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Dissertation title:

**The efficiency of the Big Three Greek banks in South  
Eastern Europe: A DEA approach**

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## Executive Summary

After the collapse of communism in 1989, the transition countries of South Eastern Europe received significant waves of FDI inflows, a large part of which targeted the financial services market.

The SEE countries performed some important banking reforms as a part of their transitional process which enabled foreign banks enter the market through greenfield or brownfield investments. In the early 90's, Greek banks followed their home clients and the foreign competition and penetrated the SEE market mostly through acquiring local banks, currently operating in Albania, Bulgaria, FYROM, Romania and Serbia (SEE-5).

Despite the wide presence of Greek banks in SEE, there is scarce literature on their performance there. This dissertation aims to assess the comparative efficiency of the largest three banks operating in SEE-5 with a Data Envelopment Analysis (DEA) approach, from 2005 until 2010. In order to estimate the efficiency of the Greek banks in SEE, an output-oriented DEA model is applied. The selection of the inputs and outputs was made according to the intermediation approach. The efficiency of the banks was estimated under both constant returns to scale and variable returns to scale in order to calculate scale efficiency apart from the technical one.

NBG displays a higher average Overall Technical Efficiency (OTE) and Scale Efficiency (SE) than Alpha Bank. As far as Technical Efficiency (TE) is concerned the two banks are quite on the same level. Eurobank presents lower efficiency scores than the other two banks and is quite affected from the economic crisis with inefficiencies both attributed to management and operations of scale. The total average efficiency also indicates that the efficiency of Greek banks was affected by the crisis, with 2009 to be the worst year.

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# 1. Introduction

The collapse of communism in 1989 signaled a new era for the countries of South Eastern Europe (SEE). After decades under the communist regime, they had to engage in a transition process from an economy based on central planning to an open-market economy. The virgin markets of SEE countries became the epicenter of the foreign investors' interest and received huge FDI inflows as they were proceeding with the economic reforms and improving their business environment.

Financial intermediation was the economic activity which received the lion's share of the incoming FDI in the region. The radical banking reforms led to the liberalization and modernization of SEE countries' banking sectors and the large-scale privatization of the former state-owned banks gave the opportunity to foreign banks to establish themselves in the region through greenfield or brownfield investments. The foreign entry had a beneficial impact on the domestic banking systems and economies and as is inferred by the available literature, foreign banks have reached high levels of efficiency and profitability.

Greek banks entered the SEE market in the mid-90's, following their corporate customers which decided to relocate in the SEE countries and take advantage of the opportunities in conducting businesses in the region. Greek banks have operations in five SEE countries; Albania, Bulgaria, FYROM, Romania and Serbia (SEE-5) and provide financial services through their branches and subsidiaries.

Although Greek banks have a large and successful presence in the SEE region, the literature on their efficiency is scarce. This dissertation aims to assess the comparative efficiency of the three largest Greek banks that operate in the SEE-5 via a Data Envelopment Analysis (DEA) approach. First, it is going to provide a framework of the banking reforms that took place in SEE countries, the presence of the foreign banks in the SEE region in general and of the Greek banks in SEE-5 in particular. Next, it is going to present a literature review on the field of foreign and Greek banks' efficiency, a description of the methodology, the empirical results and finally some concluding remarks.

## 2. Banking Reforms in SEE

After 1989, post-communist countries had to undergo a transitional process, moving from a centrally-planned economy towards a market economy. The reform and restructuring of the banking sector was an essential element of this process, as a well-developed and properly functioning and supervised banking system is vital for the development of the whole economy, despite its volatility. The transformation of communist banking systems was proved to be difficult as their function was entirely different from the market-oriented banking system. They were state-owned and mono-bank based (except for the Former Yugoslavian countries which had a two-tier banking system since the mid - 60's), consisting of a large State Bank and a few special purpose units, like an agricultural or a savings bank (Barisitz, 2008). Moreover, their function was completely different from a market-oriented banking system; the banks were primarily used as vehicle from the government in order to allocate resources according to the central plan. In other words, they provided almost unconditionally credit to the other state-owned enterprises and were characterized by the presence of soft budget constraints, with the concepts of bankruptcy, insolvency and regulation being absent (Fries & Taci, 2002).

South Eastern European (SEE) countries were more hesitant to begin their banking reform process in comparison to Central Eastern European (CEE) countries. Moreover, there were regional variations among them regarding the timing, the sequencing and the extent of the implementation of the reforms. The development of the reform process in all the countries, despite the variation, was in line with the so-called Washington consensus, under the advisory of its main proponents, the International Monetary Fund and the World Bank, and also advocated by the rest of the International Financial Institutions (IFIs) (Fries & Taci, 2002; Stubos & Tsikripis, 2005).

## **2.1 Banking Reform Waves**

The process of the reconstruction and the reform of the banking systems in SEE evolved in two phases. The two reform waves triggered credit booms, followed by busts and most often banking crises, as it will be described afterwards.

### **2.1.1 First Reform Wave**

The first reform wave lasted from the early until the late 90's. The initial step in the transitional banking was the creation of a two-tier banking system and the separation of commercial and central banking functions, which included the Central Bank and the commercial banks. The first reform wave also included the liberalization of bank licensing which had the aim of boosting the competition in the banking industry. Moreover, financial rehabilitation measures were introduced in order to tackle bad accumulated loans which were inherited by the communist past, like replacing the non-performing loans with government bonds (Barisitz, 2008). In this initial phase of reform, privatization was "surface", partial and in most cases insider, implemented by following voucher and Management Employee Buy-Out (MEBO) methods (ibid). The early regulatory and supervisory regime was rather lenient or generous.

Although there was a revival of economic growth around mid-90's and a relatively stabilized macroeconomic situation, the initial phase of banking reforms resulted in many problems. The emerging banking systems were overbanked due to the easy entry regulation. In addition, they were reburdened with huge non-performing loans and in the same time were hit by external shocks (Barisitz, 2008). The insufficient regulation and supervision regarding property, creditor and contract rights, combined with the retainment of soft budget constraints and the continued lack of the rule of law, resulted in irregularities and fraudulent activities (ibid). Capital flight, connected lending, pocket banks and financial pyramids became a common thing. All of the above inevitably led to recessions and banking crises, which affected almost all SEE countries and triggered the second wave of reforms (Stubos & Tsikripis, 2005).

### **2.1.2 Second Reform Wave**

The severe banking and economic crises in 1996-1999 urged governments to re-design their banking reform strategies and thus entered the second reform wave, which started in late 90's and is still in progress. Finally there was the establishment of hard budget constraints to the banks, like resolution and recapitalization measures, as also the crucial hardening of bankruptcy conditions, which led to the consolidation of SEE banking systems (Stubos & Tsikripis, 2005). Moreover, banking regulation and supervision were tightened up, moving from plain verification of rules to substantial risk-based approaches (Barisitz, 2005). The accounting methods were also upgraded in alliance with International Accounting Standards and EU standards. Property and creditor rights were strengthened and protected, and were also spread to the whole real sector. SEE countries proceeded to the implementation of an outsider, in-depth privatization, by opening up to foreign strategic investors and creating links with European banks. All of these resulted to credit booms, which due to financial and macroeconomic risks had to be controlled. This is why the authorities had to adopt credit containment policies, like prudential tightening, minimum reserve requirements and administrative restrictions, and in general strengthened regulation and supervision (ibid). SEE banking industry is well regulated and broadly competitive, with sound balance sheets, and has so far proved resilient to the latest crisis, with relative high profitability and a sound capital base (Commission, 2009).

## **2.2 EU Accession and Banking Reforms**

Bulgaria and Romania became members of EU in 2007. The rest of the SEE countries are either candidate (Croatia, FYROM) or potential candidates (Albania, BiH, Serbia, Montenegro) for EU membership. In this context and in order to achieve EU accession they have to comply with certain criteria, the so-called Copenhagen criteria, which are the following:

1. Candidates should dispose of institutional stability and a democratic constitutional order, respect for human rights and protection of minorities.
2. By the date of EU entry, candidates should have created a functional market economy that can resist competition pressure within the EU.
3. They should also adopt and effectively implement the *acquis communautaire*, the EU's body of legislation. (Merkel & Grimm, 2007)

SEE countries' efforts to strengthen and respect the rule of law and harmonizing their domestic legislation with the *acquis*, effectively contributed to the progress of regulating and supervising their banking sectors.

### **2.3 Banking Reform Assessment in SEE**

The outcome of the banking reforms in Western Balkan countries has been rather successful. The legal and institutional framework regarding the regulation and supervision of financial institutions has been strengthened and improved, featuring a characteristic of a contemporary banking sector (Stubos & Tsikripis, 2004). This is very clear when examining the Transition Indication Scores by the European Bank for Reconstruction and Development (EBRD). These scores try to measure the progress of the transitional countries and range from 1, which represents little or no change from a centrally-planned economy, to 4+, which represents the industrialized market economy standards (EBRD, 2010). Especially the Banking reform indicator, ranges between little progress and full convergence of banking laws and regulations with the standards of the Bank for International Settlements (BIS) and the availability of a full set of banking services (Backé & Reininger, 2004). Table 1 depicts the progress of the banking indicator scores from 2000 to 2010.

SEE countries have come a long way and have reached quite satisfactory levels. Nevertheless, only Croatia and Bulgaria followed by Romania seems to be

near the ultimate goal, while the rest of the countries need to keep on with their banking reform strategies.

Table 1

	2000	2005	2006	2007	2008	2009	2010
Albania	2+	3-	3-	3-	3	3	3
BiH	2+	3-	3-	3-	3	3	3
Bulgaria	3	4-	4-	4-	4-	4-	4-
Croatia	3+	4	4	4	4	4	4
FYROM	3-	3-	3-	3-	3	3	3
Montenegro	1+	2+	3-	3-	3	3	3
Romania	3-	3	3	3+	3+	3+	3+
Serbia	1	3-	3-	3-	3	3	3

Data: EBRD

## 2.4 SEE Reform Overview

As it was mentioned before, SEE countries didn't perform their banking reforms at the same time. Croatia was the earliest to engage in the reform process in the early 90's (though it fell behind compared to CEE countries) (Barisitz, 2005). The rest of the countries in the region started around mid-90's with the latest to be Serbia, whose banking sector had to wait until 2001 to be reformed. The delay and the rather slow pace of the reforms are explained by the adverse political and economic situation, which was emanated from the communist heritage and the war

legacy in the Balkan region. The dawn of the transition era in SEE Balkan countries was marked by macroeconomic imbalances, misallocation of resources trade flows and corrupted old political elites which were resisting to the implementation of the reforms, especially to the enactment of prudential regulations and privatization (Fries & Taci, 2002). Nonetheless, the banking crises in late 90's, urged SEE countries to intensify the speed and the volume of the reforms.

According to the relevant literature, the legislation on supervision and regulation of banking systems in Western Balkans can be summarized in the following:

- Creation of two-tier banking system
- Central Bank independence
- Delegation of the Central Banks to be the supervising authorities of the banking system
- Tightening of the licensing requirements of commercial banks
- Privatization of state-owned banks and opening up to foreign ownership
- Bank rehabilitation
- Bank bankruptcy
- Deposit insurance
- Minimum capital requirements, solvency and liquidity requirements
- Harmonization of domestic legislation with EU and Basel standards
- "know your client" requirements, in order to prevent money laundering

In Table 2, there is an indicative summary of the most important legislation until 2003:

Table 2

**Chronology of important regulatory events**

Country	Bank regulation
<b>Albania</b>	<ul style="list-style-type: none"> <li>▪ Law on the Bank of Albania (1992, 1997)</li> <li>▪ Law on Banks in the Republic of Albania (1992, 1998)</li> <li>▪ Principles of Bank Licensing (1994, 2003)</li> <li>▪ Law on Deposit Insurance (2002)</li> </ul>
<b>Bosnia-Herzegovina</b>	<ul style="list-style-type: none"> <li>▪ Law on the Central Bank of Bosnia and Herzegovina (1997)</li> <li>▪ Banking Law (1997, 2000, 2002)</li> <li>▪ Law on Privatisation of Enterprises and Banks (1998)</li> <li>▪ Law on Deposit Insurance (2000, 2002)</li> <li>▪ Law on Payment Systems (2001)</li> </ul>
<b>Bulgaria</b>	<ul style="list-style-type: none"> <li>▪ Act on the Bulgarian National Bank (1991, 1997, 1998, 1999)</li> <li>▪ Law on Banks and Credit Activity (1992, 1997, 1998, 1999, 2001)</li> <li>▪ Law on Privatisation of Enterprises and Banks (1997)</li> <li>▪ Law on Bank Deposit Guarantee (1999)</li> <li>▪ Law on Bank Bankruptcy (2002)</li> </ul>
<b>Croatia</b>	<ul style="list-style-type: none"> <li>▪ Law on the National Bank of Croatia (1992)</li> <li>▪ Law on Banks and Savings Banks (1993)</li> <li>▪ Law on Bank Rehabilitation (1994)</li> <li>▪ Law on Deposit Insurance (1997)</li> <li>▪ New Banking Law (1998, 2002)</li> </ul>
<b>FYROM</b>	<ul style="list-style-type: none"> <li>▪ Banks and Savings Houses Act (1993, 1996)</li> <li>▪ Law on Deposit Insurance (1997)</li> <li>▪ New Banking Law (2000, 2002, 2003)</li> <li>▪ Law on the National Bank of FYROM (2002)</li> </ul>
<b>Romania</b>	<ul style="list-style-type: none"> <li>▪ Act on Banking Activities (1991)</li> <li>▪ Law on Deposit Insurance (1996)</li> <li>▪ The Bank Insolvency Act (1998)</li> <li>▪ The National Bank of Romania Act (1998)</li> <li>▪ The Banking Law (1998, 2001, 2002)</li> <li>▪ The New Banking Law (2003)</li> </ul>
<b>Serbia-Montenegro</b>	<ul style="list-style-type: none"> <li>▪ Law on Banks and Other Financial Organisations (1988, 2001)</li> <li>▪ Law on Accounting (2001)</li> <li>▪ Law on Bank Rehabilitation, Bankruptcy and Liquidation (2001)</li> <li>▪ Law on the National Bank of Yugoslavia (2002)</li> </ul>

Source: Athanasoglou et al., *DETERMINANTS OF BANK PROFITABILITY IN THE SOUTH EASTERN EUROPEAN REGION*, 2006

### 2.4.1 Albania

The banking reform in Albania started with a rather slow pace. The system allowed for fraudulent investment schemes, the so-called financial pyramids, the collapse of which not only caused a banking and economic crisis in 1997, but a general turmoil in the country with anarchy, chaos and 2000 citizens killed (Strazzari, 2007; Stubos & Tsikripis, 2005; UNODC, 2008). After that, there was the enactment of a new banking law, establishing a two-tier banking system and giving the Central Bank of Albania (BoA) the role of the supervisor of the banking system (Masciandaro & Quintyn, 2010). Through time there were several amendments which further strengthened the role of BoA by reinforcing its Supervision Department and its Regulation Office (Commission, 2010a; Masciandaro & Quintyn, 2010). Privatization

has proceeded and foreign ownership reached 92.4% of the total asset share in 2010 (EBRD data). Laws about bank licensing and deposit insurance were introduced and there is significant alliance with the acquis and the Basel guidelines, with room for improvement (Commission, 2010a). BoA in March 2010, decided to abolish the restrictions on financial transactions of foreign-owned banks to their parent banks, which induced a considerable increase in commercial banks' deposits (EBRD, 2010).

#### **2.4.2 Bosnia and Herzegovina (BiH)**

In BiH, after the end of the civil war, the banking sector was overbanked, with small and undercapitalized banks. In 1997 the Central Bank of BiH (CBBH) was established in order to harmonize the legal framework and improve the cooperation between the two Entity Banking Agencies, but was functioning as a Currency Board (Stubos & Tsikripis, 2005). The enactment on the Law of Banks and its later amendments providing for minimum capital requirements and "anti-financial terrorism" measures facilitated foreign entry, which accounted for 94.5% of total asset share in 2009 (Stubos & Tsikripis, 2005; EBRD data). There was also the introduction of a Deposit Insurance Law and the corresponding Agency. Furthermore, CBBH has implemented an anti-money laundering policy by enforcing a single registration of commercial bank accounts. In general, adequate banking regulations and supervisory rules have been established, but under the Entities' responsibility and not the CBBH. A single banking regulator was only established in 2010 in the context of the IMF programme (Commission, 2010b).

#### **2.4.3 Bulgaria**

The Bulgarian legislation allowed for the liberalization of the banking sector in 1991. Poor regulation and governance led to an insolvent overbanked system with 80 financial institutions with questionable lending activities and serious recapitalization needs (Barisitz, 2005). This endemic problem led to one of the most serious banking crises in SEE which lasted from 1996 to 1997. Under IMF advice, the Bulgarian government introduced a Currency Board which was pegged to the deutsch mark and through a deep depression, Bulgaria managed to stabilize its macroeconomic environment (Stubos & Tsikripis, 2005). The banking sector was

restructured in a systematic way, by the introduction of laws and regulations. In 2000 a Central Credit Registry was established and consolidated supervision was adopted by the Central Bank (BNB). In 2003, there was the introduction of International Accounting Standards (IAS) and the introduction of new regulations aligned with the Basel guidelines, like credit growth containment policies, minimum capital requirements and intensified supervision of the banking system (Barisitz, 2005; Stubos & Tsikripis, 2005). All these efforts led to a consolidated, profitable and well capitalized banking sector, with a foreign ownership of 81% and the highest capital adequacy ratio among all EU members for 2009 (17%) (EBRD, 2010).

#### **2.4.4. Croatia**

Croatia was the earliest reformer among SEE countries. In 1992 the Central Bank of Croatia (HNB) was defined as the supervisor of the banking system and in the next years there was the introduction of laws about bank rehabilitation as well as about deposit insurance (Athanasoglou, Delis, & C. K. Staikouras, 2006). Nevertheless, after this first reform wave Croatia suffered from a banking crisis in 1998 (Barisitz, 2005). After that, Croatia followed a hard budget constraints program which reduced the number of banks in the country. Privatization in the banking sector was almost complete in the early 00's, with foreign assets reaching 90.6% of total assets in 2010 (EBRD data). Croatia through the years has been constantly amending the Credit Institutions Act and the Deposit Insurance Act, as well as adopting EU directives such as the Capital Requirements Directive, in order to be in alliance with EU standards (Commission, 2010c). In the context of a more substantive risk-based approach, HNB further increased the capital adequacy ratio from 10 per cent to 12 per cent in April 2010 following the Basel 2 guidelines (EBRD, 2010).

#### **2.4.5 FYROM**

In FYROM, the initial regulations had to do with rehabilitation and privatization issues. The Central Bank (NBRM) has made a consistent effort of creating a regulatory and supervisory framework, with strict capitalization requirements and provisions for money laundering (Stubos & Tsikripis, 2005). In

early 00's, right after the 2001 civil conflict, NBRM adopted a new Banking Law including the core Basel Principles and until nowadays most of them, as well as further elements of the Basel 2 framework and EU banking Directives are being implemented (Commission, 2010d; Stubos & Tsikripis, 2005). As a result, foreign ownership rose from 47.3% in 2004 to 93.3% in 2009 (EBRD data). Nevertheless, while new anti-money laundering policies have lately been further developed, some financial services, such as leasing, remain unregulated and unsupervised (Commission, 2010d; EBRD, 2010).

#### **2.4.6 Romania**

In Romania, the progress of the banking restructure was quite slow in the first transition decade. The banking sector was highly concentrated, with the dominant banks burdened with large portfolios of non-performing loans (Bonin, Hasan, & Wachtel, 2008). It was only after the 1997-1999 financial crisis, with the bankruptcy of the largest state bank, the beginning of large-scale privatizations and the adoption of a number of reforming laws that the Romanian banking sector was rationalized (Stubos & Tsikripis, 2005). In the context of EU accession, there was the adoption of the New Banking Law, which included the tightening of loan provision and classification rules and other supervision regulations (Barisitz, 2005). Romania has 84% foreign owned assets in its banking sector and is constantly improving its legislation, with the latest law to be about consumer rights and the elimination of some fees (EBRD, 2010).

#### **2.4.7 Serbia**

As it was aforementioned, in Serbia the banking reform only started in 2000 after the change of the regime. Until then, the banking sector was state-owned, insolvent and under a liquidity crisis. In 2001, the Law for Rehabilitation, Bankruptcy and Liquidification came into force in order to restructure the banking system, while the Central Bank of Serbia (NBS) was entrusted with more regulatory and supervisory powers with a new Banking Act in 2002 (Barisitz, 2005). In the same year, Serbia performed the most radical act in transition banking history: the declaration of bankruptcy of large insolvent banks which accounted for 60% of the

official book value of total sector assets (Barisitz, 2008). The IMF programme emphasized on privatization and there was the adoption of privatization legislation, as well as its amendments later on (Fink, Haiss, & Ugjesic, 2005). Nevertheless, the whole procedure did not go as fast as in the rest of Western Balkan countries; the foreign assets reached 74% of the Serbian total assets in 2010 (EBRD data). With a new accounting law, all banks were required to adopt IAS and since 2002, NBS has been focused on enforcing its regulatory and supervisory authority as an autonomous and independent institution (Stubos & Tsikripis, 2005).

#### **2.4.8 Montenegro**

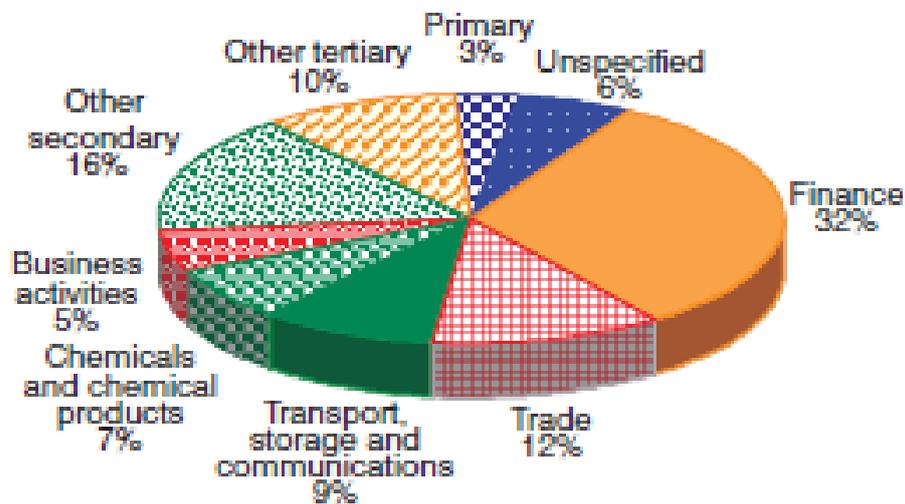
In Montenegro banking reform progressed faster compared to Serbia. The banking sector has almost completely been privatized, with foreign ownership reaching 87.1% of total assets in 2009 (EBRD data). There was a tightening in licensing conditions from the beginning. Moreover, Montenegro has established a legal framework that includes a Deposit Insurance Law, a Bankruptcy and Liquidation Law, a Financial Stability Council Law, and has made several amendments to the Law of Banks which are in line with the EU Capital Requirements Directive (Commission, 2010e). Nevertheless, in all the aforementioned areas, there is need for further compliance with EU standards. This is why the Montenegrin authorities introduced a new package of laws in 2010 regarding the intervention capacities of the Central Bank, the deposit protection by requiring banks deposit guarantees at €50,000 per depositor as well as several amendments to the key regulatory legislation (Commission, 2010e; EBRD, 2010). However there is still room for further alliance with the *acquis*.

### 3. Foreign Banks in SEE

#### 3.1 Financial FDI and Foreign Bank Presence

A distinctive characteristic of SEE countries' transition era is the significant waves of FDI inflow. The structure of FDI according to economic activity shows that financial intermediation is by far the leading economic activity of interest to foreign investors. As shown in Table 3, the FDI inward stock targeted to financial services reached 32 % in 2008.

Table 3



Source: *World Investment Report*, UNCTAD, 2010

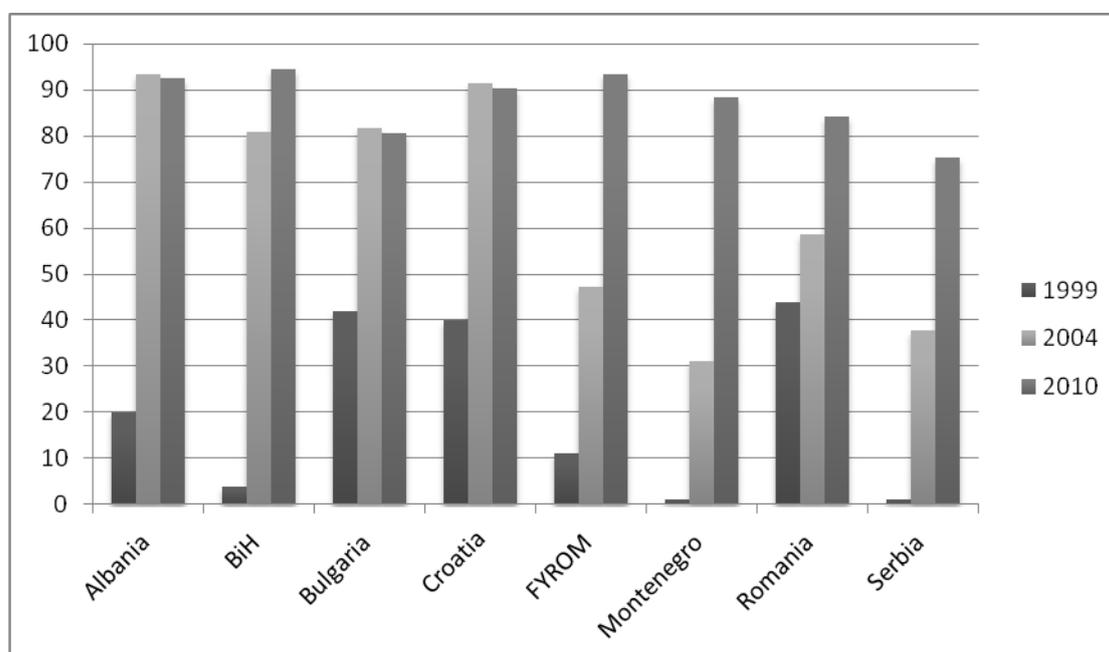
As a result, there was a dramatic expansion of the foreign-owned banks presence: by 2010 the share of banking assets owned by foreign entities in SEE countries reached 90%. In the following tables we can see the evolution of the share of foreign banks in terms of total assets, including data from 1999 until 2010. There was a tremendous increase regarding foreign ownership among SEE countries. In some cases the change was quite radical; in Bosnia and Herzegovina for example, foreign ownership rose from 4% in 1999 to 81% in only 5 years' time and reached 94.5% in 2010. Foreign bank presence 20 years ago in Montenegro was almost at zero levels, reached 31 % in 2004 and made a spectacular jump to 88 % in 2010.

Table 4

	2004	2005	2006	2007	2008	2009	2010
Albania	93.3	92.3	90.5	94.2	93.6	92.4	92.4
BiH	80.9	90.9	94	93.8	95	94.5	94.5
Bulgaria	81.6	74.5	80.1	82.3	83.9	84	80.7
Croatia	91.3	91.3	90.8	90.4	90.8	91	90.3
FYROM	47.3	51.3	53.2	85.9	93.1	93.3	93.3
Montenegro	31	87.7	91.9	78.7	84.6	87.1	88.4
Romania	58.5	59.2	87.9	87.3	87.7	84.3	84.1
Serbia	37.7	66	78.7	75.5	75.3	74.3	75.3

Data: EBRD

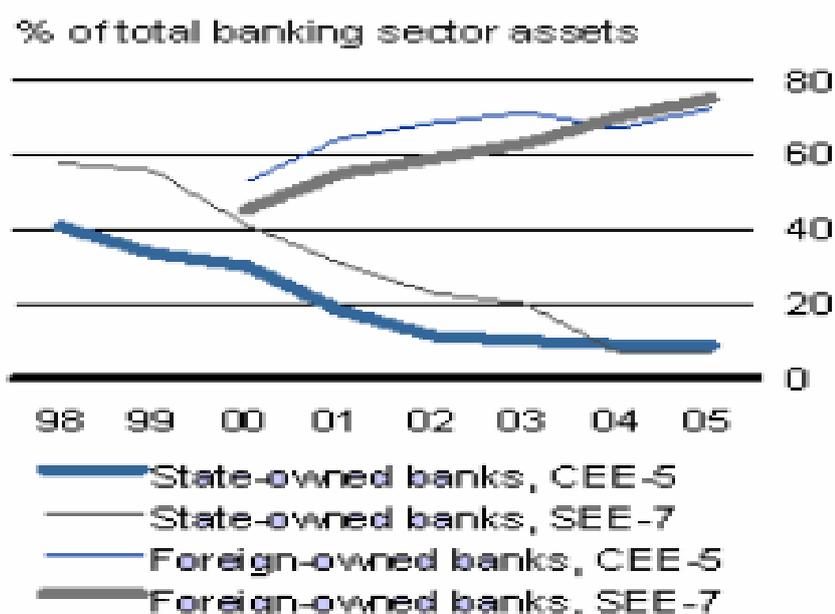
Table 5



Data: EBRD

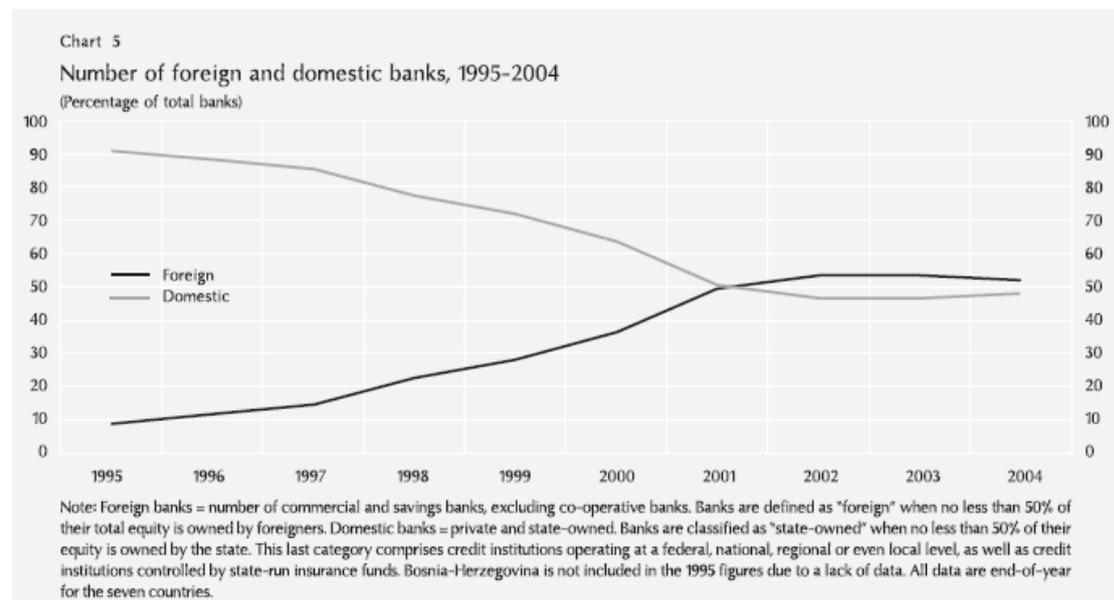
Large scale privatization and opening to foreign investors, resulted in the decrease of state-owned banks and the increase of private, and through time, foreign owned banks, as clearly shown in Table 6. The wave of bank globalization combined with the financial liberalization and the other economic transformations which were implemented generated the expansion of foreign capital in the region. In Table 7, there is a very distinctive graph that shows the development and the distribution of foreign and domestic banks over time, from 1995 to 2004. The total number of financial institutions was gradually decreased, after the overbanking that was caused by the initial easy entry regulations, and in the same time there was an obvious domination of foreign banks, which are now controlling the majority of the market shares in all SEE countries. In Table 8, there is the total number of banks in SEE countries and the number of foreign banks inside the parenthesis for the years 2004 until 2010. The most striking cases are the one of FYROM, where foreign banks were increased from 8 to 14, and Serbia, where foreign banks nearly doubled, from 11 to 21 with the parallel decrease in the total number of banks from 43 to 33.

Table 6



Source: Mühlberger M., *Banking in SEE: Moving in the spotlight*, 2007

Table 7



Source: Kapopoulos P., Lazaretou S., *Foreign bank presence: the experience of South-East European countries during the transition process, 2007*

Table 8

Number of banks (foreign-owned)	2004	2005	2006	2007	2008	2009	2010
Albania	16 (14)	16 (14)	17 (14)	17 (15)	16 (14)	16 (14)	na
BiH	33 (17)	33 (20)	32 (22)	32 (21)	30 (21)	30 (21)	29 (21)
Bulgaria	35 (24)	34 (23)	32 (23)	29 (21)	30 (22)	30 (22)	30 (22)
Croatia	37 (15)	34 (13)	33 (15)	33 (16)	34 (16)	34 (15)	34 (15)
FYROM	21 (8)	20 (8)	19 (8)	18 (11)	18 (14)	18 (14)	18 (14)
Montenegro	10 (3)	10 (7)	10 (8)	11 (8)	11 (9)	11 (9)	na
Romania	40 (30)	40 (30)	40 (33)	42 (36)	43 (37)	42 (35)	42 (35)
Serbia	43 (11)	40 (17)	37 (22)	35 (21)	34 (20)	34 (20)	33 (21)

Data: EBRD

### 3.2 Factors of Foreign Bank Entry in SEE

There are a number of factors that foreign institutions took under consideration for their decision to expand their operations in SEE region.

The first reason was the “follow the client” motive, in other words their desire to service their existing customers abroad, which is considered to be a motivation for bank expansion in the early period of entry. This is the factor that most likely explains the massive presence of the first entrants in SEE market which were from neighbouring countries, like Greece, Austria and Italy (D. Bădulescu & A. Bădulescu, 2008; Cull & Pería, 2007).

There were also some host-specific factors regarding the attractiveness of SEE region to foreign investors. SEE countries could offer substantial profit opportunities in the provision of financial services, as foreign banks can profit from the wider interest rate spreads while enjoying low domestic competition (Kapopoulos & Lazaretou, 2007). Moreover, SEE countries have the potential to succeed in their efforts for EU entry (Bulgaria and Romania are already EU members), therefore their macroeconomic situation will be further improved. Another host-specific factor is that the entry of foreign banks may facilitate and be followed by the entry of non-financial firms, and indeed many foreign banks settled in SEE countries, were followed by a massive presence of non-financial companies from the same home country (D. Bădulescu & A. Bădulescu, 2008). Also, bearing in mind that that financial intermediation is positively related with per capita income, retail banking was expected to expand in the host countries as disposable income increases (Kapopoulos & Lazaretou, 2007). A factor of significant importance was also the low taxation regime that foreign banks could enjoy in SEE countries (ibid).

Another factor for foreign bank entry in the region was the possibility to engage in new business activities not related at all with their initial clients from their home country, for example retail banking and non-financial services, and extent the services they provided as well as their clients’ portfolio, involving themselves in the local market (D. Bădulescu & A. Bădulescu, 2008). In addition, there is the factor of

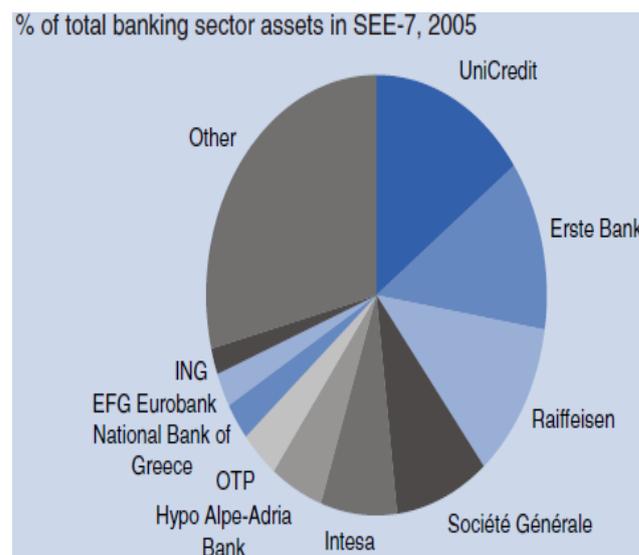
following-up the competition of the other banks with the intention of entering the region as well.

Two significant factors were also the economic, cultural and historical links with SEE countries, as well as the institutional and regulatory similarities which make foreign investors feel “close to home” (Cull & Pería, 2007; UNCTAD, 2010a).

### 3.3 Ownership Structure in SEE Banking Sectors

These last two factors seem to be responsible for the ownership structure in the banking sectors of SEE countries. The main foreign players in the region (presented in Table 9) are banks from EU countries; specifically Austria, Italy, Greece and France (with the only exception of a CEE bank, the Hungarian OTP, and the Dutch ING).

Table 9



Source: Mühlberger M., *Banking in SEE: Moving in the spotlight*, 2007

In 2009, the Italian Banca Intesa and UniCredit owned nearly one fifth of Serbia’s total bank assets, while Austria’s Raiffeisen, Erste and Hypo Group Alpe Adria are possessing one third of the banking assets in Croatia (UNCTAD, 2010a). Greek banks are enjoying average market shares of 20% in the region and are mainly operating in Bulgaria, Romania, Serbia, FYROM and Albania. In Table 10 there are the countries where Austrian and Italian subsidiaries are among the three largest banks

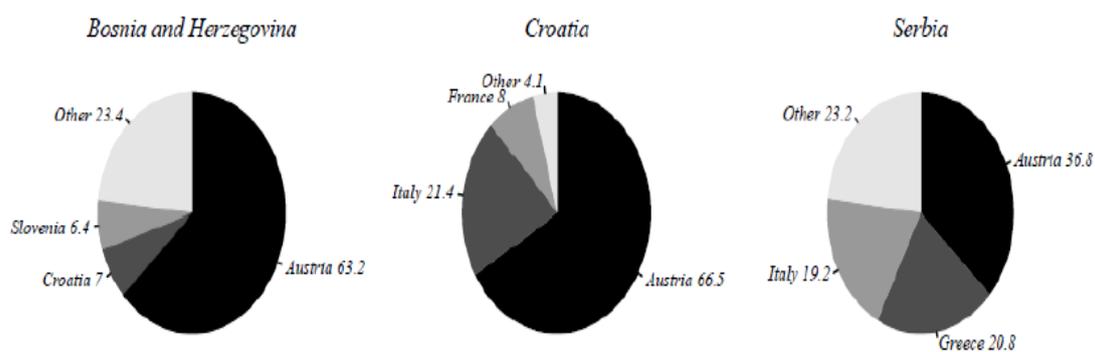
in the country. Table 11 shows the foreign ownership in Bosnia, Croatia and Serbia for the year 2010.

Table 10



Source: *Transition report 2006-Finance in transition*, EBRD, 2006

Table 11



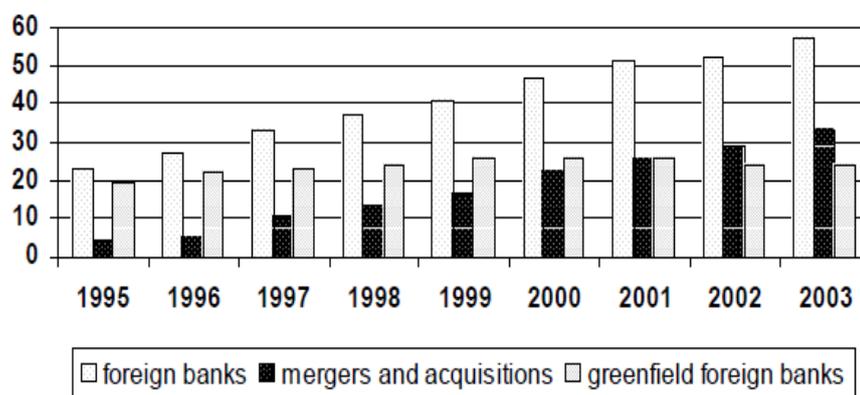
Notes: The ownership structure for Bosnia and Herzegovina is based on shareholders' capital, for Croatia and Serbia on assets of the banking sector. The ownership structure for Serbia relates to 30th June 2010, and was calculated on the basis of individual bank data, which were obtained from the homepage of the NBS.

Source: Četković P., *Credit Growth and Instability in Balkan Countries-The Role of Foreign Banks*, 2011

### 3.4 Ways of entry and Operations/Activities Preferred by Foreign Banks in SEE

Regarding the ways of entry, foreign banks chose the following: establishing subsidiaries, acquiring existing local banks and set up branches. The most frequent form was acquisitions, for a number of reasons; first, the acquisition of a domestic bank enabled foreign banks to rapidly gain a large share of the market. Moreover, the privatization of local banks in most cases was possible only as an arrangement with a foreign bank, as the purchase cost was high and governments needed the capital inflows in order to proceed with their reforms (Kapopoulos & Lazaretou, 2007). In SEE as well as in CEE countries, the evolution of the way of entry followed the pace and the development of privatization: the foreign capital from greenfield investments was gradually decreasing as the capital from acquisitions was growing, as it is clearly depicted in Table 12 (D. Bădulescu & A. Bădulescu, 2008).

Table 12



*Foreign banks' position in Central and Eastern Europe, by way of entry (number of banks)*

Source: Bădulescu D., *Aspects Regarding the Motivation and Forms of Foreign Banks' Penetration in Central and Eastern Europe*, 2008

The operations and activities that foreign banks chose to be engaged into in the first place, were with an increasing order; corporate financing, foreign trade and project financing. Less standard operations like bonds and securities, leasing, non-financial operations as well as retail banking and especially small and medium enterprises' (SMEs) financing were considered less desirable. Foreign banks operated

according to “cherry picking”, i.e. choosing the most profitable activities and clients, as they were exploiting their competitive advantages as new comers from more advanced banking sectors (D. Bădulescu & A. Bădulescu, 2008). Nevertheless overtime, as the market and the region were developing, banks started to engage in these activities as well. In Table 13, we can see that retail banking was the third source of financial income in SEE for 2006, counting for 21.2%, after payment and settlement and corporate finance. More sophisticated activities like asset management are mostly conducted from foreign banks and are still in low levels in the region.

Table 13

Fee and commission income from financial services (as a percentage of income)									
	Newly created foreign banks	Privatised foreign banks	Private domestic banks	State-owned domestic banks	Small banks	Large banks	CEB	SEE	CIS
Corporate finance	12.4	9.9	13.9	13.8	21.6	7.8	6.4	22.6	8.2
Retail brokerage	0.6	1.7	1.6	0.3	1.1	1.4	0.7	0.9	1.7
Asset management	3.6	2.2	2.8	0.9	2.9	2.9	4.8	0.5	3.5
Trading and sales	7.1	7.0	10.1	15.2	8.7	8.6	9.0	5.2	13.2
Retail banking	24.0	34.1	19.6	10.9	22.5	29.2	29.6	21.2	15.8
Commercial banking	23.6	18.4	20.2	26.3	19.5	20.1	18.1	19.6	27.4
Payment and settlement	26.5	24.6	28.8	32.3	21.6	27.8	29.2	28.7	26.3
Agency services and custody	2.5	1.8	2.8	0.3	2.1	1.8	2.0	1.4	3.5
Net commission income to net interest revenue	48.6	53.9	51.1	54.1	60.4	41.4	42.7	50.4	55.3
Net commission income to total revenue	24.8	26.8	25.2	30.1	30.1	24.3	22.7	27.1	27.2

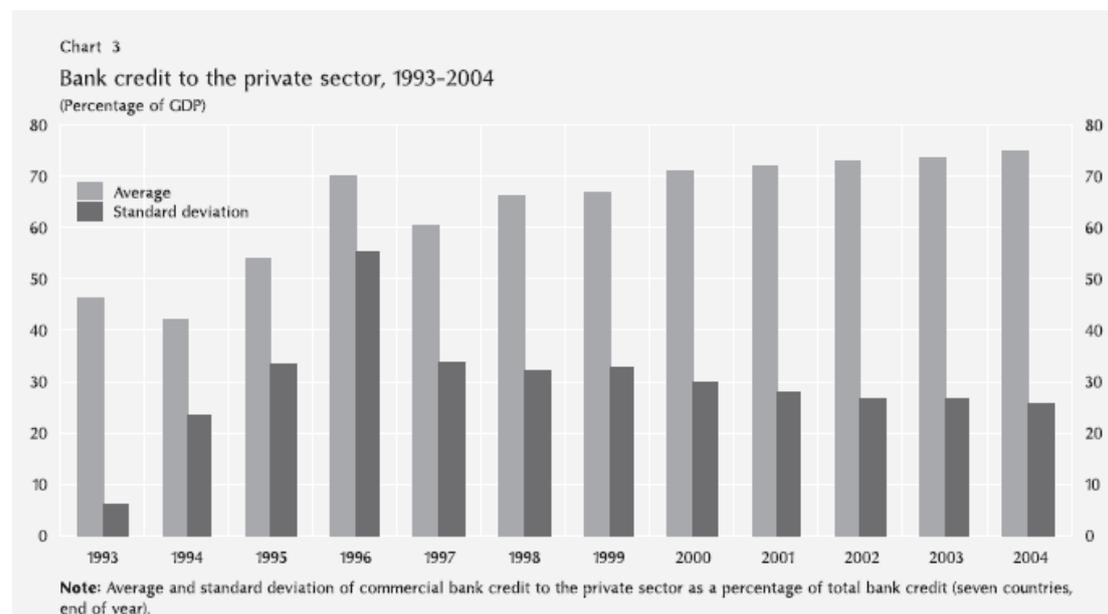
Source: *Transition report 2006-Finance in transition*, EBRD, 2006

### 3.5 Positive impacts of Foreign Bank Penetration in SEE Banking Systems

Foreign bank entry has been found to be a positive influence for SEE banking systems. To begin with, foreign banks appear to have a positive effect on *financial development* (EBRD, 2006; Kapopoulos & Lazaretou, 2007). As Table 14 shows,

private credit has had an upward trend, with the average annual credit to the private sector as a percentage of total bank credit to ascent from 46% in 1993 to 75% in 2003. In the same time standard deviation between SEE countries fell significantly from 55% in 1996 to 26% in 2004, indicating that bank behavior is becoming more uniform over time.

Table 14

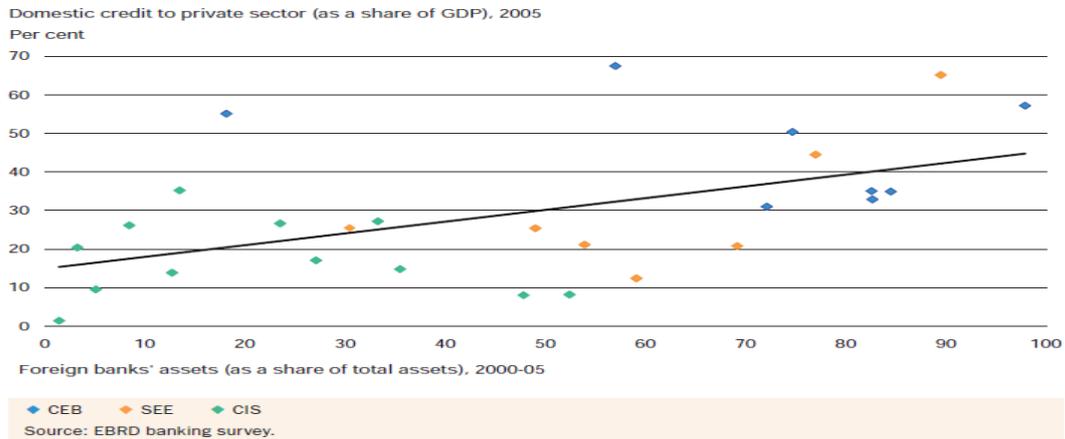


Source: Kapopoulos P., Lazaretou S., *Foreign bank presence: the experience of South-East European countries during the transition process, 2007*

The positive relation between foreign bank entry and financial development is also depicted in Table 15, although it also shows that in countries with low ratios of credit to GDP, for example in many CIS countries and a few SEE countries, foreign banks appear to have no positive effect on financial development. In other words there is a prerequisite for this positive effect to be evident; domestic markets should have achieved a high level of development before the foreign entry (EBRD, 2006).

Table 15

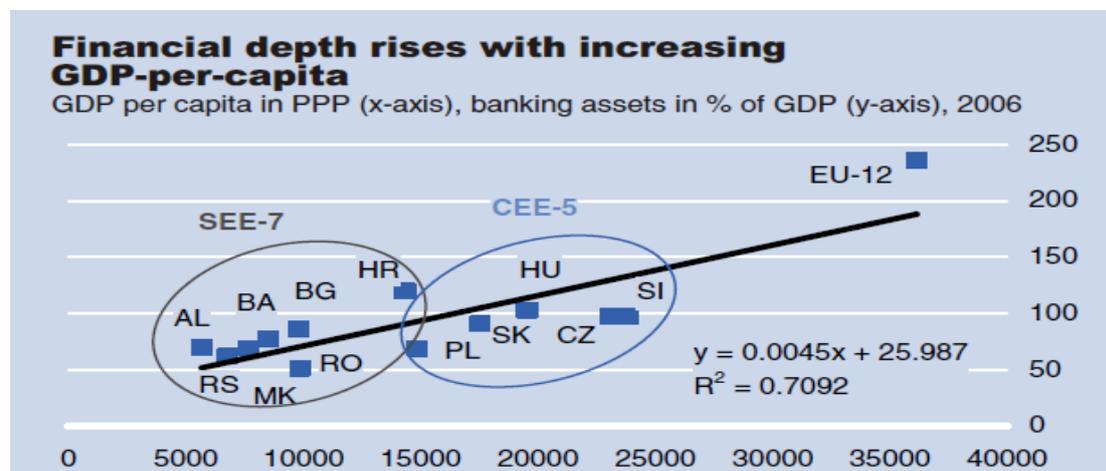
**Foreign banks' Impact on financial development**



Source: *Transition report 2006-Finance in transition*, EBRD, 2006

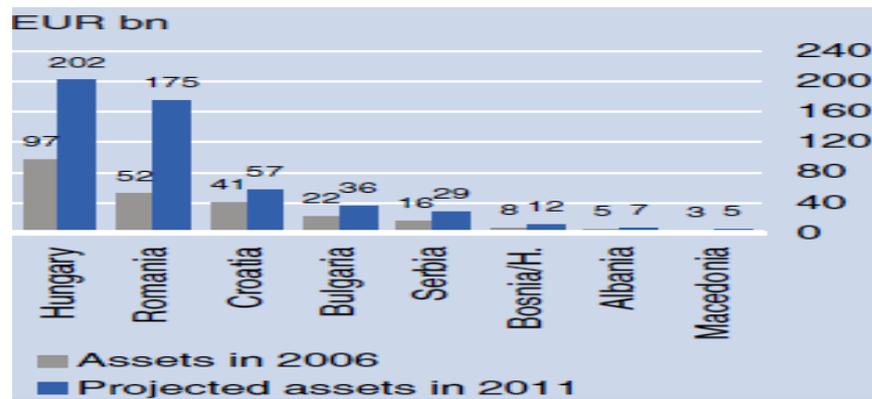
In 2006 in a research made by Deutsch Bank, some predictions were made about the future volume of assets in SEE by using a simple forecasting model, and based on the empirical finding of the positive relation between credit-to-GDP levels and per-capita GDP (Table 16). According to the estimates, SEE banking sector was expected to grow on average 17% until 2011 (of course not taking into account the financial crisis of 2008). Specifically Romania's assets were expected to increase 132 billion euros in 5 years' time, as shown in Table 17 (Mühlberger, 2007).

Table 16



Source: Mühlberger M., *Banking in SEE: Moving in the spotlight*, 2007

Table 17



Source: Mühlberger M., *Banking in SEE: Moving in the spotlight*, 2007

Another positive impact was reflected on the **stability** of SEE banking systems. There were almost no failures of banks that were sold to reputable foreign players. Some exits were due to a change in business strategy of the foreign bank, or because some SEE ventures proved to be disappointing (Kraft, 2004). In 2009 the Austrian Hypo Alpe Adria Bank had to be rescued by the Austrian government (UNCTAD, 2010a). In general there have been national and international efforts to stabilize the banking industry which was threatened by the financial crisis, and as a matter of fact the European Commission in its enlargement reports, characterized SEE banking sectors as resilient to crisis, with relative high profitability and a sound capital base (European Commission, 2009).

One more benefit of enormous importance was the **positive spill-over effects** from foreign bank presence to the domestic market, as domestic banks were prompted to keep up with the foreign banks in order to maintain their market share (Kapopoulos & Lazaretou, 2007). There was a substantial *transfer of know-how and technology* in SEE banking sectors, as foreign banks introduced advanced risk management techniques, information technology systems, screening methods and monitoring systems (EBRD, 2006; Kraft, 2004). Foreign banks are also responsible for a *more expertised human capital*. Investing in their human resources by choosing highly-skilled managers and by constantly training their personnel, foreign banks upgrade the quality of their human capital but of the whole domestic banking system as well (Kapopoulos & Lazaretou, 2007). They are also active in *introducing*

*new, sophisticated financial products and services*, part of which were already offered in the foreign banks' home markets, like asset management (Kraft, 2004).

In addition, the wave of Mergers & Acquisitions (M&A) that came with foreign bank entry resulted in the **consolidation** of SEE banking sectors, as the initial large number of banks due to easy entry regulation was decreased. For example, the number of banks in Croatia in 1997 was 61 and was decreased to 34 in 2010, while Bosnia's overbanked sector with 61 banks in 1999 shrunk to a smaller one of 29 banks in 2010 (EBRD, 2010; Kraft, 2004).

The purchase of small banks, the acquisitions and the greenfield foreign banks, combined to more concentrated banking systems and the new market policies implemented by foreign owners, resulted in substantial **competition**. Banking systems with 5 to 10 strong players were more competitive than those characterized by a large number of small banks few years earlier (Kraft, 2004).

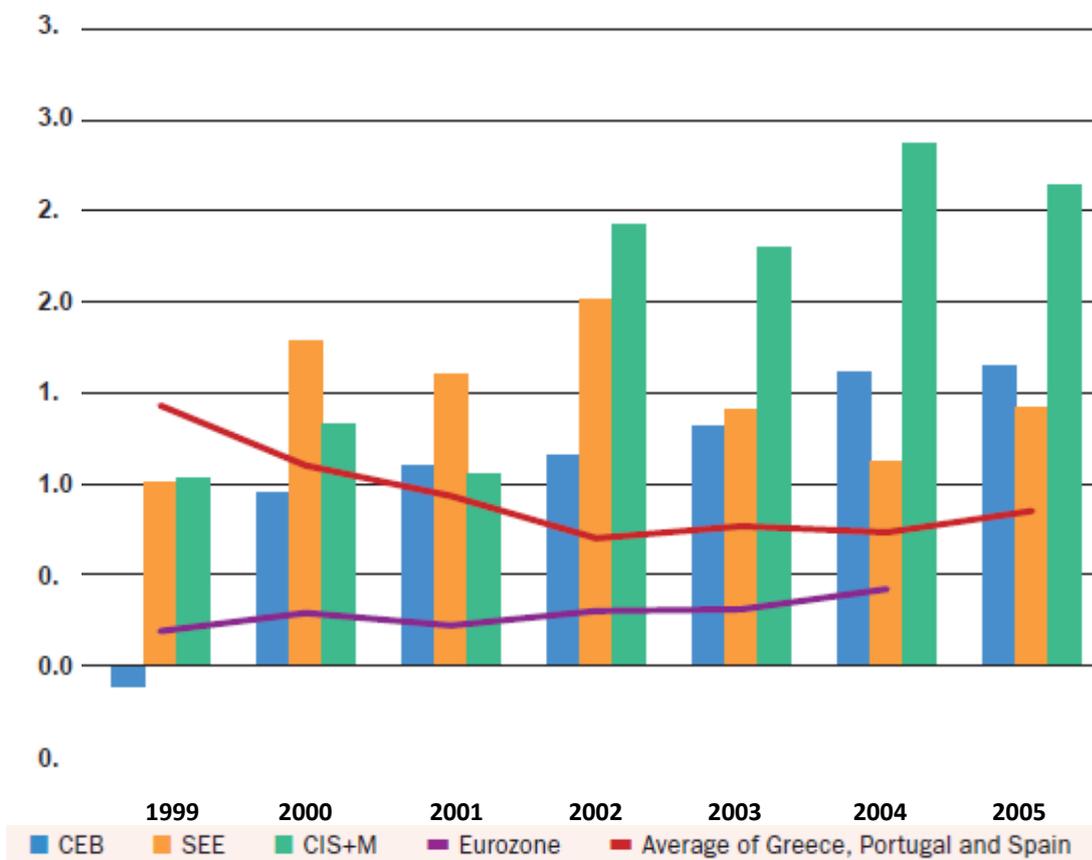
As competition is closely linked with **efficiency**, the increased competition caused by foreign bank entry, led to higher banking sector efficiency. After all, a number of studies have shown that foreign banks are more cost and profit efficient than domestic ones (this will be discussed broadly in section 5.1). Foreign banks are likely to have a more efficient credit allocation and monitoring methods and thus are of lower risk and operating costs (P. R. Haiss, Steiner, & Eller, 2005). Banks with majority foreign ownership have a significant positive impact on efficiency relative to domestic banks (J Bonin, I Hasan, & P Wachtel, 2005). They can impart cost-driven efficiencies more easily than profit-driven ones and can accumulate more deposits and loans, hence they provide better services (ibid).

Bank **profitability** was also positively influenced by the operation of foreign banks in SEE countries, which have been found to perform significantly better in terms of both Return on Assets (ROA) and Return on Equity (ROE) than domestic banks (Athanasoglou et al., 2006) . Bank profitability was strong in SEE region, as ROA and ROE have increased or remained at a relatively high level which is well above the average level prevailing in three benchmark EU countries-Greece, Portugal and Spain (Table 18). Foreign banks also managed to reduce the amount of non-

performing loans, which were the hallmark of the transition banking system (Tables 19,20) (EBRD, 2006).

Table 18

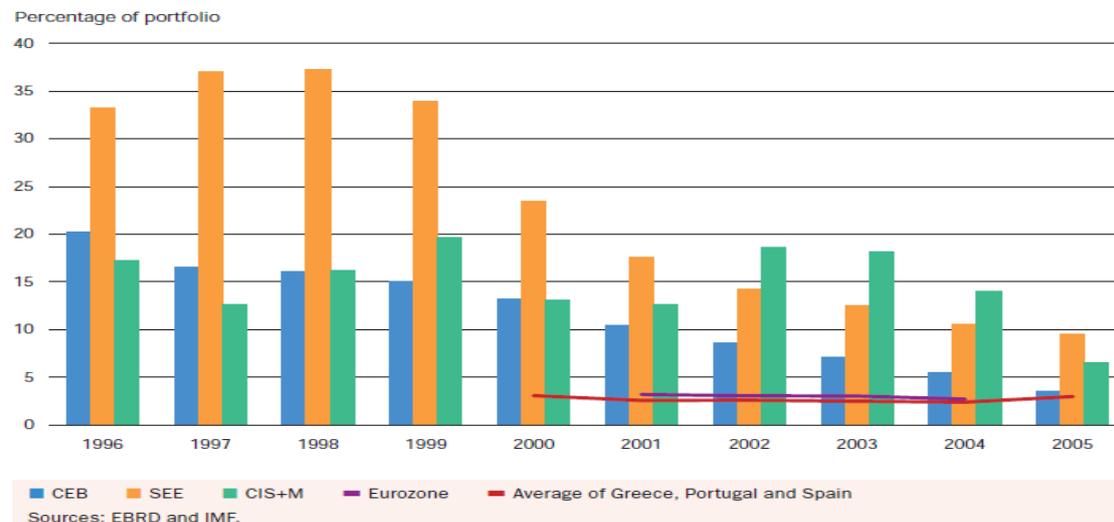
**Banks' return on assets**



Source: *Transition report 2006-Finance in transition*, EBRD, 2006

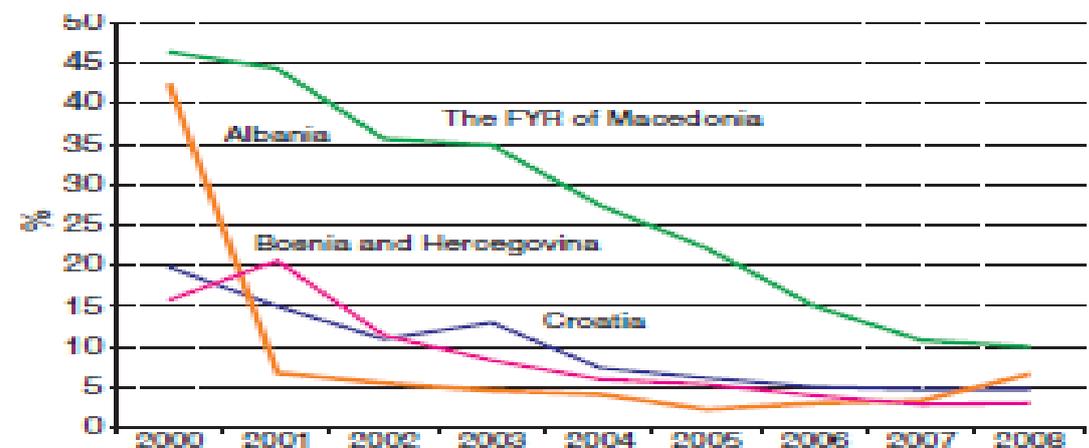
Table 19

**Non-performing loans**



Source: *Transition report 2006-Finance in transition*, EBRD, 2006

Table 20



Source: UNCTAD, based on banking supervision reports of South-East European countries.

Source: *World Investment Report*, UNCTAD, 2010

Foreign banks also contributed to the progress of **banking reform** as well as to **banking regulation and supervision**. Foreign banks usually import their parent company's supervisory systems, which cover by far the requirements of the local supervisory authorities-the so called home country principle which banks from EU countries are following (Kapopoulos & Lazaretou, 2007). As it was presented in the

EBRD index in section 2.3, it is clear that SEE countries have come a long way to reach quite satisfactory levels on the transition index.

### **3.6 Concerns about foreign ownership**

Apart from the positive effects that were mentioned before, foreign ownership has also raised some concerns.

First, high levels of competition cannot be taken for granted, due to the fact that the levels of concentration are constantly rising in the banking sectors of SEE countries, which means that with a smaller number of banks there will be more opportunities for tacit collusions (Kraft, 2004). Moreover, as foreign banks have been used to high profits they may not be willing to change that by sustaining aggressive competition. This can be encountered by the strengthening of the licensing requirements, the close cooperation between the home country and the domestic regulators and the enforcement of anti-trust regulations that will restrict possible abuse of dominant position and anti-competitive practices (ibid).

Second, there is the possibility of excessive credit growth due to the support of the parent banks to their subsidiaries. For example in Bulgaria and Romania, the loan growth was higher than the deposit growth for several years, partly due to the subsidiaries borrowing from their parent banks (EBRD, 2006).

In addition, the recent financial crisis has raised concerns about a systemic risk in SEE, as a small number of foreign banks are dominating the financial services industry (UNCTAD, 2010a). There are questions about the impact of a possible downsize in operations, a bankruptcy or an exit of foreign banks. Although the major active players which are operating in SEE region have agreed with the Vienna initiative that they won't stop their activities, no one can predict how these banks are going to act in the future (Cetkovic, 2011). For example Hypo Alpe Adria Bank, after it was nationalized, decided to reduce its assets, by selling its holdings in Montenegro, FYROM, Bulgaria, Hungary and Ukraine. So far, the effects of the crisis have been contained. The collapse of banking systems and currencies has been prevented. In addition, local financial markets have avoided high-risk financial

products and the reversals in net capital flows from the parent banks are still limited (UNCTAD, 2010a). A better cooperation between home and host country supervisors, especially regarding information sharing from home country supervisors to SEE supervisors, is essential in order to contain the risk of a crisis transmission in the region, while at the same time fully benefit from financial integration (Kraft, 2004; UNCTAD, 2010b).

## **4. Greek Bank Presence in SEE**

### **4.1 Factors for SEE Entry**

In section 3.2 there was an overview of the main reasons that motivated foreign banks to enter the SEE region. Beside from the benefits of investing in the SEE countries and some other factors that were common for all the foreign banks, there are some particular reasons for the Greek bank entry. To begin with, the saturation of the Greek banking system and the suppression of the profit margins played a significant role in their decision to expand in the SEE area (Labrianidis, 2000). Moreover, another very important reason for expanding was that a large part of their home corporate clients had already relocated their businesses in SEE. The increasing number of immigrants from the region (especially Albania, Bulgaria) and the remittances flows towards their home countries also functioned as a motive (Samantzis, 2007). What is more, Greek banks had to catch up with the competition of the rest of the foreign banks in SEE market share battle. Last but not least, the geographical proximity, as well as the common culture and mentality functioned as an additional incentive for the Greek bank penetration.

### **4.2 Entry strategies**

There are three main internationalization strategies; the “following the customer” strategy, the “following the leader” strategy and the “market seeking” strategy. In SEE, Western European foreign banks mainly chose to follow the last two more aggressive strategies, whereas Greek banks appear to have followed the more defensive “following the customer” strategy (Samantzis, 2007).

The internationalization case of Western European foreign banks can be explained by Dunning’s Eclectic Paradigm or OLI Theory (Uiboupin & Sörg, 2006). According to this theory, the foreign banks enter the country because of their ownership advantage (O) over the domestic banks, which can be their superiority in management skills, know-how and technology, their access to capital or their asset capacity. Then they choose the location (L) where they can fully exploit this

ownership advantage and which FDI decision to make for their internalization (I) over a range of market entries (Samantzis, 2007; Uiboupin & Sörg, 2006).

This approach though cannot apply to the Greek banks' entry in SEE. The internationalization of Greek banks may be explained by the Network model, according to which an international company is based on integrated and interdependent operations, resources and actors and views internationalization process as a reaction to the other actors'- business partners' actions, whether they are customers, suppliers or even competitors (Lawton & Harrington, 2006; Roolaht, 1991). Greek banks turned to SEE because of their existing bonds with their home customers as they relocated in SEE and secondly because they followed the competition of the other foreign banks (Samantzis, 2007). Nevertheless, as Greek banks over the years became some of the most competitive players in the region with great profits and diversity in their financial products, it is safe to say that they stopped "following the customer" and developed more aggressive, innovative and profit-oriented policies in order to dominate the SEE market.

### **4.3 Entry modes**

The Greek banking presence abroad has two distinctive periods (Karafolas, 2006). During the first period that extends until late 80's, Greek banks were only providing simple financial services to Greek immigrants via representative offices and had almost no relation with cross-country trade and investments with the exception of the National Bank of Greece: in other words had almost no characteristics of multinational banks (ibid).

In the second period starting in 1990 after the collapse of communism, Greek banks had finally the opportunity to expand in SEE and become multinational enterprises. The first investment was made in Bulgaria due to the increased bilateral volume of trade, and Romania and Albania followed, while the entry in FYROM and Serbia was delayed due to the political turmoil (Samantzis, 2007).

Greek banks entered the market mainly through branches and affiliates as to monitor the new market and be as more protected as possible from potential

problems due to the political and economic uncertainty in the region (ibid). After the first years they preferred to operate through subsidiaries, either by increasing their ownership percentage of the acquired affiliates, by making greenfield investments or by acquiring the majority stake of domestic banks. In general, the most popular way of entry was the buyout of a major or minor stake of a local bank (ibid).

#### **4.4 Big-3 Greek Banks Presence in SEE-5**

There are 7 Greek banks currently operating in the SEE-5; National Bank of Greece (NBG), EFG Eurobank-Ergasias, Alpha Bank, Piraeus Bank, Emporiki Bank, Marfin Egnatia Bank and Agricultural Bank of Greece (ATE). In this study, we are only going to look into the three largest institutions, NBG, Eurobank and Alpha Bank<sup>1</sup>.

##### **4.4.1 National Bank of Greece (NBG)**

National Bank of Greece (NBG) is the oldest and largest commercial bank in Greece, as it enjoys a market share in terms of assets almost reaching 18% based on the first quarter of 2010 (To Vima, 28/10/2010). It dominates retail banking with a market share that exceeds one quarter, as well as 26% market share in total deposits. It has a network of 562 branches and 1,485 ATMs in the country and has an international presence in 12 countries through its 9 subsidiaries and its branches. NBG has operations in all SEE-5 countries through its subsidiaries United Bulgarian Bank in Bulgaria (2000), Stopanska Banka in FYROM (2000), Banca Romaneasca in Romania (2003) and Vojvodjanska Banka in Serbia (2006), and a branch network in Albania, with the profit before tax and provisions for 2010 reach at 275.2 million euros.

In 2010 EBRD offered a loan package of 350 million euro to NBG Group's subsidiaries in Bulgaria, Romania and Serbia, as part of the Joint IFI Action Plan. Through the Plan which was addressed to subsidiaries of major West European Bank Groups, EBRD, World Bank and European Investment Bank supported Eastern European countries by financing their banking sectors with 24.5 billion euros in the period February 2009 – February 2011. The three agreements signed with the NBG

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<sup>1</sup> The source of information is banks' sites and banks' annual reports.

Group are the following: United Bulgarian Bank received a loan of 150 million euros, while Banca Romaneasca and Vojvodjanska Banka were provided with 100 million euros each. The resulting liquidity was directed to the financing of private enterprises in local markets so as to assist the fragile economic recovery.

In September 2011, NBG's Directors Board decided to create a holding company for its subsidiaries in the SEE-5. With this move, in the context of restructuring the banks and the other financial companies, NBG aspires to provide them autonomous access to international money and capital markets, so as to receive better scores from the rating agencies and in the same time to improve their capital adequacy ratios.

### **Romania**

In October 2003, the largest financial group in South-Eastern Europe, NBG, acquired the majority package of Banca Romaneasca, having at present 89.07% of its share capital. At present, it operates a network made up of 146 territorial units, 164 ATMs and employs 1597 people. It enjoys a loan market share of 4% and a share of 8.6 in mortgage loans. Besides specific banking activities, performed through Banca Romaneasca, NBG Group is also involved in Romania in other financial fields. The representative companies under its control are: the insurance-reinsurance company - GARANTA, the financial investments services company - NBG Securities Romania, NBG Leasing and NBG Factoring Romania.

### **Serbia**

NBG entry in Serbian market is placed in January 2002 when it opened a Branch office in Belgrade. By the end of 2006 Vojvodjanska Banka was successfully acquired by the National Bank of Greece Group with 99.4% of the equity share. This acquisition accomplished via a privatization process in which 11 European banks originally expressed interest, is considered the largest and most significant sale process of a state-controlled bank in Serbia to date. In 2008, Vojvodjanska Banka A.D. Novi Sad took over of National Bank of Greece A.D. Beograd. After the takeover, the two banks operate in Serbia under the name «Vojvodjanska Banka akcionarsko

drustvo Novi Sad» (*Vojvodjanska Banka, a joint stock company Novi Sad*). Vojvodjanska comprises of 143 branches with 2277 employees, 125 ATMs, and is the tenth biggest bank in terms of assets. Except from the banking sector, NBG is also active in the leasing business through NBG Leasing Belgrade.

### **Albania**

NBG has been active in Albania since 1996, when opened the first branch in Tirana. It now has 30 outlets, 35 ATMs and employs 305 people. NBG in Albania enjoys a 5.4% share in corporate and a 13.9% market share in retail lending.

### **FYROM**

At the beginning of year 2000 Stopanska Banka's majority share was bought by NBG Group, which acquired 73.04%, while the International Finance Corporation (IFC) and the European Bank for Reconstruction and Development (EBRD) were the other shareholders. In August 2010, NBG increased its holding by 21.6% for € 35.1 million, reaching a total 94.64%. Today, it is the bank with the biggest number of clients in the retail and corporate segment, the bank with the most developed network, largest portfolio of lending and deposit products and the bank with the biggest assets in FYROM with a market share over 25%. Stopanska Banka has 1067 employees, a network of 66 branches and 111 ATMs.

### **Bulgaria**

The activity of NBG in Bulgaria started in 1996 with the opening of the first branch. In 2000 NBG acquired 89.9% share in United Bulgarian Bank – then the second largest bank in Bulgaria that was created through the merger of 22 local commercial banks. In 2004 the NBG raised its shares in UBB, reaching 99.9%. UBB has a branch network of 249 units, 827 ATMs and currently has a working staff of 3033 employees. It is now the third biggest bank in Bulgaria, with a 12.6 loan market share – 15.4% in retail and 11.1% in business credit-, 10.6% and 10% shares in retail and business deposits and 14% in credit card activity. The other major NBG

subsidiaries in Bulgaria are Interlease – the biggest lease company on the local market and UBB Asset Management.

#### **4.4.2 EFG Eurobank**

Eurobank is the second largest bank in Greece with a market share in assets around 13% (To Vima, 28/10/2010), a network of 467 branches and 9633 employees. Eurobank has branched out in 9 countries, 3 of them in SEE; Bulgaria, Romania and Serbia by acquiring each country's post bank.

In 2010 Eurobank EFG managed to reserve 300 million euros from EBRD and the International Finance Corporation (IFC), in order to finance through its subsidiary banks in SEE small and medium enterprises in the region.

##### **Romania**

Eurobank first entered the Romanian market by acquiring 19.25% of Bancpost Romania. Since then, became the majority shareholder and consolidated its stake in Bancpost to 99% in 2009. With the outstanding number of 3696 employees and an impressive network of 302 branches and 716 ATMs has become one of the biggest players in the Romanian financial market. Moreover, Eurobank EFG has developed an entire financial group in Romania, through the establishment or acquisition of a number of Romanian companies operating in nine different fields, such as financing, leasing, private banking, equity, insurance, real estate, etc.

##### **Bulgaria**

The acquisition of 78.23% of Postbank's capital by ACBH, property of the Greek Eurobank EFG, on the 9 November 1998 signaled a new era in the history of Postbank (Eurobank EFG Bulgaria AD). Over time Eurobank EFG's share rose to 99.65% of Postbank's equity capital, after the acquisition and merge with DZI Bank. Postbank now has an extensive network of 215 branches and 320 ATMs and employs 2797 people. It has become one the largest Romanian banks with a 10% market share in assets terms, is fourth in total deposits terms and has the biggest market shares in mortgage lending, in consumer lending and credit cards.

## **Serbia**

In Serbia, Eurobank EFG Group became operational in 2003 by acquiring the local Post Bank (Postbanka). While Eurobank increased its stake in Postbanka to 93.5% in 2004, at the same time acquired another Serbian bank - Nacionalna Stedionica. In 2006 the two banks were merged and now Eurobank Beograd has a staff of 1511 employees and a network of 127 branches and 162 ATMs. It is the third largest bank in Romania in terms of assets and loans and fourth in terms of deposits with a share of 6.9%.

### **4.4.3 Alpha Bank**

Alpha bank has a market share of about 11% in terms of assets (To Vima, 28/10/2010), which makes it the third largest bank in Greece. It has a leading position for 2010 in consumer credit market as well in the card market with a 20% share and a network of 900 branches. Alpha Bank operates in the SEE-5 and in other 3 countries.

In February 2011, Alpha Bank declined NBG's offer for a merge between the two banks, as it claimed that the conditions of the deal were disadvantageous for its behalf, and the timing was inconvenient because of the economic uncertainty. Nevertheless, in 29 August 2011 Alpha Bank and Eurobank EFG announced that they reached an agreement about joining forces through a single bank under the name "Alpha Eurobank", with the participation of a Qatari investment fund of 500 billion euros. Alpha Bank will offer Eurobank's shareholders five ordinary shares for every seven Eurobank EFG ordinary shares they hold, forming an exchange ratio of 0.714 Alpha Bank shares per Eurobank EFG share and a 57.5% Alpha Bank - 42.5% Eurobank EFG ownership stakes. This new bank will have leading positions in the Greek banking sector, total assets of 146 billion euros which will make it the 23<sup>rd</sup> largest bank in Eurozone and will become a very competitive player in SEE, with an aggregate network of more than 1300 branches across 8 countries. Alpha Eurobank will enjoy top 3 market positions in Bulgaria, Romania and Serbia, with gross loans of 6.9 billion euros, 3.9 billion euros in Bulgaria and 2.2 billion euros in Serbia.

## **Albania**

Alpha Bank began its activity in Albania in 1998. Since then, it has developed a network of 47 branches, 63 ATMs and employs a total of 374 people. Alpha Bank managed to become quite competitive, as it is now the sixth biggest bank in Albania in terms of assets, a large market share of 28% in the credit card sector, 14.7% in the loans sector and 7% in the deposits sector.

## **Bulgaria**

Alpha Bank made a greenfield investment in 1995 and entered the Bulgarian market by opening its first branch in Sofia. Over 15 years, Alpha Bank created a network of 110 branches, has 117 ATMs and employs a staff of 947 people.

## **Serbia**

Alpha Bank entered the Serbian Market in 2002, but in 2005 the seventh biggest Serbian bank, Jubanka, was acquired for 152 million euro. That was the time when Alpha Bank became a big player in the financial industry, ranking as the 9<sup>th</sup> biggest bank in terms of assets for 2010. It has a branch network of 154 units, 168 ATMs and employs 1525 people.

## **FYROM**

Alpha Bank moved into the FYROM market in 2000 when it acquired Kreditna Banka AD Skopje. In 2002 became the only shareholder and renamed it Alpha Bank Skopje. The Bank now has 275 employees staffing a network of 25 branches and 25 ATMs all over FYROM.

## **Romania**

In 1994, Alpha Bank, along with EBRD and the Greek firms Bauxite AEM Parnassos, Papastratos ABES and Greek Bottling Company (3E) was the first foreign bank to enter Romania under the brand name of "Banca Bucuresti". At the beginning of 2000, "Banca Bucuresti" was named Alpha Bank Romania and in 2005 Alpha Bank became the majority shareholder, controlling 99.43% of Alpha Bank

Romania's share capital. Alpha Bank Romania has a network of 175 branches, 215 ATMs and a staff of 2450 employees and is the third largest Bulgarian bank in terms of assets. Alpha Bank Group has expanded its activities with Alpha Leasing Romania IFN S.A., SSIF Alpha Finance Romania S.A. and Alpha Insurance Brokers Srl.

## 5. Empirical Analysis

### 5.1 Literature Review

There is a vast literature about bank efficiency examining a number of factors of influence, such as ownership, size, competition, banking reforms or regulatory framework. The literature extends to a global range, from Nigeria (Muhammad, 2008), Pakistan (Akhtar, 2002), China (Ariff & Can, 2008), USA (Mester, 1996), Bahrain (Grigorian & Manole, 2005) to UK (Webb, 2003), Italy (Angelidis & Lyroudi, 2006), Spain (Maudos & Pastor, 2003), as well as cross-country analysis for France and Spain (Dietsch & Lozano-vivas, 2000), European Union (Casu & Molyneux, 2003; Maudos, Pastor, Pérez, & Quesada, 2002; Pastor, 2002) or even an international comparison (Oliveira & Tabak, 2005; Pastor, Pérez, & Quesada, 1997).

The ownership effect on bank efficiency is a rather debatable matter. For example, Staub et al (2010), using Data Envelopment Analysis (DEA), find that foreign banks and banks with foreign participation are the least efficient among Brazilian banks for the years 2000-2007, suggesting that in Brazil the home field advantage hypothesis prevails against the global advantage hypothesis. Deyoung and Nolle (2011), with a parametric profit frontier model, conclude that foreign banks are less profit-efficient than U.S.-owned bank between 1985 and 1990. On the other hand, Sturm and Williams (2004), studying the impact of foreign bank entry on banking efficiency in Australia during the 1988–2001 post-deregulation period, find that foreign banks are more efficient than domestic banks. The same findings are also met in the analysis of the Malaysian banking system by Matthews and Ismail (2006), who assert the higher efficiency level of foreign banks during 1994-2000. Regarding the Greek banking sector, the findings of Gaganis and Pasiouras (2009) were inconclusive, as the differences of the efficiencies between domestic and foreign banks were found to be statistically insignificant.

Transitional banking has drawn a lot of academic attention since the collapse of communism. Especially since 2000, there were a number of authors who were interested in studying the efficiency of the banking systems in transition countries.

Specifically for the economies of Central Eastern and South Eastern Europe, foreign ownership has been generally associated with higher efficiency levels when compared to domestic ownership.

Concerning inter-country studies, Fries and Taci (2004), by estimating a stochastic cost efficiency frontier, find that banks with a majority foreign ownership are more cost-efficient than domestic banks in a sample of fifteen East European countries in the period 1994-2001. Bonin et al (2005), use the Stochastic Frontier Approach (SFA) on data from 1996 to 2000 for eleven transition countries (four CEE countries, four SEE countries, and three Baltic countries). They find that foreign banks achieve higher efficiency scores: moreover, a strategic foreign owner has also a positive impact on cost efficiency and an international institutional investor adds an extra positive impact on profit efficiency (which is a very interesting finding regarding the new merged Alpha-Eurobank bank and the participation of the Qatari investment fund). Poghosyan (2009) narrows the cost efficiency superiority only to foreign greenfield banks for eleven CEE countries for the period 1992-2006. Yildirim and Phillipatos (2007) examine 12 CEE countries from 1993-2000 and find that foreign banks are more cost efficient but less profit efficient compared to domestic private and state banks. Green et al (2003) on the other hand, estimate bank efficiency with a system of equations on a panel data for 9 CEE and SEE countries from 1995-1999 and reject the hypothesis of foreign banks' higher efficiency levels against domestic banks.

Moving on to country-specific studies, Havrylchuk (2006), by using DEA, finds that in Poland, banks with foreign ownership are more efficient than the domestic ones during 1998-2000. Hasan (2003) aligns with these findings when studying the Hungarian banking sector from 1993 to 1997 conducting an SFA analysis, as do Jemric and Vulcic (2002) for the banks in Croatia in the 1995-2000 period. Weill (2003) also reaches the same conclusion studying Polish and Czech banks during 1997, using SFA.

Concentrating on the specific SEE region where Greek banks are active, Fang et al (2011) examine the cost and profit banking efficiency by employing the SFA in

six SEE countries for the decade 1998-2008 and argue that foreign banks are associated with higher profit efficiency but an average lower cost efficiency. Staikouras et al (2008) on their analysis of the six SEE countries for the 1998-2003 period find that foreign banks show lower inefficiency levels. Toçi (2009) using data from 2002 to 2005 for four SEE countries also concurs. Ri et al (2009) examine the cost efficiency of Serbian banks using SFA for the 2003-2007 period and find that foreign banks - which are all European – are performing better than the domestic ones. Giustiniani and Ross (2008) reach the same conclusion when they examine FYROM's banking sector for the years 1997-2005. Nevovsky et al (2008) find that foreign banks in Bulgaria are better performers in terms of efficiency than their domestic competitors for the 1999-2006 period, so do Tochkov and Nevovsky (2010) for the 1999-2007 period, both using DEA.

Unfortunately, there is an extremely poor literature for the performance and the efficiency of Greek banks which operate in the SEE region. In the analysis of the Serbian banking sector by Ri et al (2009), Greek banks show the second lowest inefficiency score among all the foreign banks operating in Serbia during the 2003-2007 period. Despite the fact that Greek banks have an important presence in SEE, there are only two papers regarding their activities in the region. Both of them are confined to the analysis of their balance sheets. Karafolas (2006) provides a comparative analysis of Greek banks' activities and results in the SEE-5 by examining their balance sheet and statement of income, as well as a financial ratio analysis for 2004. Although there are some conclusions on the profitability and capital adequacy of the six Greek banks, there aren't any about their efficiency performance. Chouliaras and Bogas (2011) use the ratios Return on Assets and Return on Equity for the years 2007-2009 in order to examine the efficiency of the Greek banks in SEE-5 and Turkey (we should note here that in Karafolas' analysis these ratios are used as profitability measures). Based on ROA, they conclude that subsidiaries are more efficient than the parent banks. The subsidiaries' ROA declined from 21% in 2007 to 12% in 2009, which was better than the parent banks' ROA which was decreased from 12% in 2007 to 2% 2009. There is a differentiation in ROE, which has a range of 11% to 19%, while for the parent banks spreads from 3% to 18%. As to the Big Three

specific analysis, except for the Turkish Finansbank, NBG's United Bulgarian Bank also presents a higher efficiency. The efficiency of Eurobank's subsidiaries is lower than the parent bank and has a declining movement, with the exception of the Romanian Bancpost. Alpha Bank's subsidiaries in FYROM and Serbia operate in loss and have negative scores, while Alpha Bank Romania does not have a negative efficiency although it is declining.

## **5.2 Methodology**

### **5.2.1 Efficiency Measurement**

There is a variety of approaches as to estimate bank efficiency available in the literature. The traditional approach concentrates to the analysis of several financial ratios as ROA, ROE, cost to revenue ratio, net interest margin and several others. While the use of financial ratios has the advantage of a relatively simple calculation process, it has received criticism as it is restricted to only one input and output, therefore doesn't allow for the multiple input and output interdependence (Halkos & Salamouris, 2004). The main approaches of efficiency measurement are the one that estimates efficiencies of scale and scope using the Cobb–Douglas production form or a translog cost function, and the one that estimates X-inefficiencies, which can be divided into technical and allocative inefficiencies, and is attributed to management and technology (Chortareas, Girardone, & Ventouri, 2008; Green et al., 2003). The second approach uses a cost/profit/production frontier in order to determine the inefficiencies. There are a number of parametric and non-parametric methods that can be applied. The parametric methods are the stochastic frontier analysis (SFA), the distribution-free analysis (DFA), and the thick frontier analysis (TFA). SFA, which is the most preferred method of the three, interprets the deviations from the cost (or profit) frontier either as random fluctuations or inefficiencies. The non-parametric methods that are used in order to estimate efficiency are Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH), with the latter to be a less popular form of DEA which relaxes convexity assumptions.

### 5.2.2 Data Envelopment Analysis (DEA)

DEA is a non-statistical, non-parametric method, which uses linear programming in order to measure the relative technical efficiency of a number of decision-making units (DMUs) with multiple inputs and outputs. The efficiency frontier is actually a linear combination of the best performing DMUs with efficiency score equal to 1. DMUs with lower scores (with the lowest possible to be 0) are inefficient, as they are below the frontier.

DEA's main advantage is that, unlike other parametric methods, it does not require an assumption about the analytical form of the production function or the distribution of the inefficiency. Moreover, it is ideal for working with small samples (as of this study). Nevertheless, DEA is sensitive to extreme observations and errors in measurements. Moreover it does not allow for random errors: every deviation from the frontier is interpreted as inefficiency.

The first DEA model was developed by Charnes, Cooper and Rhodes (1978), the CCR model or else CRS, as it is based on the assumption that each DMU operates on Constant Returns to Scale. This model estimates the overall technical efficiency (OTE). Assuming that there is a  $N$  number of DMUs,  $K$  inputs and  $M$  outputs for each of them,  $X$  is the  $K \times N$  input matrix, and  $Y$  the  $M \times N$  output matrix which represent the data for all  $N$  DMUs. For the  $i$ th DMU,  $x_i$  represents the input matrix and  $y_i$  represents its output matrix. The dual linear programming problem is specified as:

$$\begin{aligned} & \text{Min}_{\vartheta, \lambda} \vartheta, \\ & \text{s.t. } -y_i + Y\lambda \geq 0, \\ & \quad \vartheta x_i - X\lambda \geq 0, \\ & \quad \lambda \geq 0 \end{aligned}$$

where  $\lambda$  is a  $N \times 1$  vector of constants and  $\vartheta \leq 1$  is a scalar, representing the efficiency of the  $i$ th DMU. If  $\vartheta=1$ , the DMU is on the frontier and therefore is efficient, while if  $\vartheta < 1$  the bank is inefficient and needs a  $1 - \vartheta$  reduction in the inputs levels to reach

the frontier. The linear programming has to be solved N times, once for each DMU in sample, and a value of  $\vartheta$  will be obtained for each DMU representing its technical efficiency score.

The CRS is a quite restrictive assumption, as a DMU (in this case bank) is not always operating at an optimal scale for a number of reasons. Banker, Charnes and Cooper (1984), suggested a model that allows for Variable Returns to Scale, the BCC or VRS model. In this way, OTE is disaggregated into pure technical efficiency (PTE)-the technical efficiency under VRS-which relates to the management's ability to utilize the given resources of the firm and scale efficiency (SE) which refers to exploiting scale economies by operating at a point where the production frontier exhibits CRS. The previous CCR model has to be modified by adding the convexity  $I1'\lambda=1$ :

$$\begin{aligned} & \text{Min}_{\vartheta, \lambda} \vartheta, \\ & \text{s.t. } -y_i + Y\lambda \geq 0, \\ & \quad \vartheta x_i - X\lambda \geq 0, \\ & \quad I1'\lambda = 1 \\ & \quad \lambda \geq 0 \end{aligned}$$

where  $I1$  is a  $(N \times 1)$  dimension vector  $(1, 1, \dots, 1)$ . The technical efficiency under VRS is equal or higher than the one under CRS. SE can be calculated from the ratio OTE/PTE (or else TE under CRS/ TE under VRS).

A DEA model can either be input-oriented (like the ones presented above), or output-oriented. An input-oriented DEA model estimates the efficiency which indicates how much can the inputs be decreased leaving the outputs stable. On the contrary, a DEA model with an output-orientation estimates the efficiency which presents how can the outputs be maximized with the inputs given.

### 5.2.3 Input and output definition

There has to be a specific relation between the number of the DMUs and the number of inputs and outputs in order for the DEA analysis to be feasible. This relation is determined by the restriction  $n \geq \max \{m \times s, 3(m+s)\}$ , where  $n$  is the number of DMUs,  $m$  the number of inputs and  $s$  the number of outputs.

In order to determine the inputs and the outputs, first there has to be a definition of the banking activity nature. Within the banking literature there are a number of different approaches to the matter. The production or operating approach considers banks as firms which use a labour/capital combination to produce banking services charged with operational costs, therefore uses as outputs the number of deposits and loan accounts. The intermediation approach views the bank as a mediator between depositors and borrowers, which uses capital and labour in order to transform the collected funds into loans and other earning assets. Except from these two more popular approaches, there are also the profit approach, the risk management approach, the value-added approach, the user cost approach and the asset approach.

### 5.2.4. Variables and Data

This study adopts the intermediation approach, as do many other recent studies (Havrylchuk, 2006; Nenovsky, Chobanov, et al., 2008; Nenovsky, Ivanov, & Mihaylova, 2008; Pasiouras, 2008; Toçi, 2009; Webb, 2003; Weill, 2003). Total assets and deposits from clients are considered as inputs and net loans as output. Considering the choice of the inputs, an output-oriented DEA model has been selected. An input orientation would mean the minimization of the deposits and considering that the years of observation include the recession years (2009-2010) and the liquidity problem that the banks have faced in these years, this choice would seem unreasonable. Both CRS and VRS models will be estimated in order to calculate scale efficiency apart from the technical one.

The sample includes data from NBG, Alpha and Eurobank subsidiaries or branches in the SEE-5. The data for the NBG branches in Albania and the Alpha Bank

branches in Albania and Bulgaria are aggregated so they can be treated as a single bank like in the case of a subsidiary. The origin of the data is the annual reports and financial statements for the subsidiaries, the Albanian Association of Banks for the Alpha Bank and NBG branches in Albania, and the Bulgarian National Bank (the central bank) for the Bulgarian NBG branches, all according to International Financial Reporting Standards. The necessary conversions from local currencies in euro were made with the 31/12 exchange rate given by the central bank of every country for each year. There are 77 observations, 13 for each year, except for 2005 for which are 12, as NBG's Vojvodjanska started its operations in Serbia in 2006.

In Table 21, there are some descriptive statistics on the chosen inputs and output. There is a big, continuous and undisrupted increasing rate of all three variables until 2008. In 2009 there is a small decrease of the loans, while assets and deposits still are slightly decreased. In 2010, there is a decline for all the variables. The small rate of this decrease is noteworthy, considering the economic crisis and shows the resistance of the SEE financial systems and the Greek banks operating in the region to this crisis so far.

It is important to stress out that the results that are going to be presented in the next section of the study concern only the relative efficiency within the particular data set, that is the relative efficiency of one bank vis-à-vis the others in the sample. No conclusions will be drawn about the absolute efficiency of the Greek banks in the SEE-5.

Table 21

(in € million)

<b>2005</b>		<b>Assets</b>	<b>Deposits</b>	<b>Loans</b>	
	<b>Min</b>	66.05	42.63	25.35	
	<b>Max</b>	1700	1214.34	1024.13	
	<b>Mean</b>	644.01	387.85	371.83	
	<b>St.D</b>	602.09	379.32	343.16	
<b>2006</b>		<b>Assets</b>	<b>Deposits</b>	<b>Loans</b>	
	<b>Min</b>	82.55	60.34	46.46	
	<b>Max</b>	2700	1595.26	1700	
	<b>Mean</b>	1005.18	584.21	595.81	
	<b>St.D</b>	880.82	551.03	551.90	
<b>2007</b>		<b>Assets</b>	<b>Deposits</b>	<b>Loans</b>	
	<b>Min</b>	111.35	68.76	78.95	
	<b>Max</b>	3717	2373.96	2505.37	
	<b>Mean</b>	1586.22	802.94	1076.88	
	<b>St.D</b>	1327.34	688.92	915.43	
<b>2008</b>		<b>Assets</b>	<b>Deposits</b>	<b>Loans</b>	
	<b>Min</b>	187.91	80.29	139.52	
	<b>Max</b>	4380.94	3269.25	3455.36	
	<b>Mean</b>	1949.59	1063.65	1384.67	
	<b>St.D</b>	1578.20	1038.58	1150.91	
<b>2009</b>		<b>Assets</b>	<b>Deposits</b>	<b>Loans</b>	
	<b>Min</b>	144.16	59.36	105.21	
	<b>Max</b>	5011.72	3430	3460	
	<b>Mean</b>	1996.70	1067.43	1360.60	
	<b>St.D</b>	1660.28	981.44	1166.74	
<b>2010</b>		<b>Assets</b>	<b>Deposits</b>	<b>Loans</b>	
	<b>Min</b>	130.55	66.47	84.79	
	<b>Max</b>	5009.05	3052	3301	
	<b>Mean</b>	1935.87	1064.01	1333.88	
	<b>St.D</b>	1626.92	904.01	1083.12	

## 5.3 Empirical Results

### 5.3.1 Annual Remarks

As we can see in Table 22, 23 and 24, for the year 2005 only Alpha Bank Bulgaria and NBG's Romaneaska were efficient according to CRS model and were both benchmarks for the inefficient equal times. The divergence between the banks is relatively high as indicated by the standard deviation. NBG banks' efficiency is the highest in comparison with Alpha and Eurobank. The VRS model produces much better results, characterizing another 4 banks as technically efficient: Alpha Skopje, Alpha Romania, Eurobank Bulgaria and UBB. Eurobank's Bancpost has the lowest inefficiency, and could reach the same result with a 229 million euros reduction of its assets. Alpha Bank has a significantly improved efficiency score compared to the CRS score. As it is obvious, the main reason for inefficiencies seems to be the scale of operations.

Table 22

	TE CRS	TE VRS	SE
ALPHA_Alb_2005	0.599	0.652	0.919
ALPHA_Bulg_2005	1	1	1
ALPHA_Fyr_2005	0.513	1	0.513
ALPHA_Rom_2005	0.792	1	0.792
ALPHA_Srb_2005	0.879	0.898	0.979
EFG_Bulg_2005	0.855	1	0.855
EFG_Rom_2005	0.696	0.971	0.718
EFG_Srb_2005	0.589	0.637	0.923
NBG_Alb_2005	0.864	0.958	0.901
NBG_Bulg_2005	0.812	1	0.812
NBG_Fyr_2005	0.745	0.859	0.868
NBG_Rom_2005	1	1	1
Average efficiency	0.779	0.915	0.857
Standard deviation	0.156	0.134	0.138
Mean Alpha efficiency	0.757	0.910	0.841
Mean Eurobank efficiency	0.713	0.869	0.832
Mean NBG efficiency	0.855	0.954	0.895

For the year 2006 the CRS model identifies again 2 banks as efficient as we can see in Tables 25, 26 and 27. This time they are NBG Albania and Romaneaska, with the former being a benchmark for all the inefficient banks while the latter for 5 of them. Eurobank's Bancpost and UBB have increased their efficiency levels, as have all the Bank Groups in general. Under VRS, we have a better average technical efficiency, but a bigger divergence between the banks. Alpha Skopje, Bancpost and UBB added to the efficient group, with the latter to serve as benchmark 7 times, the same as NBG Albania. The most inefficient bank is the new-starter NBG's Vojvodjanska, which although exploits economies of scale, has to increase its loans by 137.55 million euros to become efficient. As far as scale efficiency is concerned, all the inefficient banks display much better scores and the average scale efficiency is bigger than CRS and VRS efficiencies, so it is safe to assume that the inefficiencies are due to management inefficiencies.

Table 25

	TE CRS	TE VRS	SE
ALPHA_Alb_2006	0.753	0.779	0.966
ALPHA_Bulg_2006	0.839	0.841	0.998
ALPHA_Fyr_2006	0.774	1	0.774
ALPHA_Rom_2006	0.794	0.927	0.856
ALPHA_Srb_2006	0.804	0.836	0.962
EFG_Bulg_2006	0.822	0.874	0.940
EFG_Rom_2006	0.910	1	0.910
EFG_Srb_2006	0.760	0.781	0.973
NBG_Alb_2006	1	1	1
NBG_Bulg_2006	0.940	1	0.940
NBG_Fyr_2006	0.811	0.855	0.949
NBG_Rom_2006	1	1	1
NBG_Srb_2006	0.616	0.647	0.952
Average efficiency	0.832	0.888	0.940
Standard deviation	0.107	0.112	0.0636509
Mean Alpha efficiency	0.793	0.877	0.911
Mean Eurobank efficiency	0.830	0.885	0.941
Mean NBG efficiency	0.873	0.900	0.968

## 2005 results

Table 23 - CRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2005	0.59907	0	0	0	234.49	0	0	177.77	73.316822	0	182.866822
ALPHA_Bulg_2005	1	10	0	0	81.41	0	0	77.75	0	0	68.07
ALPHA_Fyr_2005	0.513351	0	0	0	66.05	0	0	42.63	24.031464	0	49.381464
ALPHA_Rom_2005	0.792368	0	0	0	1331.12	0	0	552	188.406824	0	907.406824
ALPHA_Srb_2005	0.879349	0	0	0	285.79	0	0	129.2	23.873724	0	197.873724
EFG_Bulg_2005	0.85495	0	0	0	875.86	0	0	728.6	101.753177	0	701.503177
EFG_Rom_2005	0.696495	0	0	0	1700	0	0	870	366.038474	0	1206.038474
EFG_Srb_2005	0.588673	0	0	0	272.08	0	0	189	85.245723	0	207.245723
NBG_Alb_2005	0.863708	0	0	0	102.06	0	0	70.31	10.572545	0	77.572545
NBG_Bulg_2005	0.812329	0	0	0	1622.35	0	0	1214.34	236.603457	0	1260.733457
NBG_Fyr_2005	0.745471	0	0	0	544.94	0	0	446.9	110.624645	0	434.624645
NBG_Rom_2005	1	10	0	0	611.92	0	0	155.7	0	0	389.11

Table 24 - VRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2005	0.651706	0	0	0	234.49	0	0	177.77	58.547334	0	168.097334
ALPHA_Bulg_2005	1	5	0	0	81.41	0	0	77.75	0	0	68.07
ALPHA_Fyr_2005	1	1	0	0	66.05	0	0	42.63	0	0	25.35
ALPHA_Rom_2005	1	1	0	0	1331.12	0	0	552	0	0	719
ALPHA_Srb_2005	0.897865	0	0	0	285.79	0	0	129.2	19.793142	0	193.793142
EFG_Bulg_2005	1	4	0	0	875.86	0	0	728.6	0	0	599.75
EFG_Rom_2005	0.97054	0	0	-229.055831	1470.944169	0	0	870	25.497781	0	865.497781
EFG_Srb_2005	0.637445	0	0	0	272.08	0	0	189	69.389062	0	191.389062
NBG_Alb_2005	0.958331	0	0	0	102.06	0	0	70.31	2.91319	0	69.91319
NBG_Bulg_2005	1	1	0	0	1622.35	0	0	1214.34	0	0	1024.13
NBG_Fyr_2005	0.858792	0	0	0	544.94	0	0	446.9	53.274151	0	377.274151
NBG_Rom_2005	1	5	0	0	611.92	0	0	155.7	0	0	389.11

2006 results

Table 26 – CRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2006	0.752944	0	0	0	298.09	0	-66.405667	169.784333	53.57879	0	216.86879
ALPHA_Bulg_2006	0.8392	0	0	0	209.63	0	0	101	23.334308	0	145.114308
ALPHA_Fyr_2006	0.773593	0	0	0	82.55	0	-13.321661	47.018339	13.597428	0	60.057428
ALPHA_Rom_2006	0.793898	0	0	0	2113.04	0	0	823	285.30813	0	1384.30813
ALPHA_Srb_2006	0.804129	0	0	0	484.65	0	0	225.77	65.104469	0	332.384469
EFG_Bulg_2006	0.821566	0	0	0	1920.44	0	-501.42718	1093.83282	249.303666	0	1397.17367
EFG_Rom_2006	0.909723	0	0	0	2700	0	0	1300	168.701351	0	1868.70135
EFG_Srb_2006	0.759565	0	0	0	796.43	0	0	319	126.300758	0	525.300758
NBG_Alb_2006	1	11	0	0	142.51	0	0	81.17	0	0	103.68
NBG_Bulg_2006	0.939893	0	0	0	2019.63	0	-376.92113	1150.32887	88.317158	0	1469.33716
NBG_Fyr_2006	0.811411	0	0	0	684.37	0	-150.7006	389.799403	93.898264	0	497.898264
NBG_Rom_2006	1	5	0	0	1053.05	0	0	335.75	0	0	659.97
NBG_Srb_2006	0.615856	0	0	0	562.97	0	-128.82689	320.653111	157.336378	0	409.576378

Table 27 – VRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2006	0.779245	0	0	0	298.09	0	-35.165581	201.024419	46.258861	0	209.548861
ALPHA_Bulg_2006	0.840805	0	0	0	209.63	0	0	101	23.057352	0	144.837352
ALPHA_Fyr_2006	1	0	0	0	82.55	0	0	60.34	0	0	46.46
ALPHA_Rom_2006	0.927025	0	0	-227.761442	1885.278558	0	0	823	86.512772	0	1185.512772
ALPHA_Srb_2006	0.836184	0	0	0	484.65	0	0	225.77	52.362618	0	319.642618
EFG_Bulg_2006	0.873886	0	0	0	1920.44	0	-144.423162	1450.836838	165.653327	0	1313.523327
EFG_Rom_2006	1	1	0	0	2700	0	0	1300	0	0	1700
EFG_Srb_2006	0.78085	0	0	0	796.43	0	0	319	111.981493	0	510.981493
NBG_Alb_2006	1	7	0	0	142.51	0	0	81.17	0	0	103.68
NBG_Bulg_2006	1	7	0	0	2019.63	0	0	1527.25	0	0	1381.02
NBG_Fyr_2006	0.8552	0	0	0	684.37	0	-41.896427	498.603573	68.404137	0	472.404137
NBG_Rom_2006	1	4	0	0	1053.05	0	0	335.75	0	0	659.97
NBG_Srb_2006	0.647111	0	0	0	562.97	0	-44.399543	405.080457	137.554034	0	389.794034

In 2007, as we can see in Tables 28, 29 and 30, only Alpha Bulgaria is efficient according to the CRS model's estimations, with NBG's UBB to have the second best efficiency score of 0.95 and Vojvodjanska to have the lowest 0.548. The average efficiency is clearly improved under VRS, with Alpha Bank's subsidiaries in FYROM and Romania to present as efficient, along with UBB. Eurobank's subsidiaries have quiet high efficiency scores, so it has the highest average Group technical efficiency. It has also the lowest scale efficiency, so we can ascribe the inefficiencies to operations of scale. On the contrary, Alpha Bank and NBG subsidiaries' inefficiencies are due to management.

Table 28

	TE CRS	TE VRS	SE
ALPHA_Alb_2007	0.697	0.712	0.980
ALPHA_Bulg_2007	1	1	1
ALPHA_Fyr_2007	0.841	1	0.841
ALPHA_Rom_2007	0.751	1	0.751
ALPHA_Srb_2007	0.666	0.669	0.995
EFG_Bulg_2007	0.852	0.998	0.853
EFG_Rom_2007	0.728	0.991	0.735
EFG_Srb_2007	0.948	0.967	0.980
NBG_Alb_2007	0.930	0.982	0.946
NBG_Bulg_2007	0.950	1	0.950
NBG_Fyr_2007	0.779	0.787	0.989
NBG_Rom_2007	0.800	0.985	0.812
NBG_Srb_2007	0.548	0.560	0.980
Average efficiency	0.807	0.896	0.909
Standard deviation	0.131	0.156	0.097
Mean Alpha efficiency	0.791	0.876	0.913
Mean Eurobank efficiency	0.843	0.985	0.856
Mean NBG efficiency	0.801	0.863	0.935

## 2007 results

Table 29 – CRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2007	0.697494	0	0	0	432.53	0	-224.5516	138.618398	110.251987	0	364.461987
ALPHA_Bulg_2007	1	12	0	0	745.75	0	0	239	0	0	628.39
ALPHA_Fyr_2007	0.841445	0	0	0	111.35	0	-33.074247	35.685753	14.876653	0	93.826653
ALPHA_Rom_2007	0.751269	0	0	0	3533.74	0	-48.497338	1132.50266	740.62907	0	2977.62907
ALPHA_Srb_2007	0.665885	0	0	0	626.74	0	-171.10065	200.85935	176.448815	0	528.108815
EFG_Bulg_2007	0.851581	0	0	0	3140.91	0	-698.57257	1006.60743	392.809423	0	2646.61942
EFG_Rom_2007	0.728277	0	0	0	3717	0	-276.76567	1191.23433	851.049118	0	3132.04912
EFG_Srb_2007	0.948069	0	0	0	1061.5	0	-233.80758	340.192424	46.449863	0	894.449863
NBG_Alb_2007	0.929845	0	0	0	255.12	0	-32.458445	81.761555	15.081313	0	214.971313
NBG_Bulg_2007	0.949875	0	0	0	3130.18	0	-1370.7914	1003.16865	132.208022	0	2637.57802
NBG_Fyr_2007	0.778613	0	0	0	896.23	0	-419.96376	287.226242	167.188696	0	755.188696
NBG_Rom_2007	0.799868	0	0	0	1891.79	0	-31.513966	606.286034	319.025653	0	1594.07565
NBG_Srb_2007	0.548305	0	0	0	1077.99	0	-288.52282	345.477184	410.294802	0	908.344802

Table 30 - VRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2007	0.71184	0	0	0	432.53	0	-208.221975	154.948025	102.906991	0	357.116991
ALPHA_Bulg_2007	1	8	0	0	745.75	0	0	239	0	0	628.39
ALPHA_Fyr_2007	1	3	0	0	111.35	0	0	68.76	0	0	78.95
ALPHA_Rom_2007	1	3	0	0	3533.74	0	0	1181	0	0	2237
ALPHA_Srb_2007	0.669423	0	0	0	626.74	0	-164.896101	207.063899	173.658035	0	525.318035
EFG_Bulg_2007	0.99813	0	0	0	3140.91	0	0	1705.18	4.221742	0	2258.031742
EFG_Rom_2007	0.991065	0	0	-280.347681	3436.652319	0	0	1468	20.563933	0	2301.563933
EFG_Srb_2007	0.966996	0	0	0	1061.5	0	-52.285213	521.714787	28.942667	0	876.942667
NBG_Alb_2007	0.982424	0	0	0	255.12	0	-6.879602	107.340398	3.576061	0	203.466061
NBG_Bulg_2007	1	6	0	0	3130.18	0	0	2373.96	0	0	2505.37
NBG_Fyr_2007	0.787312	0	0	0	896.23	0	-333.453908	373.736092	158.845124	0	746.845124
NBG_Rom_2007	0.985359	0	0	0	1891.79	0	0	637.8	18.945973	0	1293.995973
NBG_Srb_2007	0.559655	0	0	0	1077.99	0	-97.520472	536.479528	391.873295	0	889.923295

In Table 31, 32, 33, Alpha Bulgaria is again efficient under CRS for the year 2008, as well is NBG's UBB. Eurobank Serbia has the second efficiency score of 0.948 and Alpha Bank Serbia the lowest score of 0.541, a divergence that is reflected to the value of the standard deviation. Under VRS, Alpha Skopje and Alpha Romania are technically efficient, as well as NBG's Romaneaska. The inefficiencies of all the other banks are attributed to management, as they record higher scale efficiency scores than the technical efficiency ones. NBG continues to have average efficiency superiority, followed by Eurobank and Alpha Bank.

Table 31

	TE CRS	TE VRS	SE
ALPHA_Alb_2008	0.753	0.786	0.958
ALPHA_Bulg_2008	1	1	1
ALPHA_Fyr_2008	0.862	1	0.862
ALPHA_Rom_2008	0.729	1	0.729
ALPHA_Srb_2008	0.541	0.555	0.974
EFG_Bulg_2008	0.895	0.997	0.897
EFG_Rom_2008	0.652	0.711	0.918
EFG_Srb_2008	0.948	0.950	0.998
NBG_Alb_2008	0.773	0.806	0.959
NBG_Bulg_2008	1	1	1
NBG_Fyr_2008	0.877	0.893	0.982
NBG_Rom_2008	0.812	1	0.812
NBG_Srb_2008	0.742	0.746	0.994
Average efficiency	0.814	0.880	0.929
Standard deviation	0.135	0.146	0.084
Mean Alpha efficiency	0.777	0.868	0.905
Mean Eurobank efficiency	0.832	0.886	0.938
Mean NBG efficiency	0.841	0.889	0.949

Moving to the year 2009, Alpha Bulgaria is the only efficient bank according to the CRS model, as we can see in Tables 34, 35 and 36. There is an even smaller convergence than the previous year among banks' efficiency, with the second best NBG Albania to score 0.974 and the least efficient Bancpost score 0.50. For the third consequent time, Alpha Skopje and Alpha Romania are technically efficient under

VRS, as well as NBG Albania. Alpha Bulgaria is 8 times a benchmark for the inefficient banks, with the most inefficient to be Alpha Serbia, which has a slack of 80 million in deposits and has to increase its loans by 302.84 million in order to reach the target. The divergence in the efficiencies is even higher than the one under CRS, with a score of 0.58. As for the reason of the inefficiencies, the results are mixed among the banks. On average, the inefficiencies of all the Bank Groups are due to management, but it would be better to examine the banks individually.

Table 34

	TE CRS	TE VRS	SE
ALPHA_Alb_2009	0.774	0.785	0.985
ALPHA_Bulg_2009	1	1	1
ALPHA_Fyr_2009	0.808	1	0.808
ALPHA_Rom_2009	0.830	1	0.830
ALPHA_Srb_2009	0.583	0.585	0.996
EFG_Bulg_2009	0.772	0.931	0.830
EFG_Rom_2009	0.505	0.604	0.835
EFG_Srb_2009	0.770	0.810	0.951
NBG_Alb_2009	0.974	1	0.974
NBG_Bulg_2009	0.887	1	0.887
NBG_Fyr_2009	0.780	0.780	0.999
NBG_Rom_2009	0.769	0.911	0.844
NBG_Srb_2009	0.657	0.658	0.999
Average efficiency	0.778	0.851	0.918
Standard deviation	0.139	0.158	0.079
Mean Alpha efficiency	0.799	0.874	0.924
Mean Eurobank efficiency	0.682	0.782	0.872

## 2008 results

Table 32 – CRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)	
ALPHA_Alb_2008	0.752776		0	0	550.12	0	-1.846149	452.873851	118.334796		0	478.654796
ALPHA_Bulg_2008	1	10	0	0	1096.74	0	0	279	0	0	0	939.77
ALPHA_Fyr_2008	0.862457		0	0	187.91	0	0	80.29	22.250319	0	0	161.770319
ALPHA_Rom_2008	0.728774		0	0	4380.94	0	0	1483	1020.483688	0	0	3762.483688
ALPHA_Srb_2008	0.540817		0	0	648.66	0	0	330.75	256.991645	0	0	559.671645
EFG_Bulg_2008	0.89452		0	0	3959.51	0	0	2465.49	361.447421	0	0	3426.687421
EFG_Rom_2008	0.652448		0	0	3842	0	0	2499	1156.468992	0	0	3327.468992
EFG_Srb_2008	0.948298		0	0	1399.86	0	0	697	62.426072	0	0	1207.426072
NBG_Alb_2008	0.772739		0	0	451.57	0	0	144.77	88.093969	0	0	387.633969
NBG_Bulg_2008	1	11	0	0	3971.26	0	0	3269.25	0	0	0	3455.36
NBG_Fyr_2008	0.877054		0	0	969.15	0	0	769.6	103.593396	0	0	842.593396
NBG_Rom_2008	0.811724		0	0	2743.32	0	0	785.58	442.96228	0	0	2352.72228
NBG_Srb_2008	0.741655		0	0	1143.59	0	0	569	254.8253	0	0	986.3753

Table 33 – VRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)	
ALPHA_Alb_2008	0.785942		0	0	550.12	0	-295.23505	159.484953	98.135942		0	458.455942
ALPHA_Bulg_2008	1	6	0	0	1096.74	0	0	279	0	0	0	939.77
ALPHA_Fyr_2008	1	4	0	0	187.91	0	0	80.29	0	0	0	139.52
ALPHA_Rom_2008	1	2	0	0	4380.94	0	0	1483	0	0	0	2742
ALPHA_Srb_2008	0.555149		0	0	648.66	0	-149.71989	181.030108	242.543143		0	545.223143
EFG_Bulg_2008	0.997162		0	0	3959.51	0	0	2465.49	8.725034	0	0	3073.96503
EFG_Rom_2008	0.710983		0	0	3842	0	0	2499	882.517812	0	0	3053.51781
EFG_Srb_2008	0.950175		0	0	1399.86	0	-102.6762	594.323804	60.040598	0	0	1205.0406
NBG_Alb_2008	0.805908		0	0	451.57	0	-6.832389	137.937611	72.139936	0	0	371.679936
NBG_Bulg_2008	1	4	0	0	3971.26	0	0	3269.25	0	0	0	3455.36
NBG_Fyr_2008	0.893134		0	0	969.15	0	-518.49676	251.103244	88.423469	0	0	827.423469
NBG_Rom_2008	1	2	0	0	2743.32	0	0	785.58	0	0	0	1909.76
NBG_Srb_2008	0.745894		0	0	1143.59	0	-241.26379	327.736211	249.220025	0	0	980.770025

## 2009 results

Table 35 – CRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2009	0.774044	0	0	0	471.45	0	-199.424326	174.455674	96.259234	0	426.009234
ALPHA_Bulg_2009	1	12	0	0	1145.82	0	0	424	0	0	1035.38
ALPHA_Fyr_2009	0.807661	0	0	0	144.16	0	-6.014937	53.345063	25.055121	0	130.265121
ALPHA_Rom_2009	0.830058	0	0	-398.713538	4613.006462	0	0	1707	708.381274	0	4168.381274
ALPHA_Srb_2009	0.58283	0	0	0	811.52	0	-99.824596	300.295404	305.911546	0	733.301546
EFG_Bulg_2009	0.772261	0	0	0	3998.36	0	-735.904188	1479.555812	822.817585	0	3612.977585
EFG_Rom_2009	0.504612	0	0	0	3546.25	0	-571.933276	1312.256724	1587.444263	0	3204.444263
EFG_Srb_2009	0.770365	0	0	0	1531.36	0	-175.33452	566.66548	317.75968	0	1383.75968
NBG_Alb_2009	0.973949	0	0	0	321.45	0	-47.290427	118.949573	7.567003	0	290.467003
NBG_Bulg_2009	0.886765	0	0	0	4172	0	-1886.190327	1543.809673	426.881273	0	3769.881273
NBG_Fyr_2009	0.779578	0	0	0	1059	0	-454.926931	391.873069	210.928156	0	956.928156
NBG_Rom_2009	0.768981	0	0	0	2589	0	-111.534706	958.035294	540.45892	0	2339.45892
NBG_Srb_2009	0.657293	0	0	0	1155	0	-130.603027	427.396973	357.675185	0	1043.675185

Table 36 – VRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2009	0.785457	0	0	0	471.45	0	-160.73873	213.14127	90.069102	0	419.819102
ALPHA_Bulg_2009	1	8	0	0	1145.82	0	0	424	0	0	1035.38
ALPHA_Fyr_2009	1	0	0	0	144.16	0	0	59.36	0	0	105.21
ALPHA_Rom_2009	1	4	0	0	5011.72	0	0	1707	0	0	3460
ALPHA_Srb_2009	0.585279	0	0	0	811.52	0	-80.647297	319.472703	302.842962	0	730.232962
EFG_Bulg_2009	0.930883	0	0	0	3998.36	0	0	2215.46	207.166942	0	2997.326942
EFG_Rom_2009	0.604106	0	0	0	3546.25	0	0	1884.19	1059.683128	0	2676.683128
EFG_Srb_2009	0.809982	0	0	0	1531.36	0	0	742	250.078038	0	1316.078038
NBG_Alb_2009	1	3	0	0	321.45	0	0	166.24	0	0	282.9
NBG_Bulg_2009	1	5	0	0	4172	0	0	3430	0	0	3343
NBG_Fyr_2009	0.780228	0	0	0	1059	0	-449.946455	396.853545	210.131224	0	956.131224
NBG_Rom_2009	0.911064	0	0	0	2589	0	0	1069.57	175.613801	0	1974.613801
NBG_Srb_2009	0.658109	0	0	0	1155	0	-124.881217	433.118783	356.380229	0	1042.380229

In 2010 Alpha Bulgaria continues to remain efficient according to the CRS model estimation, being a benchmark 11 times, as we can see in the following Tables. In addition, NBG's Romaneaska is also appearing efficient and serves 1 time as benchmark. The standard deviation is 0.134, indicating the persistent divergence between the efficiency scores, but it is lower for the scores under VRS with a value of 0.120. As for the previous three years, Alpha Skopje and Alpha Romania are technically efficient, once more along with UBB. Alpha Serbia managed to improve significantly its efficiency, reporting a score of 0.912, although it has a slack in deposits and has to increase its loans by 55.39 million euros in order to become efficient. Alpha Bank managed to be the most efficient in average, followed by NBG and Eurobank, which shows both technical and scale inefficiencies.

Table 37

	TE CRS	TE VRS	SE
ALPHA_Alb_2010	0.749	0.789	0.949
ALPHA_Bulg_2010	1	1	1
ALPHA_Fyr_2010	0.700	1	0.700
ALPHA_Rom_2010	0.970	1	0.970
ALPHA_Srb_2010	0.893	0.912	0.979
EFG_Bulg_2010	0.697	0.891	0.783
EFG_Rom_2010	0.580	0.714	0.812
EFG_Srb_2010	0.743	0.835	0.890
NBG_Alb_2010	0.819	0.902	0.908
NBG_Bulg_2010	0.838	1	0.838
NBG_Fyr_2010	0.736	0.747	0.986
NBG_Rom_2010	1	1	1
NBG_Srb_2010	0.669	0.670	0.998
Average efficiency	0.800	0.882	0.909
Standard deviation	0.134	0.120	0.098
Mean Alpha efficiency	0.862	0.940	0.920
Mean Eurobank efficiency	0.673	0.813	0.828
Mean NBG efficiency	0.812	0.864	0.946

## 2010 results

Table 38 – CRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2010	0.749172	0	0	0	474.66	0	-197.782757	217.837243	110.452932	0	440.352932
ALPHA_Bulg_2010	1	10	0	0	1032.83	0	0	474	0	0	958.18
ALPHA_Fyr_2010	0.700083	0	0	0	130.55	0	-6.556268	59.913732	36.324219	0	121.114219
ALPHA_Rom_2010	0.969856	0	0	-610.726889	4398.323111	0	0	1649	102.596871	0	3403.596871
ALPHA_Srb_2010	0.892736	0	0	0	693.82	0	-241.622952	318.417048	69.042674	0	643.672674
EFG_Bulg_2010	0.697243	0	0	0	4127.72	0	-478.59216	1894.34784	1159.370198	0	3829.380198
EFG_Rom_2010	0.579681	0	0	0	3316.28	0	-370.118934	1521.951066	1293.148761	0	3076.588761
EFG_Srb_2010	0.743068	0	0	0	1714.63	0	-5.099329	786.900671	408.701445	0	1590.701445
NBG_Alb_2010	0.818652	0	0	0	329.83	0	-60.060055	151.369945	55.49083	0	305.99083
NBG_Bulg_2010	0.838342	0	0	0	3820	0	-1298.875091	1753.124909	572.90132	0	3543.90132
NBG_Fyr_2010	0.73618	0	0	0	1104	0	-363.337723	506.662277	270.206036	0	1024.206036
NBG_Rom_2010	1	1	0	0	2370	0	0	888.55	0	0	1834
NBG_Srb_2010	0.668654	0	0	0	1043	0	-109.332649	478.667351	320.614941	0	967.614941

Table 39 – VRS

DMU	Score	Times as a benchmark for another DMU	Radial Movement (Assets)	Slack Movement (Assets)	Projection (Assets)	Radial Movement (Deposits)	Slack Movement (Deposits)	Projection (Deposits)	Radial Movement (Loans)	Slack Movement (Loans)	Projection (Loans)
ALPHA_Alb_2010	0.789457	0	0	0	474.66	0	-193.726907	221.893093	87.981981	0	417.881981
ALPHA_Bulg_2010	1	6	0	0	1032.83	0	0	474	0	0	958.18
ALPHA_Fyr_2010	1	3	0	0	130.55	0	0	66.47	0	0	84.79
ALPHA_Rom_2010	1	2	0	0	5009.05	0	0	1649	0	0	3301
ALPHA_Srb_2010	0.912075	0	0	0	693.82	0	-239.159592	320.880408	55.394722	0	630.024722
EFG_Bulg_2010	0.891045	0	0	0	4127.72	0	0	2372.94	326.484188	0	2996.494188
EFG_Rom_2010	0.713779	0	0	0	3316.28	0	0	1892.07	715.148485	0	2498.588485
EFG_Srb_2010	0.834512	0	0	0	1714.63	0	0	792	234.396721	0	1416.396721
NBG_Alb_2010	0.902087	0	0	0	329.83	0	-54.951822	156.478178	27.189276	0	277.689276
NBG_Bulg_2010	1	5	0	0	3820	0	0	3052	0	0	2971
NBG_Fyr_2010	0.746847	0	0	0	1104	0	-330.171127	539.828873	255.57708	0	1009.57708
NBG_Rom_2010	1	3	0	0	2370	0	0	888.55	0	0	1834
NBG_Srb_2010	0.670102	0	0	0	1043	0	-104.593233	483.406767	318.524503	0	965.524503

### 5.3.2 Overall Remarks

Going over the average efficiency of the Greek banks in Table 40, we can see that the overall technical efficiency under CRS (OTE) starts from a low score in 2005, and reaches its highest in 2006. From then it relatively decreases over time and scores its lowest value in 2009, the year which the banks were fully affected by the crisis; nevertheless there is a recovery in 2010. The technical efficiency under VRS has been decreasing over time, with the exception of a small fluctuation in 2006, until it reaches its lowest score in 2009. In 2010 though, bounces back to the 2008 level. Scale efficiency starts from its lowest point in 2005 and tops out in 2006, indicating that Greek banks managed to exploit economies of scale. Nevertheless, from 2008 till 2010 there is a steady decrease to the scale efficiency scores. Another noteworthy fact is the divergence in the efficiencies among the banks, as is shown in Table 41 through the standard deviations.

Table 40

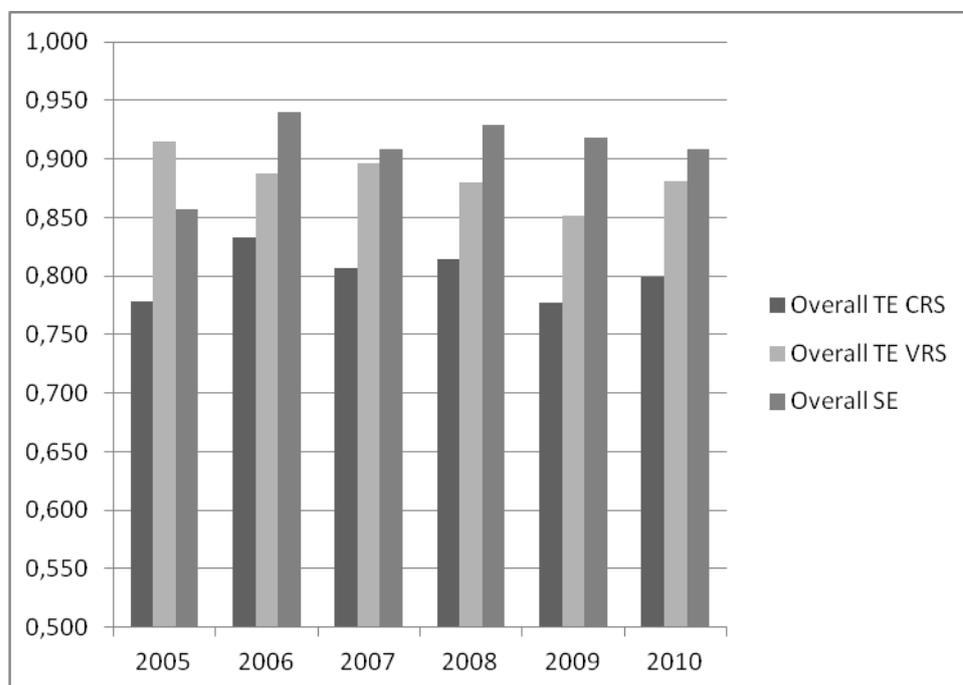
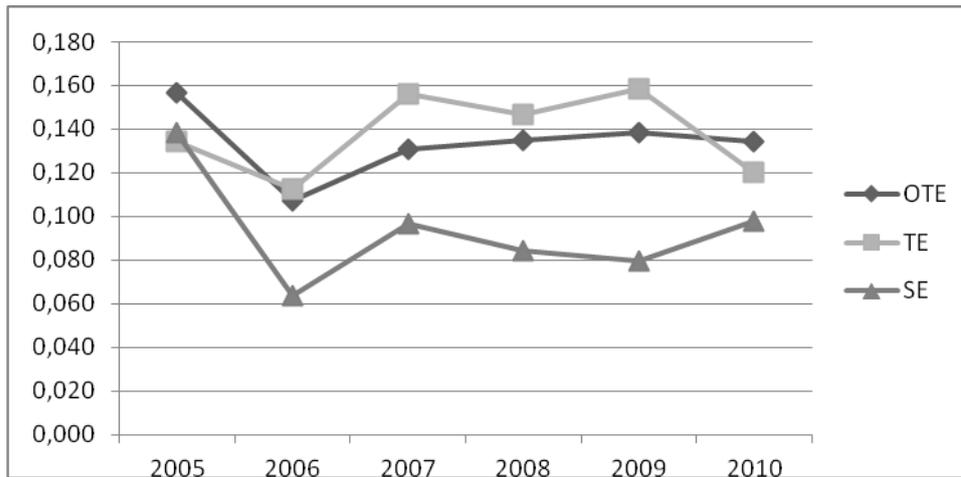


Table 41



Moving on to the Bank Group comparison, NBG has higher average OTE scores over time (Table 42). Although Eurobank reached high scores of OTE from 2006 to 2008, in the last two years there was an unprecedented decline of its OTE. Alpha Bank on the other hand, although it had relatively low scores of OTE until 2008, managed to overcome the other banks' OTE. As depicted in Table 43, which shows the banks which were found to be efficient under CRS and VRS, Alpha Bank Bulgaria is the most efficient bank operating on optimal scale among the others. Eurobank had the exact opposite record of Alpha Bank; its OTE substantially dropped after 2008, reaching its lowest efficiency levels since 2005.

Table 42

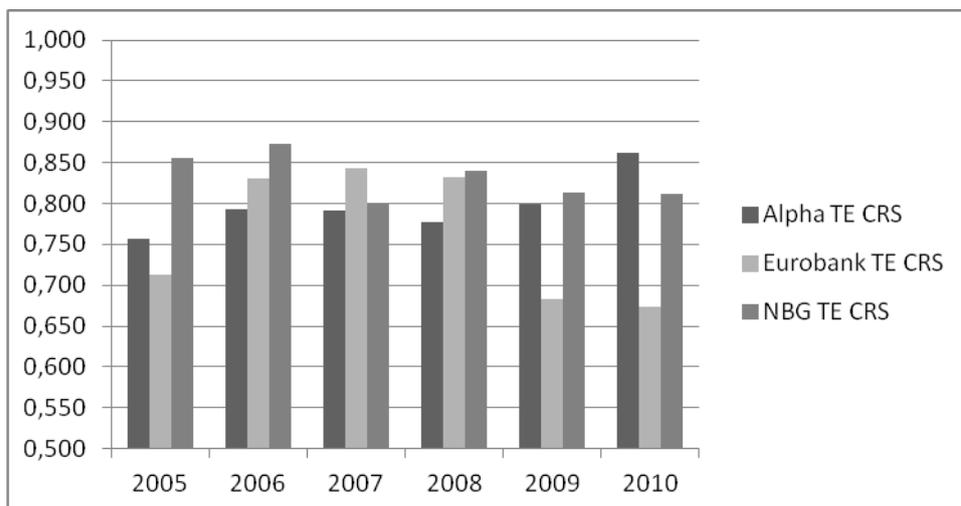
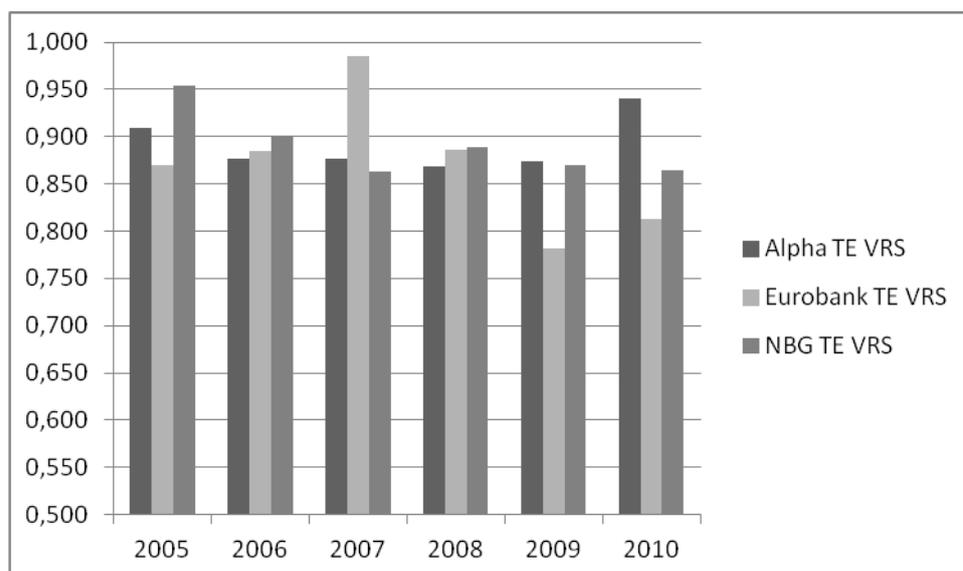


Table 43

	CRS	VRS
<b>Alpha Bulgaria</b>	5	5
<b>NBG Romaneaska</b>	3	4
<b>NBG UBB</b>	1	6
<b>NBG Albania</b>	1	2
<b>Alpha Skopje</b>	0	6
<b>Alpha Romania</b>	0	5
<b>Eurobank Romania</b>	0	1

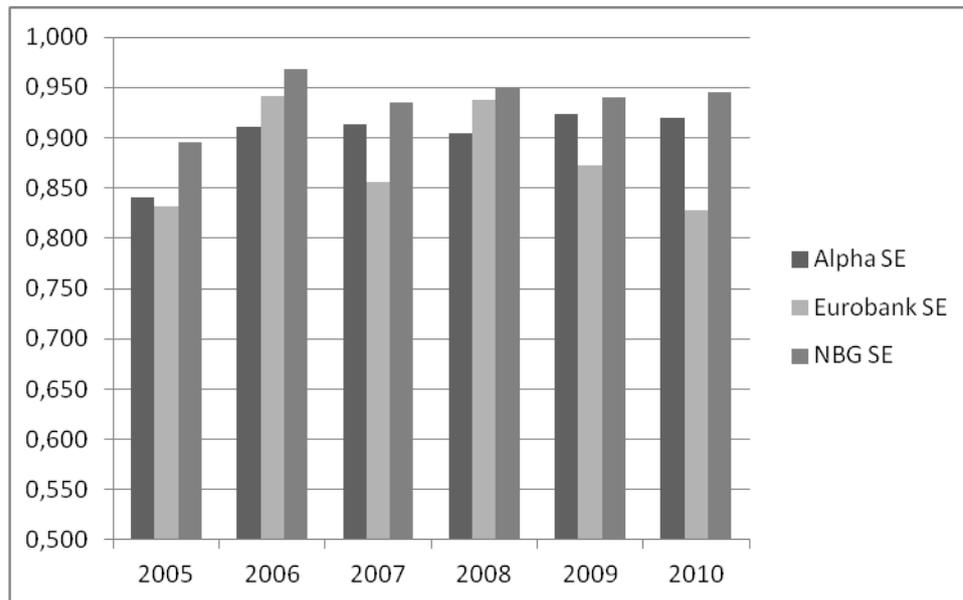
As far as TE is concerned (Table 44), NBG and Alpha are on the same level of efficiency, with NBG's score to be declining from 2005 to 2007 and again from 2008 to 2009, while Alpha Bank manages to improve its scores from 2008 to 2010. Eurobank although obtains the highest score of all times in 2007, has a decreasing efficiency with signs of recovery in 2010. Alpha Bank Bulgaria, Skopje and Romania and UBB, are the most efficient banks under VRS.

Table 44



NBG reports high scale efficiency over the years, with relatively small fluctuations and smaller scores compared to its highest 2006 score, as we can see in the following table. Alpha bank also presents high scale efficiency, although smaller than NBG's, with increasing though fluctuating scores compared to the low 2005 one. Eurobank has large fluctuations in its efficiency levels until 2008, from when it has declining scale efficiency.

Table 45



## 6. Conclusion

The main objective of the empirical analysis was to assess the comparative efficiency of the three largest Greek banks that operate in the SEE-5 through their subsidiaries or branches. The analysis was confined to a sample of the 13 separate banks for the years 2005 – 2010 (12 for 2005), a sum of 77 observations. Two DEA models were used; CRS, which estimates the overall technical efficiency (OTE), and VRS, which estimates the technical efficiency (TE). The scale efficiency can be estimated by the OTE/TE ratio.

NBG displays a higher average OTE than Alpha Bank and Eurobank and has 3 banks that were efficient under CRS. However, it was affected by the crisis, with inefficiencies mostly due to management as indicated by its TE and SE scores. In average TE terms, NBG managed to turn the decreasing rate in 2008, but didn't sustain the recovery for 2009 and 2010. Nevertheless, United Bulgarian Bank was efficient under VRS for all the six years of observation, while Banka Romaneaska was for four years and NBG Albania for two. These banks' inefficiencies are due to scale inefficiency, but in on average NBG has a quite high SE score, as the rest of the banks manage to exploit economies of scale and present inefficiencies because of management.

Alpha Bank doesn't seem to be affected by the crisis as it managed to increase its OTE in 2009 and 2010. Although it has the most efficient bank under CRS for all the years except 2006, Alpha Bank Bulgaria, its OTE levels are affected by the least efficient banks, Alpha Bank Serbia and Alpha Bank Albania. Alpha Bank's average TE is at the same range as NBG's, although Alpha Bank Skopje is efficient under VRS for all the six years whereas Alpha Bank Bulgaria and Alpha Bank Romania for five. Alpha Bank displays lower SE than NBG, with increased scores for 2009 and 2010.

Eurobank presents lower scores of efficiency than the other two banks that were greatly deteriorated since 2008. The financial crisis provoke inefficiencies that are attributed both to operations of scale and management. None of Eurobank's'

subsidiaries was efficient under CRS and only Bancpost was efficient under VRS for 2007.

The analysis in this dissertation is only a modest approach of the comparative Greek bank efficiency in SEE. The DEA approach would be more elaborate if we used a bigger number of inputs and outputs. Nevertheless it is a start and it would be interesting to see more studies dealing with the efficiency of the Greek banks operating in SEE.

The average efficiency levels of the Greek banks in SEE-5 are indicative of the impact of the economic crisis. The ongoing economic turmoil in Greece and EU's sinking deeper and deeper into the crisis, create adverse conditions for the Greek banks in SEE-5. Greek banks have reduced their operational expenses in the last three years, and sold or are about to sell a minor or major share of their international subsidiaries, like NBG with 20% of Finansbank in Turkey, or Eurobank with 70% in Poland in order to reinforce their capital adequacy. The liquidity problem, the increased non - performing loans, the lower profits or losses in some cases and the haircut of the Greek bonds may lead Greek banks to follow the example of the Alpha Bank – Eurobank merger in order to ensure their viability inside and outside the Greek borders. The operations in SEE-5 have proven to be extremely lucrative and Greek banks have to do anything in their powers to hold on to their subsidiaries. The extraversion of the Greek banks may be the golden chance of their survival. But with them being important actors in the SEE-5 financial system, their survival is also crucial for the region's stability.

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