



# Integration and efficiency convergence in EU banking markets

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## ABSTRACT

Evidence of financial integration and convergence are considered of importance in assessing the outcome of EU deregulation policies aimed at improving the efficiency and performance of banking sectors. This paper evaluates the recent dynamics of bank cost efficiency by means of data envelopment analysis (DEA). Borrowing from the growth literature, we apply dynamic panel data models (GMM) to the concepts of  $\beta$ -convergence and  $\sigma$ -convergence to assess the speed at which banking markets are integrating. We also employ a partial adjustment model to evaluate convergence towards best practice. Results seem to provide supporting evidence of convergence of efficiency levels towards an EU average. Nevertheless, there is no evidence of an overall improvement of efficiency levels towards best practice.

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## 1. Introduction

During the past two decades, the deregulation of financial services in the European Union (EU), together with the establishment of the Economic and Monetary Union and the introduction of the euro, aimed at fostering integration through the creation of a level-playing-field in the provision of banking services across the EU. The plan was to remove entry barriers and to promote both competition and efficiency in national banking markets. Indeed, in the calculation for gains from European integration in financial services, it was assumed that banks in different countries would become equally efficient with the removal of cross-border restrictions [1]. It was also expected that deregulation-induced competition would foster efficiency by providing incentives to managers to cut costs in order to remain profitable. EU regulators believe that a well integrated financial system is necessary to increase the efficiency of the euro area economy by reducing the cost of capital and improving the allocation of financial resources (see ECB [2]). While it is generally agreed that deepening financial integration is beneficial on the whole, it might also have negative effects. For example, integration in a particular market segment might lead to a high degree of consolidation which might hinder competition.<sup>2</sup>

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<sup>2</sup> Financial integration does not necessarily have implications for consolidation in all market segments. While integration may lead to consolidation in an industry, there is no direct causal link between integration and consolidation [3].

Furthermore, integration has significant implications for financial regulation and the issue of financial stability has assumed an increasingly international dimension. As a consequence, it is important to monitor and understand the process of financial market integration.<sup>3</sup> In addition, as further integration is promoted at the EU level, it is also crucial to measure accurately the state of integration in various segments of the single market.

In this context, an integrated financial market is defined as a market where participants with the same relevant characteristics: (a) face a single set of rules, (b) have equal access to financial instruments and/or services, and (c) are treated equally when they are active in the market [3]. The above definition of financial integration is closely related to the law of one price, which states that if assets have identical risks and returns, then they should be priced identically regardless of where they are traded. Based on the law of one price it is possible to derive measures of integration. For example, the cross-sectional dispersion of relevant variables (such as interest rate spreads or asset return differentials) is often used as an indicator of integration. The concepts of  $\beta$ -convergence and  $\sigma$ -convergence can also be used to

<sup>3</sup> The European Central Bank [4–6] “Financial Integration in Europe” reports (published in March 2007, April 2008 and 2009) aim at providing a dynamic evaluation of the process of economic integration of EU member states. Specifically, the ECB [6] report focuses on the effects of the 2007–2008 financial turmoil on the state of financial integration in the euro area. The report finds evidence of some disruption to the integration process in 2008, which has resulted in a retrenchment within national borders (cross-border disintegration). However, as the crisis is still unfolding, it is difficult to assess the long term impact on the integration of financial markets once more stable conditions return.

assess the speed at which markets are integrating. In addition, measuring the degree of cross-border price or yield variation relative to the variability within individual countries may be informative with respect to the degree of integration in different markets.<sup>4</sup>

This study aims to contribute to the current debate by investigating the impact of integration on the efficiency of EU banking markets. As our definition of financial integration is closely related to the law of one price, this allows us to examine the link between the dynamics of efficiency and financial integration. The concept of price convergence implies that, in case of increased integration, price differentials for the same financial asset should be either eliminated or greatly reduced overtime. This should also apply to the factors of production. Consequently, if factor input prices (i.e. the cost of capital, labour and deposits) are converging across the European Union, so should banks' cost structures, reflected in a convergence of cost efficiency scores. On the other hand, if country differences in observed cost efficiency levels remain (that is, if there is no evidence of increased convergence), it would imply that the regulatory removal of cross border restrictions alone was not sufficient to equalise the cost structure of EU banking systems and that country-specific structural differences remain relevant.

Measuring convergence towards a European average efficiency level is relevant in the context of the single market for financial services, as evidence of convergence would indicate a reduction in the coefficient of variation within countries (i.e. it would indicate increased integration). However, this could occur either because the least efficient banking systems improve their efficiency (i.e. they are "catching up") or because the most efficient ones see a decline in their efficiency levels (i.e. they are "lagging behind"). Färe et al. [7] re-formalised the notion of "catching up/lagging behind" as the decrease (increase) over time of the distance between a unit actual performance and its potential (i.e. its best practice frontier).<sup>5</sup> From a regulatory point of view, measuring convergence towards best practice (that is, towards the maximum attainable efficiency) is important, as increased integration is supposed to bring about improvements in cost efficiency via increased competition [9]. If the process of EU integration had a positive impact on bank cost efficiency, this should result in convergence towards best practice (i.e. an overall improvement of efficiency levels over time).

In this study, we evaluate cost efficiency by means of data envelopment analysis (DEA) for the EU-15 countries prior to the latest round of accessions in 2004. In this context, DEA has the advantage of allowing us to compare banks of different size in different countries with respect to one EU-wide frontier without imposing any specific parametric functional form.<sup>6</sup> At present, formal statistical tests to assess convergence in a DEA framework do not exist (see Henderson and Zelenyuk [10]). Therefore, we borrow the concepts of  $\beta$ -convergence and  $\sigma$ -convergence from the growth literature (see Barro and Sala-i-Martin, Quah [11–14]) and we apply a dynamic panel data analysis. To test for

convergence towards best practice we use a variant of the classic partial adjustment model (see also Flannery and Rangan, Gropp and Kashyap, Zhao et al. [15–17]). Results seem to provide supporting evidence of convergence of efficiency levels towards an EU average. Nevertheless, the results also indicate persistence of inefficiency, evidenced by a decrease in the overall efficiency levels.

The remainder of the paper is structured as follows. Section 2 reviews the main literature on integration and efficiency in banking. Section 3 describes data and empirical methods used. Section 4 discusses the results and Section 5 concludes.

## 2. Literature review

Several studies investigate the existence and implications of financial convergence in Europe, especially in relation with the deregulation process, the creation of the single market for financial services and the introduction of the euro. Convergence in banking is often analysed by testing the time trends of a number of aggregate and micro level indicators. For example, recent studies of price convergence include Martín-Oliver et al. [18,19], De Graeve et al. [20], Vajanne [21], Gropp et al. [22] and Affinito and Farabullini [23]. Recent empirical evidence suggests that the sustained legislative changes at the EU level, as well as other major developments such as the introduction of the euro in 1999, have contributed towards the integration of European banking and financial markets [24]. There is some evidence of integration in money, bond and equity markets [25,26,39,27,28] and in wholesale banking [29]. However, most empirical evidence suggests that significant barriers to the integration of retail banking markets still exist [30,31]. Gropp and Kashyap [16] propose a new test of integration based on convergence in banks' profitability (return on assets or ROA), based on the assumption that in equilibrium (with well functioning markets) the expected returns of comparable assets in an economy should be similar [32]. Overall, they conclude, banking markets in Europe appear far from being integrated. A robust alternative to using banks' profitability is to check for convergence in banks' profit or cost efficiency.

There is a vast literature on the measurement of cost structure and efficiency in banking and on the determinants of efficiency (see the reviews by Goddard et al., Berger, Hughes and Mester [24,33,34,35]). Efficiency is commonly estimated by employing parametric methods (such as stochastic frontier analysis, SFA) or non-parametric methods, the most popular of which is data envelopment analysis (DEA). The early bank efficiency literature shows that before deregulation EU banking markets were often characterised by the presence of many institutions operating at a non-optimal scale with relatively high excess capacity (see Berger and Humphrey [36]). Inefficient banks could survive mainly because of the lack of competitive pressures and the fact that, in some cases, the domestic authorities, while acting as protectors of their banking sectors, were keen on maintaining a large number of banks in their systems. With deregulation and higher competition, EU bank efficiency improved, particularly over the late 1990s, as banks were under pressure to cut costs (see, among others, Amel et al. and Casu et al. [37,38]). However, more recent studies indicate a decreasing trend in bank efficiency [34,39]. While there are a number of studies that carry out comparisons of bank efficiencies in different countries based either on the use of a common efficient frontier or of nation-specific frontiers, only a handful of studies directly address the issue of the relationship between EU integration and efficiency. Tortosa-Ausina [40] examines the convergence in efficiency of Spanish banks following deregulation through a model of distribution dynamics and

<sup>4</sup> See Baele et al. [3] for a review of different measures of financial market integration.

<sup>5</sup> In DEA, the concept of best practice frontier is more general than the concept of a "production function" in economics. The frontier results from the linear combination of the efficient units and it accommodates the possibility of multiple production functions, one for each DMU, with the frontier boundaries consisting of "supports" which are "tangential" to the more efficient members of the set of such frontiers (see Cooper et al. [8]).

<sup>6</sup> Formally, DEA is a methodology directed to frontiers rather than central tendencies. In this context, we define a unit 100% efficient (relative efficiency) on the basis of available evidence if and only if the performance of other units does not show that some of the inputs or outputs can be improved without worsening some of the other inputs or outputs (see Cooper et al. [8]).

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