

BACHELOR THESIS

The impact of the EU entry on the efficiency of the Bulgarian
banking sector

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Abstract:

This paper examines the efficiency of banks in Bulgaria and evaluates whether EU entry affects the efficiency of the Bulgarian banking sector. Using a sample of 34 banks operating in the period 2004-2009, the research finds significant improvements in the efficiency of the domestic banking sector in the first year after the EU entry, which is reasonably decreased in the following years. Moreover, the analysis concludes that net interest margin, market share, size and banking reforms, all influence the level of bank efficiency.

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1. Introduction

Efficiency is a crucial element in the development of the banking sector, especially in transition economies. In order to finance investments and spending, it is of great importance for an economy to have a stable and productive banking system. Thus, the development of efficient banks, which play crucial role in resources distribution, is one of the main challenges for a transition economy.

Examining the efficiency of the Bulgarian banking system is of great economic relevance because of two reasons. First, Bulgaria is one of the newest and least developed members of the European Union and it is still catching up with the requirements and regulations of the EU. Low efficiency of banks would slow down the process of financial development and economic growth, while weak banking sector might lead to a currency crisis. Secondly, Bulgaria is one of the three EU countries that have a currency board (the other two being Lithuania and Estonia). The board limits the availability of lender of last resort¹ which ensures the stability of the banking system (Vives, 2010). The board fixes the exchange rate and the country's terms of trade and consequently weakens the financial system. This potentially raises the risk of insolvency if the banking structure is inefficient or there are some liquidity problems that occur when it has lack of cash.

Since the late 1990s, the effectiveness of the Bulgarian banking system has been an interesting research topic and thus extensively deliberated in the literature. The existing papers focus mainly on the efficiency of the banks in the transition economies and the effect of privatization and foreign ownership on bank performance (Nenkov, 2003). However, most of these studies cover only the period between the start of the banking crisis of 1996 until 2003.

The purpose of this research is to investigate the efficiency of the Bulgarian banking sector before and after entering the EU and analyze whether the Bulgarian membership leads to better performing banks and why. The sample is obtained mainly from the annual reports of the Bulgarian National Bank² and financial disclosures of all the banks included in the sample. The data is composed by the commercial banks operating in Bulgaria during the

¹ A function of the central bank to lend money to banks which are facing heavy withdrawals (http://www.investorwords.com/2768/lender_of_last_resort.html)

² www.bnb.bg

period between 2004 and 2009. This time period allows for the evaluation of the impact of EU accession on bank efficiency, an issue that has not been addressed by previous research.

Following this introduction, section 2 describes the reforms in the Bulgarian banking sector and their impact on the productivity of the banks. The next section focuses on the existing relative literature on banking effectiveness and the theoretical background on the determinants of bank efficiency in Bulgaria. Section 4 clarifies the structure of the Bulgarian banking sector and its developments. Then, the data description for the period 2004-2009 is analyzed in the following section. Testing models and results are shown in section 6. The models test whether the period after EU membership is presented with higher efficiency of the banking sector and which factors are most significant. The last section wraps up and suggests recommendations for additional research, based on the results provided in the analysis.

2. Reforms in the Bulgarian banking system

Previous studies on transition economies suggest a positive trend in efficiency of banks, operating in EU member states. This is due to the opening of financial markets, the increasing role of competition, foreign investors and the introduction of new technology. However, the new reforms and the tightening of prudential requirements, associated with EU membership, impose charges which may decrease bank efficiency at least in the short run. The literature on banking in transition economies identifies that more reforms and expanded regulatory procedures lead to lower indicators of financial performance (Fries *et al.*, 2005).

As a result of the EU accession, in 2007 Bulgarian banks removed most of the administrative measures that were imposed on providing loans and as a result bank lending increased. The highest growth was observed in consumer and mortgage loans.³ Moreover, due to its liberalization, greater financial integration and bank privatization, the domestic banking sector had to deal with larger capital inflows. These inflows resulted in two unfavorable consequences, namely, high inflation rate and volatility that could incur a currency crisis.

The inflows led to an increase in money supply, which in return resulted in higher demand for foreign goods. To reach a balance, prices had to increase and in 2002 inflation raised up to 11.4 % (Nenovski, *et al.*, 2001). In fact, with the Bulgarian acceptance in the EU, the only

³ http://www.aeaf.minfin.bg/bg/izdaniq/annual_2007_en.pdf

criterion the country did not meet is the one of inflation rate. The union required it to be not higher than 1.5 % above the average of the three member countries with the lowest rate of inflation (Molle, 2006). The realization of this criterion is still the main challenge for the country, as the percentage of inflation rate differs significantly from the criterion of the Euro Zone (see graph 2.1).

The free flow of capital created high volatility and thus enlarged the risk of a financial crisis. To avoid the cost implied, the fiscal government policy created a regime that improved the conditions for financial stability. It tightened up its regulations and required a considerable budget surplus. This was a difficult task for the country, as it had a rapidly transforming economy that was still trying to catch up with the EU directives. Additionally, there was a concern over serious credit risk in the banking system and doubts that lending standards might be undermined due to competitive pressure. As a result, the Bulgarian Central Bank decided to reduce liquidity by increasing the minimum required reserve with 4 % (Tochkov *et al.*, 2009).

In countries with Currency Board, such as Bulgaria, uncertainty about future changes in interest and exchange rates might reveal heavy costs for the economic agents. The requirements posted from the EU for higher minimum reserve indicated a decline in the resources of many banks, while at the same time higher interest rate put many borrowers off. The fears of a potential currency crisis were well-founded since the current account deficit of the country did not show any improvements and the foreign debt continued growing.

Currency board and financial reforms affect the performance and competition of banking sectors. Banks that have made significant development on restructuring make reasonable margins on loans. They offer more competitive rates on deposits and on average have negative ROE (Fries *et al.*, 2002). Consequently, to investigate the influence of reforms on efficiency and its determinants, the paper looks at the literature on banking system in transition economies and compares the different theories.

3. Literature review

In an attempt to exploit the issue of the banking efficiency, this section addresses the existing literature on the determinants of efficiency and the development of banks operating in transition economies.

Kunt *et al.*, (1999) is one of the first studies, examining the efficiency of banks in transition economies. They introduce net interest margin as a provider of essential information of the efficiency of the banking sector. Therefore, classifying the determinants of net interest margin would be of assistance to understand the trends in Bulgarian bank competence through time and identify the role of the EU membership on the banks' performance.

Determinants of bank efficiency

Many studies examine the banking efficiency in transitional economies. This includes literature on Romania (Asaftei *et al.*, 2008), the Czech Republic (Weill, 2003), Ukraine (Mertens *et al.*, 2001), Bulgaria (Nenovski *et al.*, 2008) and others. However, the sample of these studies covers mostly the period between 1990 and 2003. None of them analyses the years following the treaty of accession and the EU membership in 2005 and 2007, respectively. In order to fill this gap in the literature, this study is the first to analyze the effect of EU membership on the efficiency of the Bulgarian banking sector.

Most of the researches that focus on bank efficiency measurements in transition economies examine the discrepancies among banks with different ownership and size. The two are important in immature transition economies, where markets are characterized by high state-ownership, privatization of domestic banks and rapid entry of foreign investments. International ownership of banks has an important impact on bank spreads and profitability. One of the most commonly used frameworks is presented by Claessens *et al.*, (2001). It examines the effect of efficiency on the domestic banking sector by analyzing several potential determinants of net interest margin.⁴ The paper discovers that in transition economies, foreign banks tend to have higher profitability, net interest margins⁵ and tax expenses than domestic banks.

Nenovsky *et al.*, (2008) is the only study that focuses on the effectiveness of the Bulgarian banking sector specifically. The paper traces the tendencies in the development of the banking sector by focusing on its effectiveness. It uses the standard indicators of bank efficiency, namely the profitability ratios ROE and ROA. Similar to the current paper,

⁴ In the literature, net interest margin is one of the main indicators of bank efficiency. It calculates the difference between net interest income and net interest expenses as a percentage of total assets. Alternative measures of efficiency are ROE and ROA (see model 3 and model 4).

⁵ A high value of NIM refers to a low level of efficiency

Nenovski illustrates an increase of the two variables and thus improvement in the efficiency of the banks in 2007. The increase is due to the entry of foreign investors who bring better knowledge and experience into the domestic banking sector. However, the analysis covers only the years 1999-2007, while this research extends the sample period and looks at the short-term effect of EU membership on banking efficiency. It shows that after 2007 the efficiency of the banks operating in Bulgaria diminishes by reasons explained in section 2.

The main point of Nenovski is to show that public banks make fewer loans and higher non-interest expenses than the majority of private banks. The government-owned banks have worse technology and thus provide less service at a higher cost than those which are already privatized. The study splits the Bulgarian banking system into several major groups according to their ownership and market share. The research method used is Data Envelopment Analysis (DEA) approach. It verifies the findings of the current study that because of economies of scale and scope, large banks perform better than small ones. At the same time, technological improvements and better experience lead foreign banks to higher efficiency than domestic ones.

Fries *et al.*, (2005) use data for 15 transition economies over the period 1994- 2001 and observe that private banks are more efficient than state-owned ones. Moreover, the results indicate that foreign banks have lower costs and thus greater efficiency than those with domestic ownership. The findings for Bulgaria show that the country's average cost efficiency level is below the sample average. The authors focus on the estimation of banks' costs as an evaluation of efficiency because higher value leads to changes associated with reforms and efficient provision of public services. They take market share of foreign banks, nominal interests and rate of competition to estimate the cost efficiency of the banking sector in transition economies. The authors' hypothesis is that banks with higher market share and lower expenses are associated with lower risks of inadequacy and thus higher level of efficiency.

The literature on bank operating system presents contradictable theories on the influence that reforms have on bank efficiency. Similar to the current research, Fries *et al.*, (2005) show a negative relationship between bank reforms and efficiency. They conclude that reforms affect adversely the banks' operations by imposing high costs for the fulfillment of the EU standards. This theory is further supported by Asaftei *et al.*, (2008). The authors illustrate that in contrast to privatization, reforms such as the tightening of prudential requirements with respect to capital adequacy and expected minimum reserves have a negative result on efficiency.

In contrast to the above, Brissimis *et al.*, (2008) assess the extent to which banks' privatization and reforms have a positive effect on efficiency. Their analysis covers the period 1994-2005 and contains 10 transition economies, including Bulgaria. The paper shows that the productive efficiency of Bulgarian banks over the sample period remains stable with the exception of several years following the banking crisis (1996-97). The study is based on the econometric contributions of Simar and Wilson (2007) which explain that reforms such as competition and risk-taking policy bring higher level of efficiency. Moreover, privatization of domestic banks introduces advanced banking techniques and technology, increased profitability, improved cost management and thus higher banking efficiency (further supported by Bonin *et al.*, 2005).

Another study that examines the effect of financial reforms on the determinants of net interest margin is Kasman *et al.*, (2010). The goal of the new and less developed EU members towards integration was the establishment of a stable and efficient banking system. This, according to the authors, consisted of the formation of a free market, the privatization of state-owned banks and the development of a competent framework for regulations and supervision. Fulfilling these requirements would not only increase efficiency but would also diminish the performance gap between the banking sector of the new and old EU members.

4. Background: history of the Bulgarian banking sector

4.1 Structure and trends

The banking system in Bulgaria is the most important financial system which works on the principle of universal banking, being authorized to carry out a wide range of financial activities with both individuals and institutions.

During the communist era the domestic banking sector was under monopolistic policy. The Bulgarian National Bank was performing both central bank functions and commercial operations under the control of the government. Before 1981 there were only two other banks: one was responsible for international transactions and the other for holding all the deposits of the Bulgarian population.

Following the political changes in 1989 (the fall of communism), bank privatization was a crucial step in financial reform. Therefore, in 1992 the Banking Consolidation Company was introduced with the purpose to unite, restructure and privatize state-owned banks that

showed low results of efficiency and profitability. Seven new banks with foreign investments were established. The main goal was to create modern commercial organizations that would provide credits to different entities and support the development of the financial sector. The first foreign bank was established in 1993 while by the end of 1997, 61 new banks were licensed and their total number became 70 (Vinceletter, 2001).

Nevertheless, with the start of privatization, many banks faced liquidity problems, temporary eased through massive central bank refinancing. The continuous supply of money affected the foreign exchange market by diminishing the confidence in the national currency and leading to the devaluation of the lev/USD exchange rate to 3200 in February, 1996. At the same time, inflation rate raised to over 1000% (Tsikripis *et al.*, 2005). As a result of the weak legal management and lack of banking culture the Bulgarian banking sector suffered transactional irregularities and a series of failures. The result was mistrusted feasibility of the emerging economy that ended in a severe banking catastrophe.

4.2 Banking crisis

In 1996 the Bulgarian banking sector was hit by a harsh crisis, estimated to be one of the largest worldwide. The Lev⁶ depreciated, inflation rate sharply increased and one third of the banking sector went bankrupt.

A precondition of the banking crunch was set at the beginning of the reforms in 1990 when a large number of small domestic banks specialized in providing funds to particular branches. Almost all of them took over significant amount of non-performing credits extended to the enterprises during the period of socialism. About half of the loans given to non-financial institutions were irrecoverable due to the influence of the government on lending to strategically important public enterprises. Lack of effective framework, which would concern collecting credits from not truthful borrowers, weakened the banks' credit portfolio further. Inefficient legal procedure against insolvency and the recapitalization of the banking sector resulted in reported profit for only four banks at the end of 1995 (Roussenova, 2005).

The instability of the capital market diminished the confidence of investors and provoked a withdrawal of deposits from the banks. The result was a lack of investment opportunities and economic decline.

⁶ Bulgarian currency

The bank's financial weaknesses, liquidity problems and huge external debt repayments were preconditions for the start of the banking crisis. The attempt to stop the spillover effect by introducing a deposit insurance scheme was unsuccessful because of insufficient foreign reserve. As a result, the Central Bank started to pursue a preventive procedure towards banks by increasing the minimum reserve requirements, raising the interest rates and selling US dollars to protect the lev exchange rate. At the beginning of 1997 the Lev depreciated by almost 250 per cent which resulted in hyperinflation (Roussenova, 2002). The government had to interfere and put many banks under special supervision and introduced a law by which bad loans were converted into state bonds with low interest rates. Nevertheless, the non-performing bank loans continued increasing, resulting in diminishing solvency and the closing of many banks. The bad governance, weak regulations and lack of privatization affected even further the deterioration of the balance sheets of many banks and a series of bank failures in 1996-1997. After the unsuccessful effort to stop the collapse of the Bulgarian banking sector and all the losses it suffered, the only possible solution to the harsh crisis was the introduction of a Currency Board.

4.3 Currency Board

In 1997, following the advice of IMF, the Bulgarian government turned the Central Bank into a Currency Board. Its key role was the maintenance of stability, control and financial supervision of money, the liberalization of trade and the stimulation of competition. Since then, Central bank's liabilities were fully covered by highly liquid foreign reserve, while the Lev was pegged to the Deutsche Mark and since 1999 to the Euro. The Central Bank adopted laws that imposed financial regulations and reduced the period of loans to commercial banks. These measures were taken in attempt to recover the banking sector and mainly to decrease the inflation rate. Inflation was brought down to 0.9 % in 1998 and 6.2 % in 1999. Foreign exchange reserves have marked an increase from US\$ 518 million in 1996 to US\$ 3, 300 million in 2000 (Ialnazov *et al.*, 2001). Moreover, monetary stability and predictable business environment were observed. The Central Bank decreased significantly the exchange risk, thereby reducing the uncertainty and foreign trade transaction costs.

The policy of the Board, however, came with high costs. Weak foreign exchange market characterized the period before EMU membership with extensive moves in the exchange rate of the lev against the Euro (Gulde *et al.*, 2000). The sudden devaluation of the Lev led to high

inflation and interest rate. This resulted in increased insecurity about future levels of interest and exchange rates that could incur heavy expenses on economic agents. Banks with large borrowings from abroad might not be able to survive substantial lev devaluation. This in turn might give rise to a cycle starting with higher inflation turning into economic recession and ending up with a new banking crisis.

Moreover, the existence of currency board does not allow the use of a monetary policy (adjustment of the interest rate to the exchange rate). To avoid external shocks and to stabilize its economy, the government had to regulate the wages and prices instead. This could lead to impossibility of reacting to external shocks such as the weak foreign demand and the strong dollar, which limited the economic growth of the country.

Nevertheless, Bulgaria is still trying to withstand these external shocks by orienting its trade towards the EU. Thus, there is a high correlation between the external shocks and business cycle organization of the developed EU members and Bulgaria.

As a whole, the currency board seems to serve Bulgaria well on its approach to accept the Euro. Moreover, it tests the exchange rate stability of the banking sector (Gulde *et al.*, 2000). Real exchange rate appreciations should not be an issue if prices and wages are flexible enough to return the stability of the banking system. As for the lack of strong monetary policy, it should be noted that well-built economies such as those of the Netherlands and Belgium did not follow an independent monetary policy during their transition to the euro zone, neither. Their experience demonstrates that following strictly the Bundesbank's monetary policy (at present ECB) through fixed exchange rate to the Deutsche mark (today, the euro) helps in achieving faster nominal convergence. (Ialnazov *et al.*, 2001) And if these countries reached such results, accession countries with a currency board, as Bulgaria, should be able to do the same.

5. Data description

The data used in this study is drawn from the balance sheet and income statements of 34 Bulgarian banks for the sample period from 2004 to 2009. In order to normalize the outcomes, all variables, for which data is missing, are removed from the data set.

Table 5.1: Descriptive statistics

	<i>ROA</i> ¹	<i>ROE</i> ²	<i>NIM</i>	<i>EU</i>	<i>Size</i> ³	Market Share
Mean	0.017	0.206	0.040	0.158	5.845	0.033
Median	0.014	0.138	0.037	0.000	5.866	0.016
Standard Deviation	0.020	0.347	0.021	0.365	0.624	0.038
Minimum	-0.031	-0.148	0.002	0.000	3.603	0.000
Maximum	0.228	3.662	0.170	1.000	7.049	0.159
Count	184	184	184	184	184	184

Notes: (1) ROA= net income/ total assets; (2) ROE= net income/ total equity;

(3) Size= log (TA);

Table 5.1 implies quantitative summary of the data set by describing its main characteristics.

The outcomes show that average net interest margin is 4 % which means that Bulgarian banks realize net interest income of 4 per cent of assets, with a coefficient of variation of only 2.1% meaning that the dispersion from the average is low.

The literature on banking system concludes that increased competition leads to smaller profit margins and lower returns. This is the case for the banks in Bulgaria following the EU membership. After the first year of participation in the union, with the increasing number of foreign ownership and high concentration of competition, the ROA started falling (see graph 5.1). Moreover, the effective monetary rules and the new capital requirements decreased ROE (see graph 5.2). The average ROA is only 1.7 %, with a coefficient of variation of 1.4 %. At the same time, average ROE is calculated at 21 %. This means that Bulgarian banks can return to their shareholders twenty one cents for every dollar invested, so they become more attractive for potential investors.⁷ However, ROE has extremely large coefficient of variation, 34.7%. Therefore, the standard measure of financial performance, ROE, gives evidence of significantly more variability across the sample than does NIM. Moreover, this measure of profitability is sensitive to the strategies used to write off and grant bad loans. Hence, using ROE as a measure of profitability and consequently efficiency is fault with some difficulties (Bonin, 2004). For that reason, the paper uses NIM as an estimator of bank efficiency (see model 1).

⁷ ROE of more than 20 % is considered to be attractive (www.investortrip.com)

Table 5.2: Correlation

	NIM	EU	Size	Market Share
NIM	1			
EU	0.01	1		
Size	-0.16	0.15	1	
Market Share	0.00	0.02	0.79	1

Table 5.2 presents the correlation between the different determinants of efficiency. The results indicate that while there is no link between market share and NIM, size and NIM have a negative correlation of 16%. Although it is not a strong linear relation, it means that larger companies have lower value of NIM and thus higher efficiency. This could be due to the fact that size offers the possibility of exploiting economies of scale from technology, investment and administrative operations. Besides, larger banks have economies of scope which decrease the bank's average marketing and deposits cost (Vives, 1998).

6. Methodology and results

To empirically analyze whether the EU entry improves the efficiency of the banking sector in Bulgaria, a simple OLS regression is run for the whole sample. The model used is based on the theory explained in the previous sections. Specifically, net interest margin is regressed on a constant and three independent variables: EU, market size and market share. EU: takes value 1 if ≥ 2007 and 0 otherwise. Market size uses as its proxy the natural logarithm of total assets of bank i for time t . Finally, market share is calculated as the percentage of bank i 's assets in total banks' assets for period t . The error variable is supposed to be normally distributed. Therefore, the model is:

Model 1:

$$NIM_i^8 = \alpha + \beta_1 * size_{it} + \beta_2 * market\ share_{it} + \gamma * EU_{it} + error\ term \quad (6.1)$$

Net interest margin will help to understand changing trends in the bank efficiency in Bulgaria as a lower value of NIM shows higher efficiency. This is because a reduction in net interest

⁸ NIM= net interest income/total assets

margin means lower bank taxation on credits and consequently an improvement of the financial market function (Kunt *et al.*, 1990). The significance of the coefficients is determined by t-test statistics. As previously discussed, the European Union imposes higher minimum reserve and tighter capital requirements on the banks. On the long run this will most probably result in improvements of the banking efficiency. However, in the short run it increases the capital costs and the interest rates and thus puts many borrowers off. For that reason, this paper assumes that by entering the EU, operating banks in Bulgaria will need to follow strict regulations in order to adjust their efficiency to the EU standards. This might raise the expenditures on financial intermediation for the short term period following 2007 and even adversely affect efficiency. Therefore, the regression model tests whether there is any change in the efficiency of Bulgarian banks since EU entry (i.e., $\gamma \neq 0$).

The regression gives the following results:

Table 6.3: Results of model 1

Variable	Coefficient	Std. error	t-value	p-value
C	0.119	0.022	5.487	0.0000*
EU	0.004	0.004	0.928	0.3549
Market share	0.189	0.064	2.938	0.0037*
LOG (TA)	-0.015	0.004	-3.679	0.0003*

Notes: $R^2 = 0.070$; * significant at 1 %

The outcomes illustrate that the average efficiency indicator of the banks in Bulgaria, measured by the constant, is 0.119 whereas after entering the European Union it is $0.119 + 0.004 = 0.123$. The result of the coefficient EU dummy variable illustrates that after entering the EU, the efficiency indicator (NIM) has a higher value in comparison with the period before entrance (check also graph 6.1). This implies that efficiency decreases, however, the effect is not significant and thus the null hypothesis is not rejected. This is inconsistent with previous significant dummy variables as examined in the literature review (Kunt *et al.*, 1990).

With the help of this sample I conclude that the banking sector in Bulgaria did not become more efficient after entering the EU. Considering the fact that Bulgarian banks were highly efficient in 2007 (further supported by Tochkov, 2009), I can assume that the worsening of bank efficiency after that year is attributed to the high costs from tightening the prudential EU requirements.

On one hand, the measure of bank size holds a negative and significant correlation with NIM and thus shows that large banks operate more efficient than small ones. This outcome may be ascribed to smaller overhead costs and large investments in more efficient projects that are affordable only by larger banks. They significantly improve the efficiency of the banking sector by the estimated 0.015. The result is consistent with previous significant variables as studied in the literature review (Nenovski *et al.*, 2008). On the other hand, the results show that NIM increases with the market share. Banks with a higher market share significantly worsen efficiency (In contradiction with Fries and Taci, 2005). (Check also graph 6.2).

In 2007, 4 of the 34 operating banks in Bulgaria take part in the stock exchange market. In order to test whether this contributes to any change in the efficiency of the Bulgarian banks, the next regression is run for the whole sample. Specifically, the listed dummy variable is added to the previous model (check model 1). The variable takes value of 1 for the four listed banks if ≥ 2007 and 0 otherwise. Therefore, the model is:

Model 2

$$NIM_i = \alpha + \beta_1 * size_{it} + \beta_2 * market\ share + \gamma * EU_{it} + \delta * listed + error\ term \quad (6.2)$$

The dummy variable “listed” will help to understand the change in the bank efficiency after 2007. Generally speaking, banks participating on the stock exchange market are expected to be more efficient. With the money received from trading shares, listed banks increase the liquidity and thus approach their capital to the minimum reserve imposed by the EU. For that reason, I assume that by entering the stock exchange market, the four listed banks would increase the efficiency of the banking sector in Bulgaria.

The regression gives the following results:

Table 6.4: Results of model 2

Variable	Coefficient	Std. error	t-value	p-value
Constant	0.133	0.022	6.021	0.000*
Listed	0.016	0.006	2.514	0.013**
EU	0.003	0.004	0.762	0.447
Market share	0.225	0.065	3.454	0.001*
LOG (TA)	-0.018	0.004	-4.268	0.000*

Notes: $R^2 = 0.102$; * Significant at 1%; **Significant at 5%

The R^2 rises from 7 % in the first model to 10% in the second one. This means that the added “listed” variable increases the explanatory power of the model and thus the correlation between the dependent variables and the independent NIM. It can be seen that the average value of the efficiency indicator of Bulgarian banks, measured by the constant (0.133) is higher than the results from table 6.3. It turns out that the inclusion of the listed dummy variables increase the efficiency indicator (NIM) and thus worsens the bank efficiency. The effect is highly significant, meaning that the null hypothesis is rejected at 5 % significance level. Thus, in this sample, listed firms are exhibiting a decline of the bank efficiency. One possible reason could be the increased competition followed by the foreign banks.

Similar to model 1, model 3 and 4 test whether EU membership has any impact on the efficiency of the Bulgarian banking sector by using alternative indicators of efficiency, namely, return on equity and return on assets.

One of the most common used indicators of efficiency, except NIM, is ROE. To further support the theory that bank efficiency in Bulgaria decreases after EU accession, the following OLS regression is run. Specifically, return on equity is regressed on a constant and the three independent variables used in model 2. Therefore, the model is:

Model 3:

$$ROE_i = \alpha + \beta_1 * size_{it} + \beta_2 * market\ share_{it} + \gamma * EU_{it} + error\ term \quad (6.3)$$

ROE will help understand the banks’ profitability that reveals how much revenue is generated from the shareholders’ investments. The increase of banks’ capital intensity⁹, as a result of the EU requirements for minimum reserve, presumes lower ROE. Therefore, model 3 tests whether there is any change in the return of investments and thus bank’s efficiency since EU entry. The regression gives the following results:

Table 6.5: Results of model 3

Variable	Coefficient	Std. error	t-value	p-value
Constant	-0.379	0.372	-1.020	0.309
EU	-0.095	0.072	-1.322	0.188
Market share	-1.475	1.105	-1.335	0.184
LOG (TA)	0.111	0.069	1.616	0.108

Notes: $R^2 = 0.020$

⁹ “requires heavy capital investment in buying assets relative to the level of sales or profits that those assets can generate” (<http://moneyterms.co.uk/capital-intensive/>)

In table 6.5, R^2 shows the lowest result of all tests (2 %) meaning that the predictability of the test is too small. The outcomes illustrate that the average efficiency indicator ROE, decreases even further after the EU accession. This infers that efficiency declines, but the effect is not significant, so the null hypothesis is not rejected. Bank size and ROE are positively and highly correlated, implying that larger banks have better regulation, higher competitive position and lower financing costs. At the same time, the results confirm that banks with higher market share have lower ROE. Excess inventory reduces total asset turnover and forces the bank to sell at a lower price, which reduces its profit margin. In addition, increasing market share includes the introduction of new products and services that can increase operational complexity. Consequently training costs, the error rates and the potential degradation of the bank are higher.

There is a tendency to measure bank efficiency by its profitability ratio, ROA. However, due to reasons mentioned in section 5, examining efficiency using only the financial performance measures, such as ROA, is likely to be misleading. To further support this hypothesis and the preference of NIM over ROA as most appropriate determinant of efficiency, the next regression is run.

Model 4:

$$ROA_i = \alpha + \beta_1 * size_{it} + \beta_2 * market\ share_{it} + \gamma * EU_{it} + error\ term \quad (6.4)$$

ROA is assumed to be a better indicator of efficiency than ROE by many researchers. This is due to the fact that ROA is more stable and can be calculated even for companies with negative shareholder's equity (where liabilities exceed assets). Moreover, it is argued that ROA increases banks' efficiency as banks with high ROA grow faster, without trading additional shares to increase their capital.¹⁰ It is expected that the high inflow of foreign entry, transfer of technological advance, experience and knowledge will increase return on assets and thus the efficiency of Bulgarian banks. In addition, the augmented competition is expected to diminish the gap of profitability between domestic and foreign banks in Bulgaria. For that reason, I assume that by entering the EU, operating banks in Bulgaria will increase their profits compared to their entire investment. Therefore, model 4 tests whether there is any change in ROA of Bulgarian banks since EU access.

¹⁰ [http://e-articles.info/e/a/title/What-is-Return-on-Assets-\(ROA\)/](http://e-articles.info/e/a/title/What-is-Return-on-Assets-(ROA)/)

The regression gives the following results:

Table 6.6: The results of model 4

Variable	Coefficient	Std. error	t-value	p-value
C	0.120	0.020	5.871	0.000*
EU	-0.001	0.004	-0.364	0.716
MARKET SHARE	0.260	0.061	4.275	0.000*
LOG(TA)	-0.019	0.004	-5.033	0.000*

Notes: $R^2 = 0.133$; * significant at 1%

In table 6.6 the R^2 increases from 7% to 13% in comparison to the first model, showing that more of the variability in the dependent variable is described by the explanatory variables. The coefficient of the EU dummy variable is negative, illustrating a destructive impact on return on assets. Lower ROA means less profitability and in this case less efficiency. However, the result is not significant so the null hypothesis is not rejected. In this test the market share and size are highly significant at 1%. As expected, market share is positively correlated with ROA. At the same time, though, larger banks tend to have lower return and thus perform less efficiently (in contradiction with the results of NIM and ROE).

According to the relative literature, the financial measure ROA provides mixed signals about the bank performance in transition economies due to the evolving nature of the banking sectors (Bonin *et al.*, 2005). This fact supports further the choice of NIM as a determinant of efficiency (further supported by Kunt *et al.*, 1998).

7. Conclusion

This study examines the efficiency of the banking sector in Bulgaria and the impact of EU membership, by using simple OLS regressions. A sample size of 34 banks is studied over the period 2004-2009. First, the efficiency determinants are estimated followed by regressions testing whether EU acceptance in 2007 changes the effectiveness of the banking sector in Bulgaria. As in previous studies on this subject, the methodology shows that year 2007 is marked with higher efficiency indicators. Furthermore, the process of privatization and foreign ownership bring modern techniques and knowledge which are quickly spread out and result in increased effectiveness of the banks. In addition, to keep their market share stable, banks in Bulgaria need to become more competitive therefore it is expected that they will increase their efficiency. However, due to the rigorous EU regulations that create high costs

of fulfillment, the banks in Bulgaria indicate lower estimates of efficiency in the years following the EU membership. The profitability indicators, namely, ROA and ROE start declining in 2007 and 2008, respectively (see graphs 5.1& 5.2, Appendix). Besides that, the market share increase, resulting in higher NIM, worsens even further the efficiency of the banks in 2008 and 2009. Nevertheless, the results should be treated with caution due to the relatively short period of evaluation. In the long-run it might be the case that EU membership improves efficiency in the banking sector of Bulgaria by showing positive values for all its determinants.

In conclusion, the efficiency of banks in transition economies and the role of EU membership are a dynamic research area, where there is still a lot to be explored. I recommend additional studies that focus on longer period of time before and after EU accession. In this way, one can trace out the development of the Bulgarian banking sector and consequently conclude whether in the long-run, the EU membership has a positive effect on the performance of the banks in Bulgaria.

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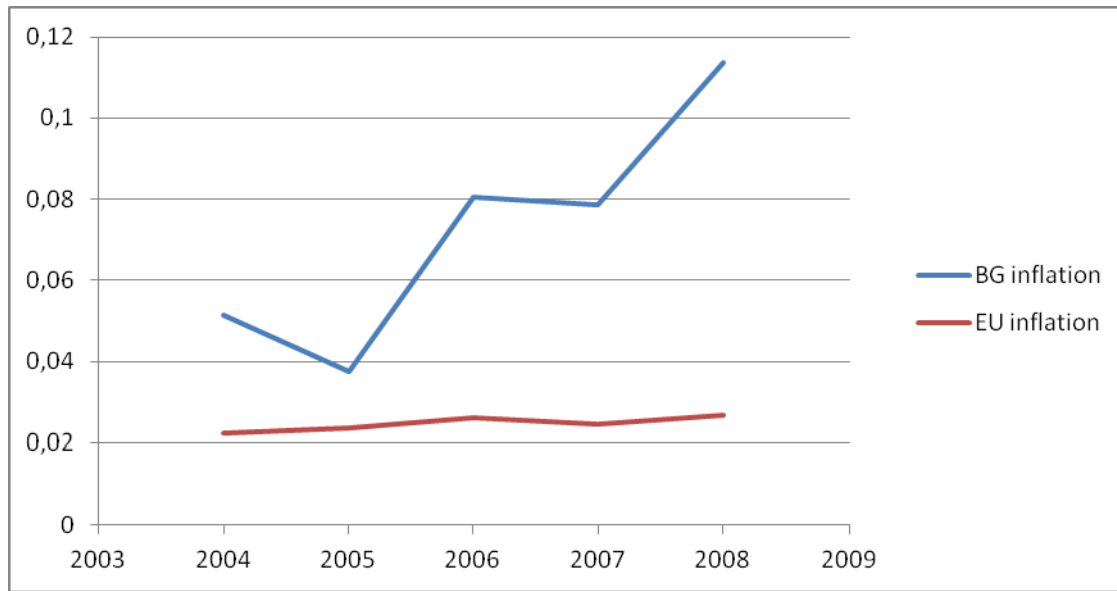
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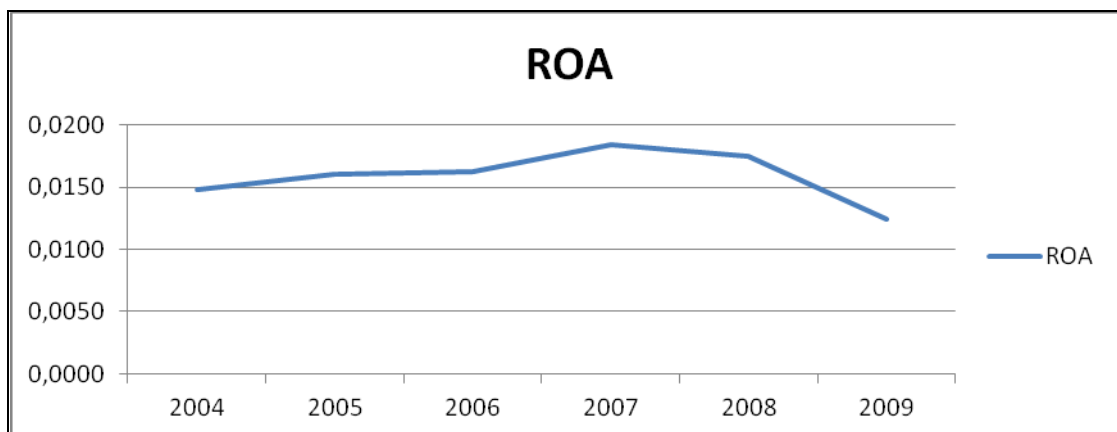
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Appendix:

Graph 2.1: Inflation, GDP deflator (%)¹¹

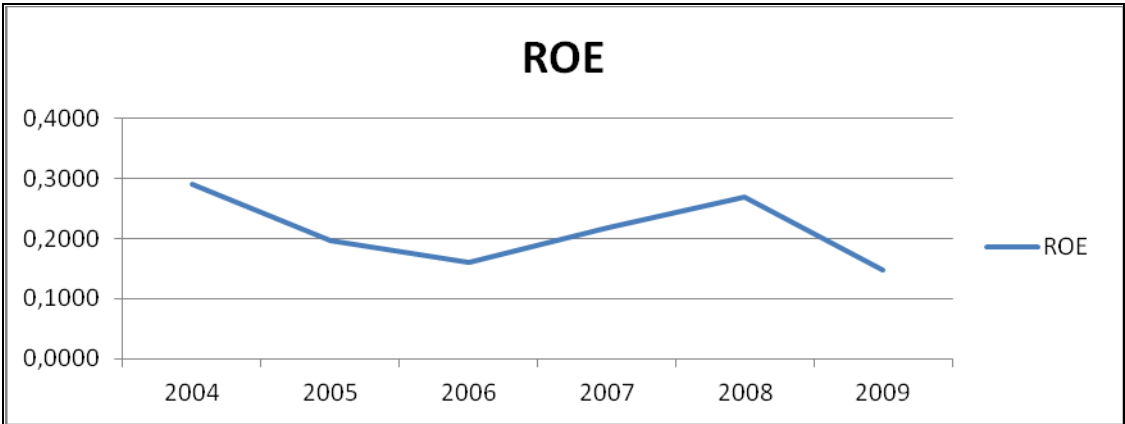


Graph 5.1: ROA

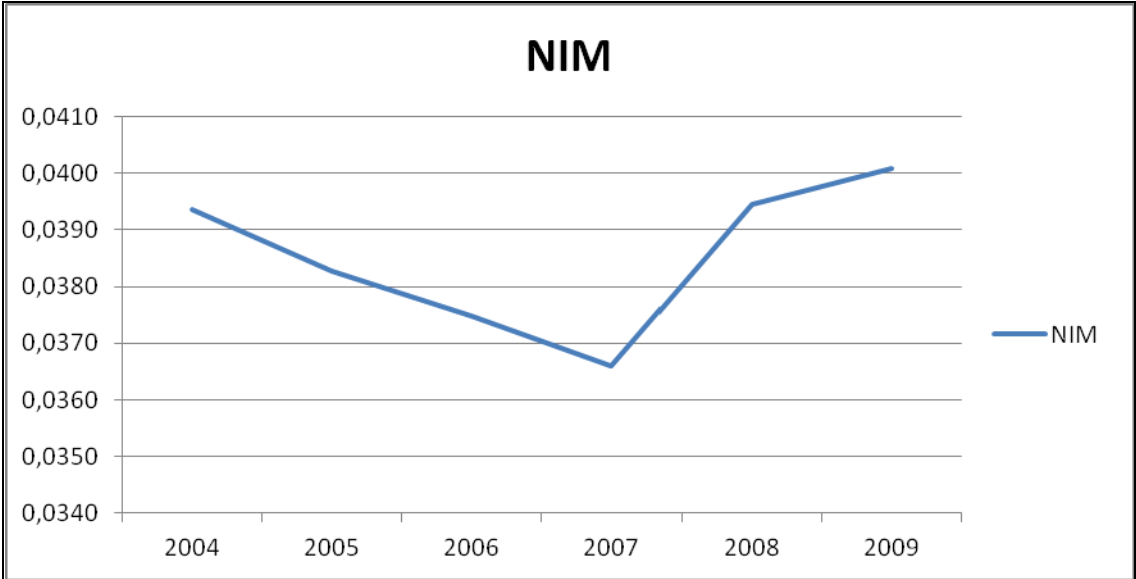


¹¹<http://www.worldbank.bg/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/BULGARIAEXTN/0,,m enuPK:305464~pagePK:141132~piPK:141109~theSitePK:305439,00.html>

Graph 5.2: ROE



Graph 6.1: NIM



Graph 6.2: Market share

