coding.

Far from suggesting that these changes are *the* path forward, the intention in this essay is to spark thinking about how global universities can adapt to an age of complexity – a subset of the broader question of how organisations and societies might organise themselves for complex grand challenges, such as

sustainability. NUS represents one of many possible ways for global universities to adapt to complexity. Indeed, NUS has encountered many challenges, which will be outlined, and the outcomes are far from preordained. It is NUS's conviction that venturing a different approach is imperative: sticking with past approaches alone will not suffice.

### 3.2 Platforms in research and innovation

In research and innovation, NUS has brought together experts from different disciplines, sectors and even countries through platforms: define joint problem statements that various experts can address together and allocate space and resources for them to gather and collaborate. In this section, three examples of platforms in the areas of climate sustainability and health are outlined.

#### 3.2.1 *Nature-based solutions*

The Centre for Nature-based Climate Solutions (CNCS) is a platform that seeks to develop nature-based solutions to climate change; for example, restoring mangrove and other forests can help store carbon and mitigate climate change. This requires bringing to bear insights from different disciplines. For example, mangrove restoration requires understanding the wave activity and tidal flows at a site, the conditions necessary for a particular mangrove species to grow, problems around land tenure and community ownership of the reforestation sites and more. In other words, a transdisciplinary approach (Friess et al., 2022).

Beyond the disciplines, nature-based solutions also often require cross-sectoral and cross-border collaboration. This is because Singapore is a small city-state, but South and Southeast Asia account for 7 per cent of the world's forests (Food and Agriculture Organization of the United Nations, 2020). Southeast Asia accounts for roughly one-third of the world's mangrove forests (Leal & Spalding, 2022). For example, a SGD 15 million (equivalent to USD 11.1 million as at 30 June 2023) project, Carbon Integrity SG, will monitor conservation and reforestation projects by setting

up monitoring plots and using Light Detection and Ranging (Lidar) technology. CNCS is working with a renewable energy company in the Philippines on such a project. These efforts aim to boost confidence in estimates of how much carbon is captured and, hence, in carbon credits (National University of Singapore, 2022). By enabling companies to trade carbon credits, Carbon Integrity SG ultimately incentivises forest conservation.

### *3.2.2 Adapting to climate change in food security*

Given that climate change will impact food production, NUS has set up platforms in food science and agricultural technologies, often in collaboration with business and the government in Singapore, which aims to meet 30 per cent of the city-state's nutritional needs through local production by 2030. AquaPolis brings together the national food agency, seven fish producers, and NUS researchers to work on projects, such as identifying the best time to move young fish out of the nursery to get the best yield, or mitigating viral infections as waters warm (Begum, 2022). AquaPolis is partly anchored in a shared physical space – an R&D lab located on St. John's Island, in the southern seas of Singapore (Singapore Food Agency, n.d.). As another example, the NUS Agritech Centre helps commercialise deep-tech start-ups by providing space and equipment, such as climate-controlled chambers, for researchers and entrepreneurs to develop innovations (NUS Enterprise, n.d.). One start-up, Singrow, has developed strawberries that grow in warmer temperatures. The start-up is also trying to develop 30 other crop varieties (Chew, 2023).

### *3.2.3 Wicked problem of an ageing population*

NUS is strengthening expertise in population health and has similarly set up platforms to promote health and optimise health span (or the length of time when people are healthy). This is salient as populations age. In Singapore, one in ten people was 65 years or older in 2012; by 2030, roughly one in four will be 65 years or older (Strategy Group et al., 2022). Government operating expenditure on health tripled from SGD 3.3 billion



(equivalent to USD 2.4 billion as at 30 June 2023) in 2010 to SGD 9.9 billion (equivalent to USD 7.3 billion as at 30 June 2023) in 2019 (Ministry of Health, n.d.). At this rate, it will hit SGD 27 billion (equivalent to USD 20 billion as at 30 June 2023) in 2030 (Ong, 2022). Many Group of 20 nations (G20) are ageing too, including China whose working population has already shrunk (United Nations Department of Economic and Social Affairs Population Division, 2022).

To create solutions to raise health span, not just life span, NUS has partnered the Singapore Ministry of Health, the Housing Development Board (HDB), the National University Health System (to which the NUS Yong Loo Lin School of Medicine (NUS Medicine) belongs), residents, and others to form Health District @ Queenstown. Because Queenstown, a housing estate, is super-aged – 21 per cent of its residents are aged 65 years and older (Singapore Department of Statistics, 2021) – it offers a glimpse of what it might be like when Singapore becomes super-aged in 2026 (Ong, 2023).

Health District @ Queenstown provides a platform for education, research and innovation for every discipline. Engineering students learn codesign as they develop technology with older residents. Medicine colleagues are testing healthcare and social interventions to prevent, delay and even reverse frailty. Humanities colleagues are exploring mentoring among NUS students, older residents and school children in Queenstown, to counter ageism and strengthen intergenerational cohesion. The Yong Siew Toh Conservatory in NUS is exploring the ability of music to address loneliness. Indeed, the study of and innovations for an ageing population cut across all disciplines.

In addition, the Healthy Longevity Translational Research Programme initiated by NUS Medicine seeks to improve health by learning how the body ages and developing interventions to extend healthy longevity. One study aims to identify molecular and physiological markers of unhealthy ageing, such as pulse rate

velocity, to help at-risk people prolong healthy years (Khor, 2021). The Programme's Centre for Healthy Longevity, where people seek to enhance health span, is located at Alexandra Hospital, in Queenstown.

### 3.3 Changes in education

As platforms tap cognitive diversity and encourage collaboration for research and innovation, how might the global university change how it educates? NUS believes that there are two broad sets of changes necessary. First, a global university must help learners cultivate the habits of mind to make sense of complex challenges and relate to others as fellow citizens and human beings, while honing specific skills to perform tasks to stay relevant as economic agents, e.g. structure green bonds and use R for data analytics.

Second, a global university needs to offer people lifelong learning opportunities to cultivate habits of mind and hone specific skills throughout their active years. This is partly because of technological changes, e.g. AI. The World Economic Forum (WEF) projects that 12 per cent of workers today are in jobs that will be displaced from 2023–2027, while new jobs created in this period will amount to 10 per cent of the jobs existing today. People will need to pick up new skills for new tasks or jobs, but this adjustment takes time: six in ten workers will require training before 2027, but only half have enough training opportunities (World Economic Forum, 2023).

Shortcomings in facilitating this adjustment could hurt social solidarity. For example, the information technology revolution is found to have decreased middle-income jobs and increased high- and low-income jobs (Autor & Dorn, 2013). This may have contributed to social and political polarisation in advanced economies, and even “deaths of despair” (e.g. suicide, drug use) among the American White working class (Case & Deaton, 2021). To enable Singaporeans as whole to flourish amid technological

change, Singapore has embraced lifelong learning: the SkillsFuture movement supports Singaporeans in deepening their skills throughout their lives.

### 3.3.1 Interdisciplinary learning

To help cultivate habits of mind in people to deal with complexity, NUS has expanded the space for interdisciplinary learning to complement its traditional focus on disciplinary specialisation, as part of its undergraduate programmes. This is intended to help learners view complex problems as a whole – to delve into one part, while recognising how it affects others, and view them in new light. To grasp different approaches to viewing and addressing problems – in a way, to learn to live like an engineer, scientist, philosopher or sociologist, without being one. Exposure across disciplines will hopefully cultivate mental habits of versatility, agility and curiosity, making these second nature to NUS graduates, and mitigate the risks of obsolescence. To be clear, interdisciplinary learning builds on disciplinary perspectives and insights.

Hence NUS introduced an interdisciplinary Common Curriculum in 2021 for undergraduates in the natural sciences, social sciences and humanities; and in 2022 for undergraduates in engineering and design. Learners take the Common Curriculum in their first 18 months, developing habits of mind early in their college career. This accounts for one-third of the courses a learner needs to graduate. Later, learners can choose to specialise in a discipline, add a second specialisation or take advanced interdisciplinary courses.

By way of illustration, a course on *Sporting Bodies* covers mental and physical health, gender and sexuality, and doping and substance abuse, through both cultural and scientific lenses. It is offered by Pharmacy, and Communications and New Media. Another course, by Economics and Chemistry, unites the physics and chemistry of electric-vehicle technology with environmental,

economic, geopolitical and policy considerations (NUS College of Humanities and Sciences, n.d.).

To support these curricular changes, NUS merged the Faculty of Engineering and the School of Design and Environment to become the College of Design and Engineering (CDE). It also created the College of Humanities and Sciences (CHS), which taps the deep capabilities in the Faculty of Science and the Faculty of Arts and Social Sciences. In 2022, NUS established its first honours college, NUS College, to “break open the classroom” and nurture graduates adept at dealing with the unknowns through interdisciplinary education (National University of Singapore, n.d.-a). NUS implemented these changes in the past three years, impacting around three-fifths of incoming undergraduates each year.

### *3.3.2 Learning from young to old*

CHS and CDE enable younger learners to cultivate habits of mind through interdisciplinary education, while continuing to hone specific skills through the disciplines. What about supporting learning throughout life? To encourage NUS alumni to keep learning, a learner is now enrolled for 20 years when he or she enters as an undergraduate or postgraduate, instead of the traditional one to four years.

Yet lifelong learning requires other changes in how a global university operates. Adults learn differently; they juggle family and work responsibilities and value relevance to work. Their needs may be varied: some want to change careers, others to satisfy their curiosity. And the numbers change too. As Minister for Education Chan Chun Sing said, the challenge in Singapore “is never about just producing a cohort of 30 or 40,000 graduates a year from our IHLs [institutes of higher learning]. It is that, plus reskilling half a million or more adult learners every year to keep pace with the competition” (Chan, 2022, point 21).

Building on earlier efforts in continuing education, NUS set up the School of Continuing and Lifelong Education (SCALE) in 2016 to unify professional development and continuing education and training (CET) offerings at the university. SCALE supports the delivery of large-scale training. Its programmes target the needs of working professionals and are therefore broad-based and multidisciplinary. NUS conducted nearly 650,000 days of CET in 2020, up 50 per cent from 420,000 days in 2016 (National University of Singapore, 2021).

To achieve this, first, NUS works closely with industry associations, unions and employers to ensure its courses meet the professional needs of adult learners. For example, SCALE's services are available to corporations through "All-You-Can-Learn" (AYCL), a customisable training programme to upskill and reskill employees. NUS has memoranda of agreement with nine clients under the AYCL programme. Some learning programmes also require learners to work with a private, public or non-profit organisation, to invent an application or solve an industry problem. They are mentored by a faculty advisor and a company representative.

Second, to accommodate the number and needs of working adults, NUS has introduced flexibility in terms of teaching schedule and learning journeys. On schedules, SCALE offers short courses (which typically last a few days), including in the evening and over the weekend. These can be taken all year round, whereas semester courses follow the academic calendar, with intakes in August and January.

NUS has also created more flexible learning journeys: a learner can start with short courses, then stack them into graduate certificates, graduate diplomas and degrees. For example, students can take three courses, such as Hydrogen Energy and Technology, and receive a Graduate Certificate in Sustainable Energy & Chemicals. They can then choose to pursue a Master of Science

(Chemical Engineering) or Master of Science (Energy Systems) programme; what they learn as part of the graduate certificate will count toward their degree requirements (National University of Singapore, n.d.-b).

It is worth emphasising that NUS both hones specific skills and cultivates habits of mind in adult learners. Some of its new postgraduate programmes (Master's and Graduate Diplomas) are multidisciplinary or interdisciplinary. In the Lee Kuan Yew School of Public Policy's course, "3D Printing, Robots and Public Policy," for example, students explore the benefits and risks of 3D printing and robotics in various industries, as well as the policy and regulatory implications in terms of growth, efficiency and equity, and competitiveness. This equips a future policymaker with knowledge and skills from different disciplines to make informed decisions about how to maximise the benefits and manage the risks of 3D printing (NUSMods, n.d.).

## 4 Reflections

In this essay, NUS has been used as an example of how one global university is adapting its ways of working and organisational form to an age of complexity, even while staying true to the roles of educating, researching and innovating. In research and innovation, it has encouraged collaboration across disciplines, organisations and borders through platforms, which share joint problem statements and sometimes facilities. In education, it cultivates the habits of mind for a complex world by creating room for interdisciplinary learning for college-age learners and, to an extent, adult learners, while continuing to let them hone specific skills and specialisations. It has embraced lifelong learning: it works closely with industry to ensure the relevance of its courses, and boosts flexibility in learning schedules and experiences to cater to the larger pool of adult learners and their needs.

## 4.1 Challenges

Despite these intentions, NUS has experienced some challenges, which would be instructive to other global universities and even societies exploring how they want to adapt to an age of complexity. It bears emphasis that the intent is to trigger thinking about how global universities and societies might want to change.

First, the recent embrace of interdisciplinary learning, research and innovation runs against the grain of history – NUS and many universities have traditionally organised themselves along disciplines (de Greef et al., 2017). Professors may find it hard to understand each other, for example, because “urban ecosystem services” means one thing to an architect, another to an economist (Tan et al., 2020). Similarly, if a professor sits in one department, it is much harder to find a collaborator far away in another department. Given that interdisciplinary learning is recent, what is “bad” is clearer (e.g. a philosopher teaches the first half of the course, a chemist the second) than what is “good” (e.g. integration of disciplinary perspectives into novel insights).

Second, the university has traditionally educated high-school graduates, who learn over three or four years. This differs from teaching adults with professional experience. Professors need to turn a semester-long course into a few courses that run for a few days each; work with industry to identify specific skills needed and problems to solve; design short courses that stack into certificates and degrees; strike a balance between cultivating habits of mind and building specific skills, especially in short courses; and even scheduling night classes. These changes require adjustment.

In the literature on change management, there is considerable discussion of organisational culture, deeply held assumptions and mindsets (Schein, 2010). In some senses, the university’s habit of mind is to focus on the disciplines, not collaboration across disciplines and organisations. It is to focus on the 20-year-old

undergraduate, not people who will need to learn different things, when they are young, working or retired. Yet universities must cultivate new habits of mind, alongside existing ones, as they seek to educate, research and innovate more effectively.

A third challenge lies beyond the university. The “global university” is premised on a globalising world: students and faculty come from different countries, and researchers work with peers across borders. Four of the five senior leaders at NUS – the flagship national university – completed their undergraduate studies outside Singapore. Around the world, cross-border collaborations accounted for 23 per cent of science and engineering publications in 2020, nearly double the 12 per cent figure from 1996 (White, 2021). This is especially necessary in a complex world, where there is a “diversity bonus” to reap from tapping ideas and talent (Page, 2017).

National security concerns, however, have grown more salient in higher education, particularly amid growing tensions between the USA and China. If scholars and research centres are subjected to security vetting, the cross-border flow of talent and ideas could slow. For example, the number of researchers who declare affiliations both in the USA and China on research papers fell by more than 20 per cent from 2019 to 2022 (Van Noorden, 2022). To be sure, policymakers in each nation have their considerations. Far from offering judgment, this essay makes the point that national security considerations could hinder global universities from connecting people and ideas, and from cultivating talent and insight, when it would be ideal for countries to set aside their differences and work together to address global grand challenges.



## 5 Conclusion

It has been the contention of this essay that complexity increasingly characterises the world today. Because of emergent outcomes, surprises occur often in an interconnected world, such as the global financial crisis and pandemic. The grand challenges of these times, including climate change, health and social solidarity, are inherently complex. They require talent who can see things in different ways and make sense of the issues holistically. They require a raft of solutions that harness different mental models – cognitive diversity. It is argued that societies and institutions might need to organise themselves differently for this age of complexity if they are to overcome these grand challenges and flourish.

In this essay, NUS is offered as one example of how a global university is trying to adapt *how* it functions to perform its roles of education, research and innovation more effectively. Specifically, it has encouraged interdisciplinary learning and lifelong learning, as well as platforms to encourage collaboration across disciplines, sectors and borders. By no means is it the case that NUS offers the only way forward; indeed, it has faced considerable challenges, both from its own habits of mind regarding disciplinary specialisation and high-school graduates, and from changes in the external environment. Through this outline of NUS's own experimentation and learning, it is hoped that a discussion will be sparked about how global universities and societies can adapt to these complex times, and hence contribute to sustainable futures.

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## GEO AWAKENINGS – BUILDING A SUSTAINABLE FUTURE IN THE EMERGING EURASIAN ERA

With mounting geopolitical tensions, the increasingly fragmented international order and worsening climate change both require long-term, stable solutions, which certainly necessitates international cooperation. The challenges that are taking place today, mainly arising as a result of economic and social cycle changes, which can be identified as crisis situations, also increase the need for cooperation. In Eurasia, practical and theoretical cooperation goes back thousands of years, providing a stable basis for focusing on common goals when building the future.

In the modern world, cooperation and collaboration are necessary not just between individual international actors but also between different disciplines. This is even more so the case, as sustainable development is now universally recognised as one of the pillars of development for each unique discipline. This recognition leads to the emergence of interdisciplinary approaches that bring together experts from various fields to address complex global challenges. By fostering cooperation and collaboration, these approaches promote the exchange of knowledge, ideas and resources, ultimately leading to more effective and holistic solutions for sustainable development.

The decade of the 2020s promises to be extremely hectic, creating new opportunities for Eurasian cooperation and the countries of the region. This volume represents the Magyar Nemzeti Bank's commitment to the realisation of Hungary's goal of bridging East and West in the centre of Eurasia and becoming a future intellectual and financial hub. It aims to reach a broad audience and offer a solid foundation for discussion on its topics in the future. By including the perspectives of outstanding experts from China, Germany, Singapore, the United Kingdom, South Korea, Norway and Hungary, the volume provides a comprehensive understanding of the global implications of the ongoing transformation from geopolitical, financial and technological aspects and sets an example for others to follow on the significance and forward-thinking character of cooperation.