PAPER

Does Financial Integration Increase Bank Efficiency?
New Evidence From the Euro area

Ehsan Rajabi[*]

Abstract This paper aims to estimate the relationship between a bank's cost and profit efficiency and financial integration, which we defined as five groups of competition, bank market ownership, financial liberalization, free capital flow, and the euro area control variables. A two-step quantitative research design was employed to accomplish the purpose of the current paper for an unbalanced pooled time series dataset of 126 banks of the euro area banking system between 1999 and 2012: Data Envelopment Analysis (DEA) and panel regression analysis (GMM regression model).

The results suggest that concentration ratio, foreign ownership, domestic credit, and market integration are negatively related to banks' cost and profit efficiency. In contrast, the coefficients of real credit growth and capital flow positively relates to cost and profit efficiency scores. Furthermore, empirical findings of bank market power, government budget deficit targeting, and public debt targeting are consistent in both cost and profit efficiency models. Therefore, the government budget deficit positively impacts cost efficiency without assurance of sound public finance policy, which is essential to ensure sustainable economic development within the euro area. Criteria relating to government deficit needs to adjustment for the euro area adopted by the Member States because, by increasing the difference of actual from the targeted value of government budget deficit, bank cost efficiency will be increased.

Keywords: Banking, Euro Area, concentration ratio, foreign ownership, market integration.

Jel Classifications: E5, C33, F36, L25, G32.

1. Introduction

During the past two decades, the deregulation of financial services in the European Union (EU) and the establishment of the Monetary Union and the introduction of the

Ehsan Rajabi[**](✉)

[*] Assistant Professor, Department of Agricultural and Food Policy, Agricultural Planning, Economic and Rural Development Research Institute (APERDRI), Ministry of Jihad-e Agriculture, Tehran, IRAN.
Email: e.rajabi@agri-peri.ac.ir

Euro have targeted promoting integration through the formation of a level-playing-field in the provision of banking services across the EU-17. Without a doubt, in the calculation for gains from financial integration, it is suspected that banks in different countries would become equally efficient with removing cross-border constraints. In addition, EU regulators believe that a well-integrated financial system is essential to improve the efficiency of the euro area economy by reducing the cost of capital and enhancing the allocation of financial resources. Although it is mostly agreed that deepening financial integration is beneficial in general speaking, it may also have negative effects. By way of example, integration in a particular market segment might lead to a high degree of consolidation, which might hinder competition. Furthermore, financial integration has significant implications for financial regulation, and the issue of financial stability has suspected an extremely international dimension. As a result, it is essential to monitor and realize the procedure of financial integration and its effect on bank performance.

In light of the ongoing process of financial integration, it is of specific interest to investigate its impact on efficiency scores for all the euro area Member States over the convergence period. Moreover, an advantage of looking at all Member States banking systems in terms of efficiency level is that it permits us to single out differences across countries that, then, may help discover optimal pathways towards the next rounds of financial integration, which potentially could lead towards successful adoption of banking supervision (banking union). Therefore, this paper is designed to contribute to the current debate by investigating the influence of financial integration factors on the efficiency of the Eurozone banking system. This permits us to examine the dynamic linkage between the efficiency of 126 selected banks and financial integration (which closely relates to competition, foreign ownership, financial liberalization, and capital flow).

For enhancing efficiency, developing a highly effective and dependable financial system constitutes a substantial purpose of the reform procedure and transfers from an intensive economy to a market economy within the European Monetary Union (EMU). A series of factors could considerably influence bank performance in the euro area, such as financial liberalization, development in the circulation of capital, goods and services, financial integration, economic interaction among union members, and a new common monetary environment.

Therefore, monetary and financial integration are crucial elements of economic integration in the European Union (EU), which we evaluate its potential benefits on bank efficiency. In principle, establishing a common currency area, the Member States in the sample will powerfully reinforce the mobility of financial flows and cross-border banking activities. Even so, the existing dissimilarity of average costs and the wide difference of profitability among various banking systems continue to raise questions concerning the future upcoming of the progressive integration of banks within an effectively integrated euro area banking system. Therefore, the study of the differences through out bank

efficiency among the Member States of the euro area, which apply financial integration, will also clarify each country's competitive position in the banking sector and may shed light on the capacity to respond to the new changing environment.

The assessing efficiency of the banking system and its influence factors can help smooth operating of their national economic system and banking industry. Because of improved efficiency of the banking sector, it can cause better banking performance, decrease costs, improve in quality of services, and betterment the allocation of resources and increase the productivity of the entire economy. Efficiency improvement also contributes to amelioration in the soundness and stability of the banking system that achieves profits channel toward increase equity and provision for better absorption of risks.The remainder of this study is structured as follows: Section 2 briefly reviewed the literature. The research method is represented in section 3, followed by results and discussion in section 4. Finally, conclusions depict in section 5.

2. Literatures Review

Through the years, various researchers have worked on financial integration in European countries. Many of these studies have focused on the Euro and the financial services integrated with it. Banks' coverage has usually been tested through the micro-level and aggregating factors. For instance, in recent studies, it has been shown that price convergence is an indicating factor of financial coverage (e.g., Gaganis & Pasiouras, 2013). In 1999, the Euro was introduced for the first time in the euro area. Since then, using the single currency as well as the additional legislative initiative has led to major developments along with the integration of the European market (Jiang, Yao & Feng, 2013; Goddard, Molyneux, Wilson, & Tavakoli, 2007). Studies show some evidence of money, bond, and equity integration (Tabak, Fazio & Cajuerio, 2013; Cappiello, Vives, & Gérard, 2006; Emiris, 2011; Hartmann, Straetmans, & De Vries, 2005; Manna, 2004), as well as integration in the wholesale banking. However, it has been noted that despite all the efforts, there are still some barriers left (Chortareas, Giradone & Ventouri, 2013; Berger, 2003; Berger, Dai, Ongena, & Smith, 2003).

Moreover, numerous studies focus on the banking efficiency and cost structure and how these can lead to efficiency (Goddard et al., 2007; Hughes & Mester, 2008). In the majority of these studies, efficiency is measured by parameters such as Stochastic Frontier Analysis. However, some studies use non-parametric methods such as Data Envelopment Analysis. Before the introduction of the Euro, many of the European banks were facing deregulation due to high levels of capacity or non-optimal scale (see Berger & Humphrey, 1997).

However, in reality, many inefficient banks survive due to a lack of competition or by the support of the government or domestic authorities. Post-Euro, the competition among banks increased, and during the 1990s, in particular, many of the banks showed higher efficiency levels by cutting costs (see, among others, Ferreira, 2013; Amel,

Barnes, Panetta, & Salleo, 2004; Casu et al., 2004). However, in recent years, the European bank's efficiency level has dropped (Casu & Girardone, 2006).

In addition, many studies have compared banks' performances in different European countries. Some of these studies have used nation-specific frontiers for their comparison, while others have employed common efficient frontiers. Nevertheless, only a few have focused on the direct impact of financial integration on bank efficiency. For example, Ausina (2002) assessed the Spanish banks' performance before and after EU integration. He showed that deregulation leads to lower efficiency of the banks in question. In another study, Murinde et al. (2004) tested the banking system in Europe following the introduction of the European common market in 1993. They showed no significant correlation between the convergences of banks in question, except for some products. Another study done by Weill (2009) showed that there is financial integration in the convergence of efficiency. Another study done by Mamatzakis et al. (2008) provided evidence of efficiency cost convergence based on the cross-country comparison. In their study, authors examined ten new members of the European Union from 1998 until 2003. They found slight convergence among few of the new members. Now, we look at the development of the euro area banking market and how it affected banks in Europe. In the 1990s, numerous mergers and acquisitions took place in the European market (Thomson Financial Database, 2002). By 2000, more than 80% of the mergers and acquisitions were done domestically. Such mergers and acquisitions lead to lower competition in the banking sector as the number of national players are reduced. The assessment of some bank branches and banks between 1994 and 2005 proves this observation (ECB, 2007). This shift of domestic focus on the number of bank branches could result in negative impacts. When economic scales are the source of merger and acquisition motivation, the number of branches would surely decrease as a result. However, it did not result in the reduction of branches as was expected.

Several studies show the results of an absence of competition. It was shown that during the 1990s and from 2000 until 2005, the competition among EU banks was extremely low (Ayadi, Arbak, Naceur & De Groen, 2015; De Guevara, Maudos, & Perez, 2005). By calculating the Lerner index for five of the biggest countries in the EU, the authors showed the lack of significant increase in the competition among banks. In a more recent study, Guevara et al. (2007) expanded their investigation to 15 countries in the EU. In that study, it was shown that ten of the countries showed improvement in competition.

In a similar study, Goddard et al. (2004) examined six of the major countries in the EU in terms of profitability. In their study, they looked at the banks' profitability in those six countries and noticed the existence of an abnormal profit between 1992 and 1998. This abnormal profit was linked to the absence of competition among banks in the EU in the period in question. The reduction of banks' margin in the 1990s might; however, some studies have shown the reduction of banks' margin in the 1990s, which

might be surprising considering the lack of increasing competition in the EU banking section during that period. Maudos and Guevara (2004) explained the reduction of margins through the relaxation of competition in that period and increased market power. Authors also showed that banks benefited from lower interest rate risks, lower risk of credits, and lower operating costs in that period, which led to lower margins while retaining the market power.

In another study, Casu (2009) examined the impact of the Lerner index (competition) and efficiency among five EU countries' banks. He showed that there is a positive relationship between market power and efficiency. Another study conducted by Weill (2004) examined the relationship between competition and efficiency. In that study, the author used the regression method to link the independent variables (GDP and demand density) through intermediating ratio of loans over deposits to the dependent variable (efficiency scores estimated by SFA). The employed model corresponded with the geographical location. It was concluded that there is positive causation between market competition and cost efficiency among the EU banks, although the causality running from the latter to the former is low.

Finally, it can be said that the financial integration in the EU happened due to the changes in the legal aspects. Despite the positive outcomes of such integration, a negative aspect remains unchanged: the low number of mergers and acquisitions among banks in the EU. This negative impact has been severed to extend where some stated that the complete integration is an illusion (Dermine, 2003). While the integration has made mergers and acquisitions easier, in practice, it has happened mostly among branches rather than cross-national banks.

Therefore, it can be said that there is still a long way until reaching the single banking market in the euro area. These obstacles are political barriers, as some countries do not seek such major collaboration and changes (Boot, 1999). Another significant barrier can be the cost drops that can make the change irrational, and the ever-channeling cost is another barrier.

In addition, the existing literature focuses on the variation of cost or profit efficiency in European economies by bank ownership. A study done in 1998 by Kraft and Tirtiroglu (1998) showed that the cost-efficiency of private and government banks varies. Their study also showed that new private banks had lower cost efficiency levels than the old ones in Croatia. In none of the studies above, a significant difference was found between the local and foreign-owned banks. Another study in Hungary showed that foreign-owned banks were dramatically more significant than the local ones (Hasan & Marton, 2003). Based on other studies such as Jemric and Vujcic (2002), Nikiel and Opiela (2008), domestically owned banks were less efficient than foreign private banks. It was also noticed that when the number of foreign banks increased, the other banks' cost efficiency was also improved. Therefore, it can be said that studies performed in a specific country did not provide clear evidence regarding the benefit

of new foreign banks, how they might improve the country's economy, and the role of policies that encourage such entries (Fries &Taci, 2005).

In recent years, there have been a number of cross-national studies on EU banking. Grigorian and Manole (2006) have conducted a study on 17 countries between 1995 and 1998. In another study performed by Yildirim and Philippatos (2007), 12 countries were investigated from 1993 to 2000. Bonin et al. (2005) carried out another research where 11 countries were covered between the years 1996 to 2000. Despite the cross-national perspective, none of the mentioned studies examined bank ownership, whether the banks in question are new private, old private, state-owned, or domestic or foreign. Efficiency can be measured through various methods. For instance, one study used date envelopment analysis while the other used the stochastic frontier method (Semih Yildirim & Philippatos, 2007).

One of the recent studies regarding the period after financial liberalization showed that financial liberalization was a result of the reduced efficiency of banks. In the study done in turkey, a sample of Turkish banks was investigated from 1970 to 1994 (Denizer, Dinc, & Tarimicilar, 2000). Another study in India showed that the liberalization process lead to reduced profitability and concentration in the Indian banks in the '90s (Brooks, 2003).

Some studies have worked on the impact of financial liberalization on a bank's performance as a whole. For instance, a study done by Williams and Nguyen (2005) showed that among 231 commercial banks in the South East Asia region, the most beneficial method was the privatization of the commercial banks. In fact, in that study which investigated the time between 1990 and 2003, it was shown that financial liberalization was the most critical factor in determining efficiency compared to other types of reform. Another study done in Malaysia showed that financial liberalization had a positive impact on the efficiency of the Malaysian banks (Njie, 2006). The descriptive statistics reveal a decrease in bank spread post the financial liberalization process in the former study.

Another study focused on the correlation between financial liberalization and a bank's efficiency (Hermes & Nhung, 2010). This study was carried out in 10 countries where commercial banking was emerging in the 1990s. Here, the data from banks were used in the DEA to estimate the bank efficiency and the financial liberalization index. The final findings showed a positive relationship between efficiency and financial liberalization.

Some studies indicate that financial liberalization leads to the financial crisis. In an attempt to justify this theory, Angkinand et al. (2010) selected banks in 48 countries for analysis. The study focused on data of these banks from 1973 to 2005. The findings suggested that financial liberalization could lead to a crisis based on countries type, insurance deposit, and reforms.

The impact of financial liberalization on a bank's performance is another subject in recent studies. Gupta et al. (2011) showed the role of government ownership in

financial liberalization and how it limits the gains. In addition, financial liberalization has been examined in the context of the Indian banking system.

By comparing the banking system in five European countries, Andries et al. (2012) showed the positive impact of the financial liberalization index on the performance index. In their study, the authors used operational performance, return on assets, and cost of intermediation as the performance indices.

3. Research Method

The purpose of the current descriptive and quantitative correlational study was to examine the relationship between environmental variables, European financial integration, and level of bank cost and profit efficiency in the euro area. A two-step quantitative research design was employed to accomplish the purpose of the current study: Data Envelopment Analysis (DEA) and panel regression analysis. In the first stage, we estimated the cost and profit efficiency level of the entire 126 listed bank[1] dataset for 17 euro area Member States by using the nonparametric DEA approach to investigate whether the cost and profit efficiency[2] of the euro area banking system improved between 1999 and 2012, and to compare the efficiency scores of the financial sectors of the euro area Member States. In the second stage, we regressed the efficiency level obtained from the first stage on factors that could influence the efficiency of banks (financial integration variables) by using a GMM regression model for the period of study.

This paper employs competition, ownership, financial liberalization, and free capital flow variables that have a proxy for financial integration. The following model presents the relationship between bank efficiency and financial integration.

Bank efficiency (1)

$$= f(Lag\ of\ Bank\ efficiency + Concentration\ ratio$$

$$+ Bank\ market\ power + Foreign\ ownership + Domesticcredit$$

$$+ Real\ credit\ growth + Market\ integration + Capital\ flow$$

$$+ Government\ budget\ deficit\ targeting + Public\ debt\ targeting)$$

---

[1] Data for banks was gathered from the "Bankscope" database of BVD-IBCA. We use unconsolidated accounting data for 126 banks from 17 euro area Member States (6 from Austria, 6 from Belgium, 3 from Cyprus, 3 from Estonia, 3 from Finland, 11 from France, 25 from Germany, 4 from Greece, 5 form Ireland, 15 from Italy, 6 from Luxembourg, 3 from Malta, 6 from the Netherlands, 4 from Portugal, 3 form Slovakia, 4 from Slovenia, 18 from Spain).

[2] For estimating cost and profit efficiency (two different optimization concepts-cost minimization and profit maximization), based on the intermediation approach, we selected labor, deposit and fixed asset as inputs and loan and profit as outputs for estimating cost and profit efficiency under assumption of variable return to scale and input oriented which more usual in literature.

The baseline regression model is formulated as below:

$$EF_{ijt} = \alpha + \lambda EF_{(ijt-1)} + \beta_1 CR5_{ijt} + \beta_2 LERNR_{ijt} \tag{2}$$

$$+ \beta_3 FORE_{ijt} + \beta_4 DCREDT_{ijt} + \beta_5 RCREDT_{ijt} + \beta_6 CPITLF_{ijt}$$

$$+ \beta_7 ln(OUFDI)_{ijt} + \beta_8 BDEFIC_{ijt} + \beta_9 PDEBT_{ijt} + \eta_j + \mu_{ijt}$$

$$i = 1, ..., 126, t = 1, ..., 14 j = 1, ... 17$$

Where symbolizes the bank, denotes the tested time period represent countries of the Eurozone unobserved specific effect of the country is the disturbance term. is cost and profit efficiency of bank at time for country that are estimated by DEA, separately. We estimate this model two (2) times with cost and profit efficiency. is the concentration ratio that is measured by asset share of five biggest banks in the entire banking system assets in each Member States. For the most prominent firms, the concentration ratio (CR) reflects the market structure. This literature is basically assuming that concentration makes competition weak through promoting collusive behavior between firms. Raised market concentration leads to higher prices and greater profits (Bain, 1951). From a certain point of view, increased concentration is anticipated to intensify market power and hence prevent both efficiency and competition. From the other point of view, it is assumed that when economies of scale cause the acquisitions and mergers of a bank, then efficiency may be improved through increased concentration.

Based Casu (2009), Weill (2004) on Competitiveness of a bank is measured by using the Lerner index . The results show that banks with a higher Lerner index will have higher profit and cost-efficiency.

Foreign ownership was measured by the percentage of the total banking assets that foreign banks hold. A foreign bank is a bank where foreigners own 50 percent or more of its shares. Financial liberalization is measured by the ratio of domestic credit to the private sector to GDP (for each of the euro area Member States. The real credit growth that has progressed the growth rate of real domestic credit can be described as the next variable that is able to proxy the progress of financial liberalization. Theoretically, financial liberalization enhances the efficiency and productivity of banks by creating a competitive and flexible environment (like set interest rates on their assets and liabilities) in which banks have more control over their operations.

Free capital flow is measured by market integration and capital flow for accounting capital movements within the Eurozone Member States. By intra-EU outflows of capital for countries which can be considered as the total stream of funds that a country invests abroad throughout a certain period (commonly a year). Although, market integration is measured by the average value of inward and outward foreign direct investment flows divided by GDP.

To control the Eurozone fiscal policy, government budget deficit targeting and public debt targeting are introduced to the model. The public finance discipline is an important criterion of the euro area convergence. Government budget deficit targeting

is measured by the difference between the actual government deficit to GDP and reference value (3% of GDP) at the end of the preceding fiscal year and public debt targeting is measured by the difference between the actual level of public debt and reference value (60% of GDP) at the end of the preceding fiscal year. Table 1 presents measurements of financial integration and source and expected signs for all 126 selected banks from all 17 euro area Member States.

Table 1. Measurements of financial integration

Variable	Symbol	Name	Description	Source	Expected Sign
Competition	CR5	Concentration ratio	Asset share of five largest banks in total banking system assets (%)	ECB	-
	LERNR	Bank market power	Lerner index: which market power allows firms to fix a price above marginal cost	Author	+
Ownership	FORE	Foreign ownership	Foreign bank assets among total bank assets (%)	IMF	+
Financial liberalization	DCREDT	Domestic credit	Domestic credit provided by banking sector (% of GDP)	WDI	+/-
	RCREDT	Real credit growth	Growth rate of real domestic credit provided by banking sector (%)	WDI	+/-
Free capital flow	CPITLF	Market integration	Average value of inward and outward EU foreign direct investment flows divided by GDP (%)	Eurostat	+
	OUFDI	Capital flow	Intra-EU outflow direct investment reported by EU Member State (million USD)	Eurostat	+
Euro-area control variables	BDEFIC	Government budget deficit targeting	Difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP)	Eurostat	-

PDEBT	Public debt targeting	Difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP)	Eurostat	-

Note: Government budget deficit targeting and public debt targeting variables are introduced by the author. ECB: European Central Bank, Statistical Data Warehouse, IMF: International Monetary Fund, Global Financial Stability Report, WDI: World Development Indicators, Eurostat: statistical office of the European Union.

Equation 2 is estimated by applying GMM, which is an abbreviation for Generalized Method of Moments which was proposed by Arellano and Bond (1991) and Arellano and Bover (1995) as well as Blundell and Bond (1998) generalized. The GMM estimation proposed by Arellano and Bond is based on Equation 3 first difference transformation by following removal of banks specific impact:

$$y_{it} - y_{(it-1)} = \alpha(y_{it-1} - y_{it-2}) + \beta(L)(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \tag{3}$$

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \beta(L)\Delta X_{it} + \Delta \varepsilon_{it} \tag{4}$$

Where Δ can be described as the first difference operation symbol. In Eq. 4, a bias is imposed in the model's estimation through Δy_{it-1} (lagged depended variable) is mutually related with, $\Delta \varepsilon_{it}$ (the error term). However, Δy_{it-2}, which is anticipated to be mutually related with Δy_{it-1} and not related with $\Delta \varepsilon_{it}$ for $t= 3,...,T$, can be utilized as an instrument in Equation 4's estimation, on the assumption that ε_{it} are not correlated sequentially.

4. Results and Discussions

Table 2 shows the correlation matrix for the euro area. The observed correlations between the models' variables were all below 0.95, with the highest observed correlation being 0.570. When variables display a correlation above 0.95, all but one is usually removed, representing a duplication of information (Berger and Humphrey, 1997). The low correlation coefficients explain that, in general, the correlation between the financial integration variables is not strong; thus, suggesting that multicollinearity problems are not severe or non-existent. To investigate whether financial integration factors can explain the efficiency levels, we explore the determinants of efficiency with specific competition, ownership, financial liberalization, and free capital flow factors by a generalized method of moment regression analyses. For this purpose, we provide a descriptive analysis by examining the cross-sectional determinants of bank-specific efficiency scores from the DEA by regressing these measures against a number of financial integration variables.

Table 2. Correlation matrix for the financial integration variables

Variable	CR5	LERNER	FORE	DCREDT	RCREDT	CPITLF	OUDFDI	BDEFIC	PDEBT
CR5	1.000								
LERNER	0.165***	1.000							
FORE	0.336***	0.132***	1.000						
DCREDT	-0.070***	-0.008***	-0.226***	1.000					
RCREDT	0.117***	0.038	0.166***	-0.190***	1.000				
CPITLF	-0.188***	0.157***	0.520**	0.066**	0.050*	1.000			
OUDFDI	-0.570***	-0.095***	-0.300***	0.175***	-0.082***	0.271***	1.000		
BDEFIC	-0.128***	0.039	0.165***	-0.324***	0.451***	0.267***	0.191***	1.000	
PDEBT	-0.129***	-0.128***	-0.566***	0.137***	-0.371***	-0.428***	0.122***	-0.431***	1.000

Note: The independent variables, concentration ratio (CR5) calculated as asset share of five largest bank in total banking system assets (%); bank market power (LERNR) calculated as Lerner index; foreign ownership (FORE) calculated as foreign bank assets among total bank assets (%); domestic credit (DCREDT) calculated as domestic credit provided by banking sector (% of GDP); real credit growth (RCREDT) calculated as growth rate of real domestic credit provided by banking sector (% of GDP); market integration (CPITLF) calculated as average value of inward and outward EU foreign direct investment flows divided by GDP (%); capital flow (OUFDI) calculated as the natural log of the intra-EU outflow direct investment reported by EU Member States; government budget deficit targeting (BDEFIC) calculated as difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP); public debt targeting (PDEBT) calculated as difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP).

The table presents the results from spearman ρ correlation coefficients.

***, **, * indicates significance at 1%,5% and 10% levels respectively.

Source: Author's calculations

The current descriptive and quantitative correlational study aimed to examine the relationship between European financial integration and level of bank cost and profit efficiency in the euro area. A two-step quantitative research design was employed to accomplish the purpose of the current study: Data Envelopment Analysis (DEA) and panel regression analysis. In the first stage, we estimated the cost and profit efficiency level of the entire 126 listed bank dataset for 17 euro area Member States by using the nonparametric

DEA approach to investigate whether the cost and profit efficiency of the euro area banking system improved between 1999 and 2012. In the second stage, we regressed the efficiency level obtained from the first stage on factors that could influence the efficiency of banks (financial integration variables) by using a GMM regression model for the period of study.

The baseline regression results focusing on the relationship between cost and profit efficiency and financial integration among the Eurozone banking systems are presented in Tables 3 and 4. Several diagnostic tests are performed to show that results are warranted. The first two columns of Table 3 report the results for GMM-DIF, and the next two columns report GMM-SYS, respectively. Using the first-differenced GMM estimator in this panel, the coefficient on the lagged dependent variable is only 0.3387, suggesting implausibly low returns to scale. Using the system GMM estimator, which exploits the moment conditions, the coefficient on the lagged dependent variable is 0.5062. It could be argued that the efficiency of the previous year may represent a certain level of accumulated knowledge and technological endowment that may help banks to generate higher outputs with their inputs by adapting relatively quickly to the changes brought about by the environmental conditions. The coefficients of all financial integration variables are significant at least at 1% level system panel GMM in the two-step version. Hence, competition, ownership, financial liberalization, and free capital flow factors play an essential role in determining cost efficiency.

Table 3. Baseline analysis for effect of financial integration on cost efficiency (controlling endogeneity)

Regressors	GMM-DIF One-step	GMM-DIF Two-step	GMM-SYS One-step	GMM-SYS Two-step	GMM-SYS♠ One-step	GMM-SYS♠ Two-step
Initial of cost efficiency (L1)	0.3390*** (0.000)	0.3387*** (0.000)	0.5059*** (0.000)	0.5062*** (0.000)	0.4868*** (0.000)	0.4875*** (0.000)
Concentration ratio	-0.0021 (0.247)	-0.0020*** (0.000)	-0.0006 (0.507)	-0.0006*** (0.000)	-0.011 (0.226)	-0.0012*** (0.000)
Bank market power	-0.0059 (0.656)	-0.0060*** (0.000)	-0.0081 (0.563)	-0.0081*** (0.000)	-0.0073 (0.594)	-0.0074*** (0.000)
Foreign ownership	-0.0006 (0.680)	-0.0005*** (0.000)	-0.0006 (0.335)	-0.0006*** (0.000)	-0.0009 (0.139)	-0.0009*** (0.000)
Domestic credit	-0.0009*** (0.007)	-0.0009*** (0.000)	-0.0008*** (0.003)	-0.0008*** (0.000)	-0.0009*** (0.000)	-0.0009*** (0.000)
Real credit growth	0.0004 (0.527)	0.0004*** (0.000)	0.0006 (0.301)	0.0006*** (0.000)	0.0006 (0.288)	0.0006*** (0.000)

Regressors	GMM-DIF One-step	GMM-DIF Two-step	GMM-SYS One-step	GMM-SYS Two-step	GMM-SYS[♣] One-step	GMM-SYS[♣] Two-step
Market integration	-0.0002 (0.132)	-0.0002*** (0.000)	-0.0003*** (0.002)	-0.0003*** (0.000)	-0.0004*** (0.000)	-0.0004*** (0.000)
Capital flow[1]	0.0055 (0.430)	0.0055*** (0.000)	0.0375*** (0.000)	0.0374*** (0.000)	0.0324*** (0.000)	0.0325*** (0.000)
Government budget deficit targeting	-0.0014 (0.507)	-0.0014*** (0.000)	0.0018 (0.409)	0.0017*** (0.000)	0.0024 (0.258)	0.0024*** (0.000)
Public debt targeting	-0.0019** (0.013)	-0.0018*** (0.000)	-0.0003 (0.610)	-0.0004*** (0.000)	-0.0012 (0.072)	-0.0012*** (0.000)
Sargan test (p-value)[2]	0.0005	0.2741	0.0001	0.6894	0.0001	0.7977
Serial correlation test: AR(1) (p-value)[3] AR(2) (p-value)	0.0001 0.6869	0.0071 0.5958	- -	0.0039 0.1861	- -	0.0054 0.3036
Wald test for joint significance (p-value)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
No. of instruments	98	98	122	122	124	124
Cross-sectional observations	123	123	126	126	126	126

Note: The independent variables, concentration ratio (CR5) calculated as asset share of five largest bank in total banking system assets (%); bank market power (LERNR) calculated as Lerner index; foreign ownership (FORE) calculated as foreign bank assets among total bank assets (%); domestic credit (DCREDT) calculated as domestic credit provided by banking sector (% of GDP); real credit growth (RCREDT) calculated as growth rate of real domestic credit provided by banking sector (%); market integration (CPITLF) calculated as average value of inward and outward EU foreign direct investment flows divided by GDP (%); capital flow (OUFDI) calculated as the natural log of the intra-EU outflow direct investment reported by EU Member State; government budget deficit targeting (BDEFIC) calculated as difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP); public debt targeting (PDEBT) calculated as difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP).

[♣] The regressions also include time trend variables for the different time periods that are not reported. [1]In the regression, this variable is included as log(variable). [2]The null hypothesis is that model and overidentifying conditions are correct specified.[3]The null hypothesis is that there is no serial correlation in the first-differenced disturbances. Values in parenthesis are p-value. ***,**,* indicates significance at 1%,5% and 10% levels respectively. Source: Author's calculations

In the first set of variables, to capture the competition situation for retail banking services and its correlation with bank cost efficiency, the *concentration ratio* variable has a negative sign, indicates a higher asset share of the five biggest banks in the entire banking system assets contribute to higher banking costs. One reason can be because the concentration make competition weak through promoting collusive behavior between firms. On the other hand, heightened competition should encourage banks to reduce their costs so that their cost efficiency, meaning their ability to produce with minimal costs, would improve (Weill, 2004). The sign of *bank market power* variable is also negative, shows that higher Lerner index level is, higher operating and financial costs are. Therefore, bank with higher market power (an inverse measure of the competition) in the banking system has lower cost efficiency then efficiency may not be improved through increased concentration. Therefore, raised concentration is anticipated to increase market power and hence prevent both profit efficiency and competition.

The sign of the foreign ownership variable coefficient is also negative, suggesting that a higher level of foreign bank share in the banking sector contributes to higher banking costs (*i.e.,* decrease in cost efficiency). A more significant presence of foreign banks in the financial sector has a negative spillover effect on other bank cost efficiency, which finds that relatively more efficient foreign banks create an environment that forces the entire banking system to become more efficient. Furthermore, the underlying belief is that foreign banks will transfer knowledge and technology and contribute to the competition. Foreign ownership is also expected to improve corporate governance practices, an area where much is needed to be done in the Eurozone context. In contrast, the empirical findings find weak evidence that the foreign controlling ownership environment is associated with somewhat lower efficiency levels.

A third set of variables was used to capture the financial liberalization in a specific Member State. The sign of the coefficient of *domestic credit* variable is also negative, suggesting that a higher level of domestic credit provided by the banking sector over GDP contributes to higher banking costs (*i.e.,* decrease in cost efficiency). Therefore, on average, a larger volume of financial credit through the banking sector can be associated with somewhat lower efficiency levels. Although, the influence of *RCREDT* is positive and significant at the 1 per cent level. This result supports the hypothesis that financial liberalization leads to improvements in banks' cost efficiency in our dataset. The empirical finding of two different demissions of financial liberalization provides mixed results on the relationship between bank efficiency and financial liberalization. In theory, the extent to which financial markets are liberalized may be linked to the impact of liberalizations on bank efficiency. In particular, the more the government retreats from influencing the allocation of scarce financial resources, the more the price mechanism will be restored and the more the conditions for the market competition will be improved, which is expected to result in more efficient banking activities. In constant, the result of the domestic credit variable is opposite to what we expected

based on the theory that financial liberalization has been associated with a substantial improvement in the efficiency of credit allocation in these countries, resulting in higher bank efficiency. The reason can be related to two issues; first, financial liberalization has different dimensions which this study focus on just two dimensions of financial liberalization; second, quality of loans perhaps is another reason which the elimination of government control refers to screening and monitoring of loan quality lead to low-quality loans. Therefore, domestic credit provided by the banking sector variable should lead to high-quality loans, which are a strong measure of financial liberalization.

The empirical finding of the next group of variables that are proxy of free capital flow shows a negative relationship between *CPITLF* and *CE* would be indicated that market integration carried out in Eurozone economies during 1999-2012 and has a negative impact on bank efficiency while the intra-EU outflow direct investment flow (*OUFDI*) has a positive coefficient that is significant at the 1 per cent level, supporting the idea that high flow capital within the Eurozone encourages banks to encourage banks' managers to utilize their resources more efficiently. The findings imply that banks operate in member with higher intra-EU outflow direct investment tend to have higher cost-efficiency scores. Likewise, negative coefficients of market integration variable in the cost efficiency regression model suggest that the high integrated market country; the less efficient of the bank will be purely because of the intra-EU inflow direct investment effect.

To investigate the relationship between Maastricht Protocol targeted policy and the Eurozone bank efficiency, government budget deficit targeting (*BDEFIC*) and public debt targeting variables (*PDEBT*) are introduced as explanatory variables in cost efficiency model regressions. The sign of the government budget deficit targeting variable is positive, while the public debt targeting variable has a negative coefficient (-0.0004). The results have indicated that, on average, an increase of difference between the actual government budget deficit to GDP and reference value (3% of GDP) was associated with increased bank efficiency at the domestic country-level. In contrast, the difference between the actual level of public debt and reference value (60% of GDP) could have a negative impact. Those two variables are related to sound public finance for sustainable convergence of Member States. The *BDEFIC* refers to countries' fiscal policy, and the positive value of variables across all Member States indicated budget deficit over time because of expansionary fiscal policies. Therefore, the government budget deficit positively impacts bank efficiency without assurance of sound public finance policy, which is essential to ensure sustainable economic development within the euro area. It must also be remembered that the criteria relating to government deficit need to be adjusted for the euro area adopted by the Member States. By increasing the actual difference from the targeted value of the government budget deficit, bank cost efficiency will increase. The negative sign of the public debt targeting coefficient suggests that higher deference of the ratio of government debt to GDP from 60% of

GDP contributes to higher banking costs (*i.e.,* decrease in cost efficiency). One reason can be the crowding-out effect of the increasing share of government debt from GDP over the long term (by continuous fiscal budget deficit). A higher share of government debt would increase the share of government in the economy. When governments find a deficit with the issuing of government bonds, interest rates can be increased across the market because government borrowing creates a higher demand for credit in the financial markets. Therefore, the bank will increase the cost of borrowing deposits, so; banking costs will be heightened. As a second reason, fiscal deficit financed by debt crowds out private sector investment and lowers the level of economic growth and development (environmental condition of the banking industry).

The paper also detected differences in the profit efficiency of banks between the countries. The application of the Battese and Coelli (1995) specification furthermore allows us to explain the association of profit efficiency with efficiency correlates, namely competition levels, foreign ownership, financial liberalization, free capital flow, and the euro area control variables.

The first two columns of Table 4 report the results for first-difference panel GMM and next two columns report system panel GMM, respectively. Using the system GMM estimator, which exploits the moment conditions, the coefficient on the lagged dependent variable is higher than first-differenced GMM (0.5062) and statistically significant. These results suggest that the profit efficiency of the previous year (L1) is significantly and positively related to the efficiency of the current year in both models. The importance of the lagged value of profit efficiency is because of including the efficiency of the previous year (L1) as an independent variable for attempting to capture the dynamic nature of the efficiency of banks. The result of L1 in all estimated profit models stated that the first lags of profit efficiency are usually significantly different from zero, thus indicating that profit efficiency at time t is positively influenced by previous years' efficiency.

Further, the GMM-SYS results satisfy the three additional conditions: a significant AR(1) serial correlation, lack of AR(2) serial correlation, and a high Sargantest. The first is a Sargan test of over-identifying restrictions, which tests the instruments' overall validity by analyzing the sample analog of the moment conditions used in the estimation process. The second test examines the hypothesis that the error term is not serially correlated. We test whether the differenced error term is second-order serially correlated (by construction, the differenced error term is probably first-order serially correlated even if the original error term is not). Failure to reject the null hypotheses of both tests gives support to our model. Therefore, The results of both specification tests, AR(2) for testing the serial correlation and Sargent test for testing the validity of the instrument adopted, are valid.

The coefficients of all financial integration variables are significant at least at 1% level and in line with our expectations with system panel GMM in the two-step

version. Hence, competition, ownership, financial liberalization, and free capital flow factors play an essential role in determining profit efficiency.

In the first set of variables, to capture the competition situation for retail banking services and its correlation with bank profit efficiency, the *concentration ratio* variable (an inverse measure of the competition) has a negative sign, indicating higher asset share of the five biggest banks in entire banking system assets contribute to lower banking profits. It means that, on average, higher market concentration can be associated with the deteriorating profit efficiency of banks. The sign of the *bank market power* coefficient is positive, which shows the higher Lerner index (degree of market power) is significantly and positively connected with profit efficiency level. Therefore, banks with higher market power in the banking system have higher profit efficiency. For interpreting this result, several explanations may justify such a result based on theoretical literature. First, the "efficient-structure" hypothesis can explain this result. Namely, the most efficient banks may have increased their market share following the acquisition or the bankruptcy of the least efficient banks. It can notably be argued that the wave of domestic mergers in EU countries during the nineties led to an improvement in profit efficiency as some evidence suggests that the acquirers were more efficient than the acquired banks (Huizinga, Nelissen, & Vennet, 2001). Second, the specificities of banking competition may also explain this result. Namely, a decrease in competition may have favored profit efficiency for banks, as they can benefit more from scale economies in monitoring and from a higher length in the customer relationship, providing the best information on the borrowers (Weill, 2004). Finally, the results of these two variables show that empirical findings on banks in the euro area countries provide mixed results for the relationship between competition and the efficiency of banks, which is more dependent on the selected proxy for competition. The sign of the foreign ownership variable coefficient is positively and statistically significant in influencing the banks' profit efficiency, suggesting that a higher level of foreign bank share in the banking sector contributes to higher banking profits. Besides making the banking industry more competitive, an increase in foreign banks' presence can positively influence the efficiency of banks through two channels (see Lensink & Hermes, 2004). First, foreign banks may introduce modern and more efficient banking techniques that may be copied by domestic banks (transferring knowledge and technology). Second, foreign banks may contribute to the quality of human capital in the domestic banking industry by importing high-skilled bank managers to work in their foreign branches and investing in the training of local employees. This, in turn, could enhance the ability of banks to transform their inputs into outputs.

A third set of variables is used to capture the financial liberalization in specific countries. Contrary to expectations, the coefficient of the *domestic credit* variable has a negative sign, suggesting that a higher level of domestic credit provided by the banking sector over GDP contributes to lower banking profit (*i.e.,* decrease in profit efficiency).

Therefore, on average, a larger volume of financial credit through the banking sector can be associated with somewhat lower efficiency levels. This empirical finding is opposite to what we expected based on the theory that financial liberalization has been associated with a substantial improvement in the efficiency of credit allocation in these countries, resulting in higher bank efficiency. Loan quality may be one reason why eliminating government control refers to screening and monitoring of loan quality leads to low-quality loans. Therefore, domestic credit is provided by the banking sector variable should lead to high-quality loans that are a strong measure of financial liberalization.

Real credit growth is positively linked with bank profit efficiency. This result supports the hypothesis that financial liberalization leads to improvements in banks' profit efficiency in the countries in our dataset. In theory, the more government retreats from influencing the allocation of scarce financial resources, the more the price mechanism will be restored and the more the conditions for market competition will be improved, which is expected to result in more efficient banking activities (Hermes, Nhung, 2010). In general, the empirical finding of two different demissions of financial liberalization provides mixed results on the relationship between bank efficiency and financial liberalization.

The empirical finding of the next group of variables that is proxy of free capital flow shows a negative relationship between CPITLF and CE, indicating market integration carried out in the Eurozone economies has a negative impact on bank profit efficiency during 1999-2012. The intra-EU outflow direct investment flow (*OUFDI*) has a positive coefficient that is significant at the 1 per cent level, supporting the idea that high flow capital within the Eurozone encourages banks to encourage banks' managers to utilize their resources more efficiently. The empirical findings imply that banks operate in a country with higher intra-EU outflow direct investment tend to have higher profit efficiency scores. Likewise, negative coefficients of market integration variable in the profit efficiency regression model suggest the high integrated market country; the less efficient the bank will be purely because of the intra-EU inflow direct investment effect. Theoretically, FDI flow enables restructuring and the reallocation of resources to create a more efficient pan-European banking market structure and further dynamic benefits (like increasing output potential and the spillover productivity effects).

Regarding the relationship between Maastricht Protocol targeted policy and the Eurozone bank efficiency, government budget deficit targeting (*BDEFIC*) and public debt targeting variables (*PDEBT*) are introduced as explanatory variables in profit efficiency model regressions. The sign of the government budget deficit targeting variable is negative (-0.0001), while the public debt targeting variable has a positive coefficient (0.0018). The results have indicated that, on average, a larger volume of difference between the actual government budget deficit to GDP and reference value (3% of GDP) is associated with decreasing bank profit efficiency at the domestic country-level whereas an increasing difference between the actual level of public debt and reference value (60% of GDP) could have a positive impact.

Table 4. Baseline analysis for the effect of financial integration on profit efficiency (controlling endogeneity)

Regressors	GMM-DIF One-step	GMM-DIF Two-step	GMM-SYS One-step	GMM-SYS Two-step	GMM-SYS♠ One-step	GMM-SYS♠ Two-step
Initial of profit efficiency (L1)	0.4258*** (0.000)	0.4243*** (0.000)	0.5034*** (0.000)	0.5016*** (0.000)	0.4985*** (0.000)	0.4988*** (0.000)
Concentration ratio	-0.0024 (0.332)	-0.022*** (0.000)	-0.0007 (0.587)	-0.0008*** (0.000)	-0.0009 (0.546)	-0.0009*** (0.000)
Bank market power	0.1225*** (0.000)	0.1221*** (0.000)	0.1250*** (0.000)	0.1246*** (0.000)	0.1251*** (0.000)	0.1251*** (0.000)
Foreign ownership	0.0004 (0.850)	0.0004*** (0.000)	0.0024*** (0.003)	0.0024*** (0.000)	0.0022*** (0.006)	0.0022*** (0.000)
Domestic credit	-0.0015*** (0.001)	-0.0015*** (0.000)	-0.0014*** (0.000)	-0.0014*** (0.000)	-0.0015*** (0.000)	-0.0015*** (0.000)
Real credit growth	-0.0004 (0.580)	-0.0005*** (0.000)	0.0002 (0.839)	0.0002*** (0.000)	0.0002 (0.823)	0.0002*** (0.000)
Market integration	-0.0004* (0.051)	-0.0004*** (0.000)	-0.0004*** (0.001)	-0.0004*** (0.000)	-0.0004*** (0.000)	-0.0004*** (0.000)
Capital flow[1]	0.0012 (0.898)	0.0011*** (0.000)	0.0347*** (0.000)	0.0348*** (0.000)	0.0328*** (0.000)	0.0328*** (0.000)
Government budget deficit targeting	0.0003 (0.917)	0.0005*** (0.000)	-0.0002 (0.940)	-0.0001*** (0.000)	0.0002 (0.952)	0.0002*** (0.000)
Public debt targeting	0.0009 (0.399)	0.0007*** (0.000)	0.0017* (0.081)	0.0018*** (0.000)	0.0014 (0.155)	0.0014*** (0.000)
Sargan test (p-value)[2]	0.0176	0.5535	0.0001	0.4807	0.0001	0.4522
Serial correlation test: AR(1) (p-value)[3] AR(2) (p-value)	0.0001 0.8930	0.0005 0.9240	- -	0.0006 0.8148	- -	0.0006 0.8792

Regressors	GMM-DIF One-step	GMM-DIF Two-step	GMM-SYS One-step	GMM-SYS Two-step	GMM-SYS♣ One-step	GMM-SYS♣ Two-step
Wald test for joint significance (*p*-value)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
No. of instruments	98	98	122	122	123	123
Cross-sectional observations	123	123	126	126	126	126

Note: The independent variables, concentration ratio (CR5) calculated as asset share of five largest bank in total banking system assets (%); bank market power (LERNR) calculated as Lerner index; foreign ownership (FORE) calculated as foreign bank assets among total bank assets (%); domestic credit (DCREDT) calculated as domestic credit provided by banking sector (% of GDP); real credit growth (RCREDT) calculated as growth rate of real domestic credit provided by banking sector (%); market integration (CPITLF) calculated as average value of inward and outward EU foreign direct investment flows divided by GDP (%); capital flow (OUFDI) calculated as the natural log of the intra-EU outflow direct investment reported by EU Member State; government budget deficit targeting (BDEFIC) calculated as difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP); public debt targeting (PDEBT) calculated as difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP). ♣The regressions also include time trend variable for the different time periods that are not reported. [1]In the regression, this variable is included as log(variable). [2]The null hypothesis is that model and overidentifying conditions are correct specified.[3]The null hypothesis is that there is no serial correlation in the first-differenced disturbances. Values in parenthesis are *p*-value. ***,**,* indicates significance at 1%,5% and 10% levels respectively. Source: Author's calculations

At least three reasons could be forwarded for this negative relationship. First, the bank was mandated to invest low-return government securities in financing government fiscal deficits (Fry, 1995). It could negatively influence bank-earning assets, resulting in lower profit efficiency. Second, the high cash reserve requirement is imposed on banks by the presence of high fiscal deficits. This persistently high cash reserve requirement may act as a cost imposed on banks because it restricts their capacity to produce maximum earning assets with their mobilized funds. Finally, in a high fiscal deficits economy, banks may find deposits more expensive to acquire scarce investible funds by launching government-sponsored saving schemes because it acts as a substitute to bank deposits. All of these factors, in turn, could hamper banks' ability to produce the quantity of earning assets and, hence, income and profit efficiency.

On the contrary, high *PDEBT* is positively related to banking profit efficiency, suggesting that higher deference of the government debt ratio to GDP from 60% of

GDP contributes to higher banking profit (*i.e.,* increase in profit efficiency). Finally, empirical findings of the euro area control variables cannot suggest a specific outcome in terms of Maastricht Protocol targeted policy and bank efficiency related to sound public finance because each variable is a line of public finance discipline but has a different impact on bank efficiency. Furthermore, these two variables have adverse impacts on cost and profit efficiency by comparing Tables 3 and 4.

The first-difference panel GMM estimator in the two-step version states that financial integration variables have a significant effect (at 1% level) on bank efficiency like system panel GMM. However, all coefficient signs are not consistent with GMM-SYS (like signs of real credit growth, government budget deficit, and public debt targeting variables. Moreover, columns 5 and 6 report system panel GMM regression, including time trend, which indicates that the results are consistent with the two-step system GMM regarding the significance level and sign of coefficients except government budget deficit targeting variable). Although, lagged dependent variable coefficient is 0.4988 and significant at 1% level but less amount than two-step system GMM.

5. Conclusions

The debate on differences in measuring and analyzing the efficiency of the Eurozone banking industry is still open and has been the subject of many applied works. This paper is designed to contribute to the current debate by investigating the influence of financial integration on the efficiency of the Eurozone banking system. This research tries to clarify the portions of the banking system based on financial integration in the euro area. Second, we estimated the relationship between cost, profit efficiency scores, and financial integration, which we defined as five groups of competition, banking market ownership, financial liberalization, free capital flow, and the euro area control variables. The results of the *t*-test suggested that concentration ratio was negatively related to bank efficiency while that the coefficient of bank market power had a negative relation to the cost efficiency score and positive relation to the profit efficiency for all years and for regression of panel data. The foreign ownership variable was negative, suggesting that a higher level of foreign bank share in the banking sector contributes to higher banking costs (*i.e.,* decrease in cost efficiency). On the other side, the profit efficiency model founds empirical evidence that the foreign controlling ownership environment was associated with somewhat higher profit efficiency levels.

Concerning the third set of variables, financial liberalization, the result showed a strong relationship between *domestic credit* and low cost and profit efficiency scores. In contrast, on average, a larger volume of real credit growth through the banking sector can be associated with somewhat higher efficiency levels. Overall, we deemed financial liberalization leads to improvements in banks' cost and profit efficiency in the countries in our dataset. The empirical finding of the next group, free capital flow, showed a negative relationship between market integration and cost and profit

efficiency. In contrast, the intra-EU outflow direct investment flow had a positive coefficient that was significant at the 1 per cent level, supporting the idea that high flow capital within the Eurozone encourages banks to encourage banks' managers to utilize their resources more efficiently. Likewise, negative coefficients of market integration variable in the cost and profit efficiency regression model suggested that the high integrated market country; the less efficient the bank will be, purely because of the intra-EU inflow direct investment effect.

The main finding of the current paper was that banks' efficiency scores could be significantly explained by Maastricht Protocol targeting policies. The current study results indicated that the public debt targeting variable had a strong negative influence on the cost-efficiency but a positive effect on profit efficiency. Conversely, the government budget deficit targeting variable positively affected cost efficiency, but it negatively impacted profit efficiency.

A clear message that emerges from the empirical analyses in this volume is that designing appropriate policies and institutions is essential for financial integration influence on bank efficiency. Whereas, the cost and profit efficiency model suggests that the level of financial integration (especially, concentration ratio, foreign ownership, domestic credit, and market integration) needs to design new regulations or developments to control its negative impacts on bank efficiency for contributing positively to bank performance.

References

Amel, D., Barnes, C., Panetta, F., & Salleo, C. (2004). Consolidation and efficiency in the financial sector: A review of the international evidence. *Journal of Banking & Finance, 28*(10), 2493-2519.

Andries, A. M., Apetri, A. N., & Cocris, V. (2012). The impact of the banking system reform on banks performance. *African Journal of Business Management, 6*(6), 2278-2284.

Angkinand, A. P., Sawangngoenyuang, W., & Wihlborg, C. (2010). Financial liberalization and banking crises: A Cross-Country analysis*. *International Review of Finance, 10*(2), 263-292.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29-51.

Ayadi, R., Arbak, E., Naceur, S. B., & De Groen, W. P. (2015). Financial Development, Bank Efficiency, and Economic Growth Across the Mediterranean. *In Economic and Social Development of the Southern and Eastern Mediterranean Countries (pp. 219-233). Springer International Publishing*

Bain, J. S. (1951). Relation of profit rate to industry concentration: American manufacturing, 1936–1940. *The Quarterly Journal of Economics, 65*(3), 293-324.

Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research, 98*(2), 175-212.

Berger, A. N. (2003). The efficiency effects of a single market for financial services in europe. *European Journal of Operational Research, 150*(3), 466-481.

Berger, A. N., Dai, Q., Ongena, S., & Smith, D. C. (2003). To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 european nations. *Journal of Banking & Finance, 27*(3), 383-415.

Bonin, J. P., Hasan, I., & Wachtel, P. (2005). Bank performance, efficiency and ownership in transition countries. *Journal of Banking & Finance, 29*(1), 31-53. doi:10.1016/j.jbankfin.2004.06.015

Boot, A. W. (1999). European lessons on consolidation in banking. *Journal of Banking & Finance, 23*(2), 609-613.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*(1), 115-143.

Cappiello, L., Vives, X., & Gérard, B. (2006). *The impact of the Euro on financial markets*(No. 0598). European Central Bank.

Casu, B., & Girardone, C. (2006). Bank competition, concentration and efficiency in the single european market. *Manchester School, 74*(4), 441-468.

Casu, B., Girardone, C., & Molyneux, P. (2004). Productivity change in european banking: A comparison of parametric and non-parametric approaches. *Journal of Banking & Finance, 28*(10), 2521-2540.

Casu, B., & Girardone, C. (2009). Testing the relationship between competition and efficiency in banking: A panel data analysis. *Economics Letters, 105*(1), 134-137. doi:10.1016/j.econlet.2009.06.018

Chortareas, G. E., Girardone, C., & Ventouri, A. (2013). Financial freedom and bank efficiency: Evidence from the European Union. *Journal of Banking & Finance*, *37*(4), 1223-1231.

De Guevara, J. F., Maudos, J., & Perez, F. (2005). Market power in european banking sectors. *Journal of Financial Services Research, 27*(2), 109-137.

Denizer, C. A., Dinc, M., & Tarimicilar, M. (2000). *Measuring banking efficiency in the pre- and post-liberalization environment: Evidence from the turkish banking system* World Bank Publications.

Dermine, J. (2003). Banking in europe: Past, present and future. *The Transformation of the European Financial System,21*(1), 31-95.

Emiris, M. (2011). Measuring capital market integration. *BIS Papers Chapters, 12*, 200-221.

Ferreira, C. (2013). Bank market concentration and bank efficiency in the European Union: a panel Granger causality approach. *International Economics and Economic Policy*, *10*(3), 365-391.

Fries, S., & Taci, A. (2005). Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries. *Journal of Banking & Finance, 29*(1), 55-81. doi:10.1016/j.jbankfin.2004.06.016.

Fry, M. (1995). Money, interest, and banking in economic development. *Johns Hopkins Studies in development Show all parts in this series.*

Gaganis, C., & Pasiouras, F. (2013). Financial supervision regimes and bank efficiency:

International evidence. *Journal of Banking & Finance*, *37*(12), 5463-5475.

Goddard, J., Molyneux, P., & Wilson, J. O. (2004). The profitability of european banks: A cross-sectional and dynamic panel analysis. *The Manchester School, 72*(3), 363-381.

Goddard, J., Molyneux, P., Wilson, J. O. S., & Tavakoli, M. (2007). European banking: An overview. *Journal of Banking & Finance, 31*(7), 1911-1935. doi:10.1016/j.jbankfin.2007.01.002

Grigorian, D. A., & Manole, V. (2006). Determinants of commercial bank performance in transition: An application of data envelopment analysis. *Comparative Economic Studies, 48*(3), 497-522.

Hartmann, P., Straetmans, S., & De Vries, C. G. (2005). *Banking System Stability: A Cross-Atlantic Perspective,* In *The Risks of Financial Institutions*(pp. 133-192). University of Chicago Press.

Hasan, I., & Marton, K. (2003). Development and efficiency of the banking sector in a transitional economy: Hungarian experience. *Journal of Banking & Finance, 27*(12), 2249-2271.

Hermes, N., & Nhung, V. T. H. (2010). The impact of financial liberalization on bank efficiency: Evidence from latin america and asia. *Applied Economics, 42*(26), 3351-3365.

Hughes, J. P., & Mester, L. J. (2008). *Efficiency in banking: Theory, practice, and evidence* Working papers//Department of Economics, Rutgers, the State University of New Jersey.

Jemric, I., & Vujcic, B. (2002). Efficiency of banks in croatia: A dea approach. *Comparative Economic Studies, 44*(2-3), 169-193.

Jiang, C., Yao, S., & Feng, G. (2013). Bank ownership, privatization, and performance: Evidence from a transition country. *Journal of Banking & Finance,* 37(9), 3364-3372.

Kraft, E., & Tırtıroğlu, D. (1998). Bank efficiency in croatia: A stochastic-frontier analysis. *Journal of Comparative Economics, 26*(2), 282-300.

Lensink, R., & Hermes, N. (2004). The short-term effects of foreign bank entry on domestic bank behaviour: Does economic development matter? *Journal of Banking & Finance, 28*(3), 553-568.

Mamatzakis, E., Staikouras, C., & Koutsomanoli-Filippaki, A. (2008). Bank efficiency in the new european union member states: Is there convergence? *International Review of Financial Analysis, 17*(5), 1156-1172.

Manna, M. (2004). *Developing statistical indicators of the integration of the euro area banking system*(No. 0300). European Central Bank.

Maudos, J., & de Guevara, J. F. (2007). The cost of market power in banking: Social welfare loss vs. cost inefficiency. *Journal of Banking & Finance, 31*(7), 2103-2125.

Murinde, V., Agung, J., & Mullineux, A. (2004). Patterns of corporate financing and financial system convergence in europe. *Review of International Economics, 12*(4), 693-705.

Nikiel, E. M., & Opiela, T. P. (2008). Customer type and bank efficiency in poland: Implications for emerging market banking. *Contemporary Economic Policy, 20*(3), 255-271.

Njie, M. (2006). The impact of financial liberalization on bank spreads in malaysia. *Journal of Economic Cooperation, 27*(3), 163-194.

Tabak, B. M., Fazio, D. M., & Cajueiro, D. O. (2013). Systemically important banks and financial stability: The case of Latin America. *Journal of Banking & Finance*, *37*(10), 3855-3866.

Tortosa-Ausina, E. (2002). Exploring efficiency differences over time in the spanish banking industry. *European Journal of Operational Research, 139*(3), 643-664.

Weill, L. (2004). On the relationship between competition and efficiency in the EU banking sectors. *Kredit Und Kapital,* 329-352.

Weill, L. (2009). Convergence in banking efficiency across european countries. *Journal of International Financial Markets, Institutions and Money, 19*(5), 818-833.

Williams, J., & Nguyen, N. (2005). Financial liberalisation, crisis, and restructuring: A comparative study of bank performance and bank governance in south east asia. *Journal of Banking & Finance, 29*(8), 2119-2154.

Yildirim, H. S., & Philippatos, G. C. (2007). Efficiency of banks: Recent evidence from the transition economies of europe, 1993–2000. *European Journal of Finance, 13*(2), 123-143.