

# Dániel Holló and Márton Nagy: Analysis of banking system efficiency in the European Union<sup>1</sup>

*In addition to aspects related to financial stability, the cost efficiency gap observed between the banking systems of the old and the new EU member states is also unfavourable from a welfare point of view. In the majority of new member states, banks are likely to price the relatively high rate of cost efficiency losses and the oligopolistic factor linked to insufficient competition in the interest rates. The high loan and low deposit interest rates may prevent, through the volume effect, an upturn in savings and investment propensity, and thereby the implementation of a higher path of economic growth.*

*In the course of our research, we measured variations in efficiency in the member states of the European Union and attempted to explain the reasons for such differences. We evidenced on an empirical basis that the degree of differences between member states and their change through time is significantly determined by the characteristics of the operational environment and the conscious behaviour of management. The conscious behaviour of management is of exclusive relevance in the long term, for the impact of advantages and disadvantages underlying the operational environment is reduced or eliminated through the integration of financial markets and institutions and the establishment of the Single European Market.*

## INTRODUCTION

The rapid development of information technology, the appearance of new competitors exploiting opportunities offered by a global capital market and the creation of new markets linked to rapid innovations has significantly promoted the intensification of competition and accelerated the consolidation of the European banking system. The banking sectors of EU countries have faced many challenges in the past decade. With regard to old member states, the Second European Directive, regulating Banking and Financial Services, the "Single European Passport" significantly accelerated the pace of deregulation, contributing to strengthening competition and the establishment of the Single Financial Market through the reduction of market access costs. The European Monetary Union (EMU) also promoted the comprehensive elimination of the operational constraints of institutions. The introduction of the euro was determinant in accelerating the integration of money and capital markets, whereby local banks gradually lost their competitive edge to foreign banks.

The integration of the banking system into the Single Banking Market commenced in parallel with the transformation of the financial intermediary system. Economic convergence, the harmonisation of regulations and the enlargement of the EU further accelerated the consolidation and integration of the banking systems of new EU member states. Following the elimination of the command economy and the single tier banking system in the new EU

member states, money and capital market liberalisation and the privatisation of the economic sector laid the foundations of the modern financial institutional system. The high influx of foreign capital, institutional consolidation and the creation of an efficient regulatory environment contributed to the rapid transformation and development of the banking system and the market-based pricing and lending activity of banks.

Our study attempts to determine the degree of efficiency differences in different countries, resulting from the specific characteristics of the operational environment, and independently of the above, the conscious behaviour of management. For the purpose of measuring such differences, we attempt to filter impacts originating from the varying operational environment of banks. We examine the efficiency of the banking systems of European Union member states, and analyse the degree and manner in which the efficiency gap changes between old and new EU members. In addition, we shall measure the rate of efficiency convergence within individual member states of the EU and between member states.

This study applies two efficiency indicators: the so-called cost efficiency (hereinafter "cost efficiency") and the alternative profit efficiency (hereinafter "profit efficiency") indicators. The cost efficiency indicator serves to measure the adequacy or inadequacy of management in managing bank operations through cost management. In relation to profit efficiency, we investigate the manner

<sup>1</sup> A more detailed study of the topic may be accessed on the home page of the Magyar Nemzeti Bank (Working Papers 2006/3).

in which the work of management impacts the varying profitability of banks. The profit efficiency approach provides greater depth of information in comparison to the cost efficiency method, because it takes into account that, in addition to the choice of a cost structure, the management's "conscious" selection of output prices and non-price factors may also contribute to efficient operation. We deduce on an empirical basis that results produced from the measurement of cost and profit efficiency and the related conclusions may vary to a major degree without the filtering of effects originating from differing operational environments. By controlling the impacts of the operational environment, however, the conclusions drawn in relation to cost and profit efficiency reveal consistency.

Our research is distinguished by the fact that it attributes primary relevance to the conscious improvement of efficiency in relation to the stability of the banking system. There is the risk of management complacency and disregard for the need to improve efficiency in the light of high profits linked to limited competition or other market deficiencies. Only a conscious improvement of efficiency may contribute to the sustainable income producing capacity of a bank; in the long term, the operation of the Single European Banking Market will lead to the limited impact or elimination of other profit and efficiency related differences caused by market deficiencies. Importantly, the improvement in efficiency may have welfare related implications; in general terms, the "efficiency surplus" of efficient institutions reflected in pricing may firstly promote investments and consumption through a fall in loan interest rates, boosting the growth of the economy, and secondly, it may lead to a consumption surplus through the reduction of the interest burden.

### EFFICIENCY APPROACHES

In practice, the relative efficiency of banks, compared to their competitors, is most often analysed on the basis of accounting-financial indicators. In addition to accounting indicators, however, the application of the statistical approach is also warranted. With statistics-based cost efficiency indicators, for example, it is possible to determine the impact of the ability or inability (ability) of management on bank operations through cost management. "Ability differences" in management are linked to the appropriate allocation of inputs and the use of technologies. The profit efficiency approach provides greater depth of information

in comparison to the cost efficiency method because it takes into account that, in addition to the choice of a cost structure, the management's "conscious" selection of output prices and non-price factors may also contribute to efficient operation. As a result of the "conscious" efforts of management, services, for example, with varying quality may be produced, and imperfect competitive pricing behaviour may strengthen, contributing to the enhanced role of the oligopolistic factor and non-interest revenue. In the course of our research, we preferred the statistics-based, so-called parametric approach, on the assumption that the efficiency frontier may be defined with a given function.

Parametric methods are most frequently used to estimate cost efficiency, while the analysis of profit efficiency has become more common in the past few years. The measurement of cost efficiency is important because it produces the greatest impact on the pricing and profitability of banks. The term of cost efficiency was first introduced by Leibenstein (1966). He used the concept to focus on "differences in the abilities" of management among different banks. Such "differences in abilities" imply the success of managing costs, allocating inputs and using technologies. Allocative efficiency, as a component of cost efficiency, attempts to incorporate efficiency linked to the degree in which management is capable of adequately reacting to relative price changes, replacing relatively more expensive inputs with relatively cheaper ones, while the technological component of cost efficiency measures the ability of management in elaborating adequate production plans and the ability of assigning resources to plans.

The estimation of profit efficiency comprises a relatively new area in efficiency literature. On the basis of the work of Berger and Mester (1997), we define alternative profit efficiency as follows: how close is the given bank to achieving maximum profit with given output levels.

Most of the publications discussing the topic study the banking system of the USA. Relatively few European studies have been published on efficiency and the analysis of the financial systems of transition economies from an efficiency point of view has been very limited.<sup>2</sup> Comparative research analysing the efficiency of banking systems in different countries is also very scarce, possibly owing to the difficult management of problems arising from different operational environments and their impact produced on efficiency.

<sup>2</sup> As emphasised by Berger and Humphrey (1997), of the 122 efficiency studies, encompassing 21 countries, only roughly 5% of these study transition economies.

## MAIN DIFFERENCES IN THE OPERATIONAL ENVIRONMENT OF EU COUNTRIES

When comparing the banking systems of countries, one of the major challenges is to assess and analyse the main differences in the operational environment and separate the impact of these on efficiency from effects originating from the behaviour of management. We will accordingly analyse the main sources of heterogeneity in the operational environment.

### The macroeconomic environment

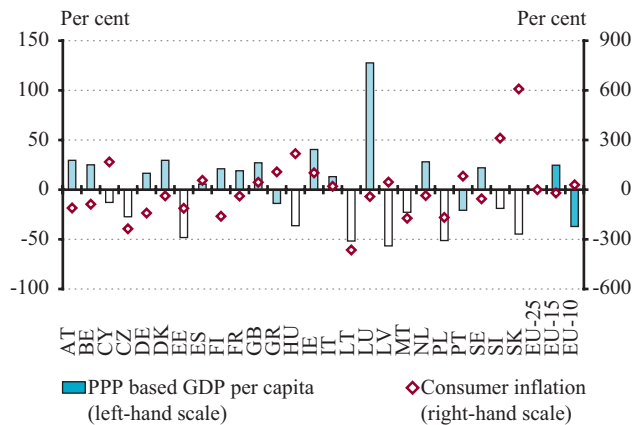
In the past decade, the macroeconomy has gained in stability in the old and new member states of the European Union. The majority of old member states fulfilled nominal convergence, the Maastricht criteria, and introduced the common currency, the euro, in 1999. In the new member states, the system of a command economy has been replaced with the market economy, promoting the commencement and acceleration of nominal convergence with the real economy of the EU and the five pillars of the EMU (exchange rate stability, price stability, balance of the budget, low level of general government debt, convergence of long-term interest rates). Despite the accomplishments, major economic differences remain, particularly between old and new member states of the European Union.

In relation to the convergence of the real economy, we may establish that, although the growth rate of the economy and productivity is higher on an aggregate level in new EU member states, the rate of output is smaller than in old member states. The average level of development in new EU member states, measured with GDP calculated on a per capita PPP basis, corresponds to nearly two-thirds of the rate in old EU members. This level is surpassed, among acceding countries, by the Czech Republic, Cyprus, Malta and Slovenia.

With respect to nominal convergence, it is important to note that differences in the average rate of inflation between the old (EU-15) and the new (EU-10) member states are smaller than in the level of economic development, but there is a high degree of heterogeneity among the member states. Although the majority of old member states reduced the rate of inflation to a low level prior to the introduction of the euro, the relative differences remain high among these countries. With regard to new member

Chart 1

Variation in percentage of the level of development and inflation of member states from the EU-25 average (in 2003)



Note: EU-15 denotes old EU member states, while EU-10 denotes new EU member states.

Source: Eurostat.

states, the differences arise from the fact that with the exception of Slovakia, Slovenia, Hungary and Cyprus, the majority of countries had reached levels defined by Maastricht criteria as early as 2003.

In the euro zone, common monetary policy has considerably reduced fluctuations in interest rates and increased homogeneity among countries. In relation to long-term interest rates, all new EU member states have fulfilled convergence criteria, with the exception of Hungary. Major variations are observed, however, among new member states with regard to different inflation rates and higher risk premium arising from fiscal imbalance and exchange rate fluctuations.

### The regulatory environment

Following the 1980s, the financial sector of the EU underwent a major process of liberalisation (capital flow) and deregulation (establishment and cessation of commercial banks, capital adequacy of banks). Following the adoption of the Second European Directive (1989), regulating Banking and Financial Services, the "Single European Passport" (1993) and the launching of the Financial Services Action Plan (1999), the convergence of regulatory systems was considerably accelerated.<sup>3</sup> Since the new member states had implemented the major European banking directives prior to accession, the enlargement of the EU slowed down but did not suspend the continuous harmonisation of financial regulations.<sup>4</sup>

<sup>3</sup> The largest future challenges in Europe are linked to the harmonisation of the varying regulations of mortgage lending, asset management, financial consulting and insurance activity in the different countries, the implementation of Basel II and the introduction of the euro in new EU member states.

<sup>4</sup> Many countries are yet to fully adopt European directives related to co-operatives and the deposit insurance system. Several new member states must proceed with the harmonisation of regulations related to capital regulation, bankruptcy laws and the operation of branches and affiliates.

It is important to note that, although the harmonisation of European directives reduced the level of heterogeneity in regulation in the past year, the stringency of the regulation of similar activities significantly varies among member states. Moreover, major differences may also be observed in relation to non-directive financial regulations and those going beyond so-called minimum levels. Such factors include consumer protection, the protection of minority shareholders, the quality of corporate governance and the promotion of competition and efficiency.

### Depth of financial intermediation

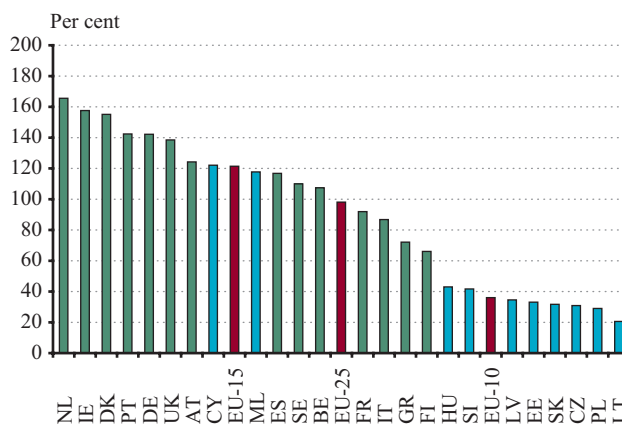
Among the major factors linked to the operational environment, the largest differences among EU member states arise in relation to financial intermediation. The average loan/GDP indicator (36%) of the banking system of new EU member states is less than one-third of the rate of old member states (125%).

The high level of divergence among new EU member states is indicated by three well definable groups of banking systems in relation to the depth of financial intermediation and its trends. The GDP-proportionate level of loans provided by the banking system to the private sector in Cyprus and Malta had reached the average rate of old EU member states as early as 2001. The rapid growth of the banks' economic role in these two countries is attributed to the early wave of privatisation, accelerated financial liberalisation and the stable growth rate of the economy. The second group includes the Czech Republic and Slovakia, where the depth of bank intermediation approximated the minimum level of old EU member states (60%) as early as 1998, as a result of the extensive financing of state-owned companies and early capital liberalisation. The GDP-proportionate rate of lending to the private sector, however, was roughly halved by 2003 (30%), due to, firstly, a high degree of portfolio rationalisation and, secondly, the firm expansion of the government's role in crediting, in parallel with the implementation of more stringent regulations. The third group includes the Baltic states (Estonia, Lithuania<sup>5</sup> and Latvia), Poland, Hungary and Slovenia, where the role of banks within the economy has been steadily gaining ground only since 1999-2000 from previously recorded low levels. Despite the rising trends, the gap between these countries has not narrowed significantly.

Finally, we should make note of the strong heterogeneity observed in old EU member states in relation to the role of

### Chart 2

The GDP-proportionate rate of lending by commercial banks of EU member states to the private sector (in 2003)



Note: We did not include Luxembourg because the GDP-proportionate rate of lending to the private sector is exceptionally high at 500%.

Source: ECB.

banks in financial intermediation. In Finland, Greece, Italy and France, the GDP-proportionate rate of bank loans to the private sector is lower than the EU-15 average, while the rate is higher in The Netherlands, Ireland, Denmark, Portugal and Germany. Differences in the depth of financial intermediation among countries is primarily caused by the varying role assigned to the capital market, the varying stringency of financial regulation and other country-specific factors.

### Market concentration

As a result of the consolidation process, the new EU member states have not only succeeded in narrowing the gap between old member states in economic, regulatory areas and financial intermediation, but also in relation to the market structure. Nevertheless, a major gap remains between the banking systems of the two regions with regard to market concentration.

Following the creation of the two-tier banking system in the new EU member states, the privatisation and recapitalisation of banks and the appearance of numerous new banks on the market contributed to the rapid dismantling of the monopolistic structures. The acquisition of most banks by foreign investors, the transfer of technology (modern risk management, corporate governance and settlement methods) and well-trained professionals greatly promoted the rise and integration of the financial sector's productivity.<sup>6</sup> In the second half of the 1990s, however, acquisitions, merg-

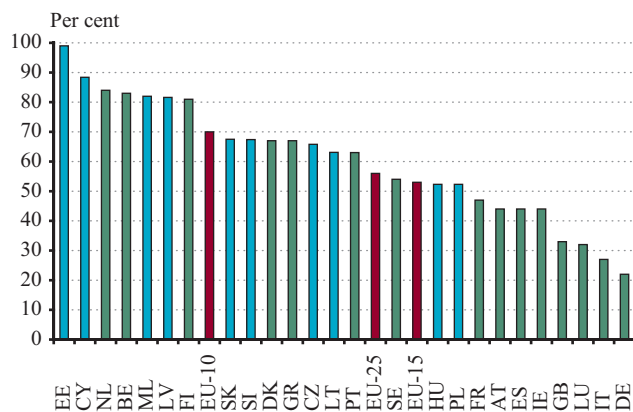
<sup>5</sup> The depth of bank intermediation is lowest in Lithuania, due, in addition to common factors, to its numerous bank crises.

<sup>6</sup> The impact of the relationship between the parent company and its affiliate on the level and development of efficiency, and the analysis of the latter, is particularly important in relation to the new member states. The analysis of this issue could represent a main direction of future research.

ers and numerous bank liquidations suspended the falling concentration of the banking system and stabilised the oligopolistic structure.

### Chart 3

Bank concentration in the EU member states (in 2003)



Note: Concentration is defined as the sum of the market share of the five largest banks, based on their balance sheet total.  
Source: ECB.

By comparing the market share of the five largest banks on the basis of balance sheet total, among the new EU member states, only Poland and Hungary reveal values approximating the average rate of the old EU member states, due to the relatively large size of the markets. Partly as a result of small market size and partly due to the inherited market structure and the advanced consolidation process, the banking sectors of the other new EU member states are considered to have high concentration (the five largest banks have a 63-100% market share).

The market structure of old EU members states is also undergoing transformation. Contrary to trends in new EU member states, the low rate of market concentration in the old member states has increased at a steady rate in recent years, as a result of numerous mergers and acquisitions promoting the improvement of efficiency and/or market position. Nevertheless, the average concentration of the banking market in old EU member states (53%) remains below the rate of new EU members, and variation among countries exceeds the value of the new members (concentration of 22-84%). The latter trend is linked to the larger differences in country size among new EU member states.

## EMPIRICAL RESULTS

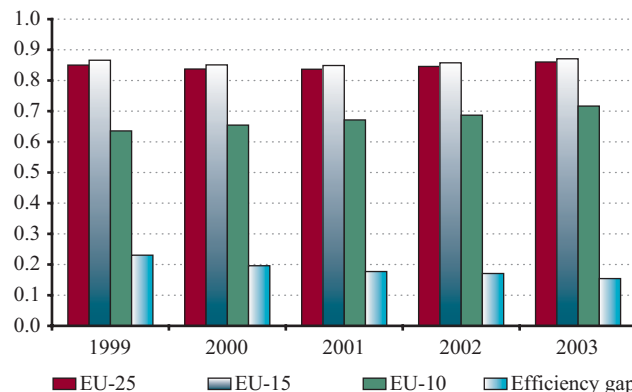
In our efficiency research, applying the statistical approach, 2459 banks in 25 member states of the European Union were analysed in the period 1999-2003. We estimated two basic equations in our research. The

first equation only analyses the input and output variables of the cost and profit function, while the second alternative equation was expanded with country-specific variables (inflation, per capita income, depth of financial intermediation, market concentration, quality of regulatory environment). We accordingly estimated the level of cost efficiency and profit efficiency for each bank and country, not controlling existing differences in the operational environment of banks, and by controlling these factors.

According to our results, irrespective of distorting factors arising from varying operational environments, a cost efficiency gap is revealed between the new and old member states, as well as a decrease of the efficiency gap through time, as a result of convergence between 1999 and 2003.

### Chart 4

Average cost efficiency levels in the European Union



Note: Efficiency measures the joint effect of the operational environment and the behaviour of management.

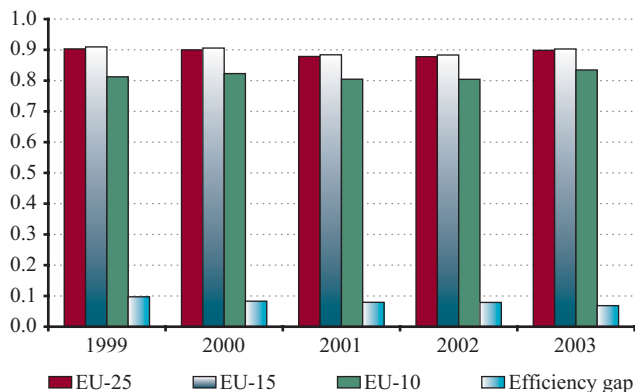
Chart 4 reveals a moderate fall in the efficiency of old member states, while the new members are closing the gap. In the analysed period, the efficiency gap between the two regions, indicating the advantage of old member states, has decreased from 23 percentage points to 15 percentage points. Chart 5, revealing the results of the alternative model, indicates that the average efficiency values of the whole EU and old member states also fell to a moderate degree in the period under review. It is noteworthy, however, that in 1999 the new member states "started" from a higher efficiency level, in comparison to the previous model, and the efficiency gap closes at a slower pace.

It is empirically evidenced that distorting factors, particularly control over inflation, the level of development and the closely linked depth of financial intermediation, as well as the regulatory environment, reduces the size of the actual gap between the old and new member states, and slows the speed of convergence. Beyond proof of convergence within the European Union, it may also be established that

the efficiency levels of banks within old and new member states are approximating each other.

### Chart 5

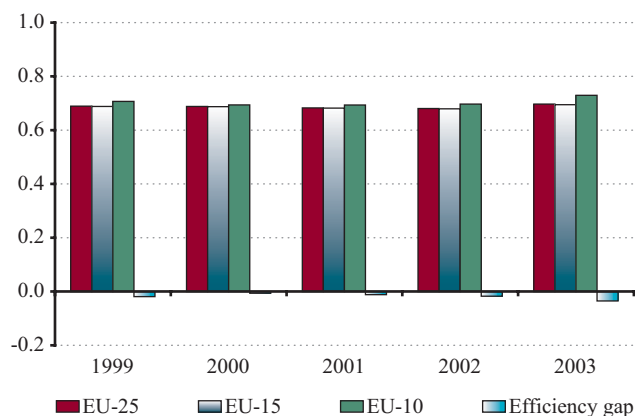
Average efficiency gap levels in the European Union



Note: Efficiency primarily measures the behaviour of management.

### Chart 6

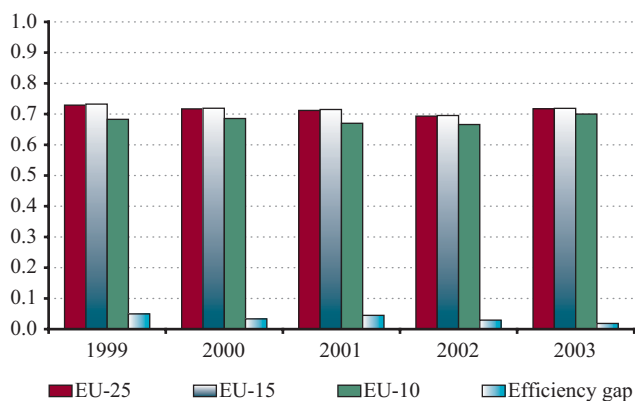
Average profit efficiency levels in the European Union



Note: We did not control differences in the operational environment.

### Chart 7

Average profit efficiency levels in the European Union



Note: We did not control differences in the operational environment.

In the course of estimating profit efficiency, a positive gap is detected between the old and new member states between 1999 and 2003, but only if we control the impact of the operational environment on profitability (Chart 7). With regard to many new member states, the special characteristics of the operational environment will likely enable banks to realise higher income, when compared to old member states. Thus a low, negative profit efficiency gap existed on the basis of the first model specification (Chart 6).

## PROSPECTS

With regard to the future, among efficiency indicators, a stable cost efficiency gap may produce an adverse impact on the long-term competitiveness of financial systems in new EU member states. The cost efficiency gap may be narrowed down through the higher internal efficiency reserves of banks in new EU member states, in comparison to old member states, linked to the behaviour of management, as a result of their low efficiency rates. There is the risk, however, that the constraint to improve cost efficiency in the banking systems of new EU member states will strengthen only to a limited degree, due to the oligopolistic market structure and the slow growth in competition. The efficiency improvement pressure may further be reduced, considering that banks of less developed countries also have high external efficiency reserves, since the gradual development and integration of the economy through the greater depth of financial intermediation results in a natural improvement in efficiency. As a limiting factor, the conscious improvement of efficiency involves higher surplus costs in the short term, producing the desired impact in the long term. Advantages and disadvantages associated with specific market characteristics in old and new member states will disappear as a result of the integration of financial markets and the financial institutional systems within the European Union. Therefore, the further narrowing of the cost efficiency gap is greatly needed.

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