



BANK OF GREECE
EUROSYSTEM

Special Conference Paper

Determinants of lending interest rates and interest rate spreads

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FEBRUARY 2011

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ISSN 1792-6564

Editorial

On 19-21 November 2009, the Bank of Greece co-organised with the Bank of Albania the 3rd Annual South-Eastern European Economic European Research Workshop held at its premises in Athens. The 1st and 2nd workshops were organised by the Bank of Albania and took place in Tirana in 2007 and 2008, respectively. The main objectives of these workshops are to further economic research in South-Eastern Europe (SEE) and extend knowledge of the country-specific features of the economies in the region. Moreover, the workshops enhance regional cooperation through the sharing of scientific knowledge and the provision of opportunities for cooperative research.

The 2009 workshop placed a special emphasis on three important topics for central banking in transition and small open SEE economies: financial and economic stability; banking and finance; internal and external vulnerabilities. Researchers from central banks participated, presenting and discussing their work.

The 4th Annual SEE Economic Research Workshop was organised by the Bank of Albania and took place on 18-19 November 2010 in Tirana. An emphasis was placed upon the lessons drawn from the global crisis and its effects on the SEE macroeconomic and financial sectors; adjustment of internal and external imbalances; and the new anchors for economic policy.

The papers presented, with their discussions, at the 2009 SEE Workshop are being made available to a wider audience through the Special Conference Paper Series of the Bank of Greece.

Here we present the paper by Ljupka Georgievska, Rilind Kabashi, Nora Manova–Trajkovska, Ana Mitreska and Mihajlo Vaskov (National Bank of the Republic of Macedonia) with its discussion by Heather Gibson (Bank of Greece).

February, 2011

Altin Tanku (Bank of Albania)
Sophia Lazaretou (Bank of Greece)
(on behalf of the organisers)

DETERMINANTS OF LENDING INTEREST RATES AND INTEREST RATE SPREADS

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ABSTRACT

This paper focuses on investigating the determinants of lending rates and interest rate spreads. In order to quantify the effect of various factors on lending rates and interest rate spreads during the last decade, we use panel estimation techniques on a sample of domestic commercial banks. Our results indicate that lending rates are mostly influenced by bank size and market share and to a lesser extent by deposit rates and non-performing loans. In addition, policy variables such as the domestic policy rate and the foreign interest rate also appear to be quite important. Furthermore, the bank size and the market share, as well as the differential between domestic and foreign rates, are the most important factors affecting interest rate spreads, while the effect of other factors is less clear-cut.

JEL Classification: C23, E43, G21

Keywords: interest rates, banking system, panel estimation

Acknowledgements: The research was carried out with Leo de Haan, an expert from the De Nederlandsche Bank, as part of the technical aid for panel estimation techniques in 2008. The authors are thankful to Sultanija Bojceva-Terzijan of the National Bank of the Republic of Macedonia for her very useful comments and suggestions, as well as to Heather Gibson of the Bank of Greece for her comments on an earlier draft of this paper presented in the 3rd South-Eastern European Research Workshop, held in Athens on 19-21 November, 2009. The remaining errors belong to the authors. Comments and suggestions for improvement are welcome. The opinions and the views in this study are those of the authors and do not necessarily reflect those of the National Bank of the Republic of Macedonia and the Bank of Greece.

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1. Introduction

The banking system and the financial system more generally, is a key pillar in any economy, bearing in mind its basic function, which is to reallocate funds from agents with a surplus to those with a deficit. By solving the problem of asymmetric information among agents and by diversifying risks, banks manage to decrease the costs of the exchange of financial funds and enable their efficient allocation within the economy. Therefore, the financial system is one of the most important sources of financing economic decisions related to consumption and investment, and hence of the financing capital accumulation and technological innovations, aimed at medium-term productivity growth and more dynamic and sustainable rates of economic growth. Consequently, the price of financing through bank loans (i.e. lending rates) and the efficiency of the banking system (as measured by interest rate spreads) are essential for the possibility of allocation additional financial potential in the economy, and thus for the acceleration or sustainability of economic growth.

The price of loans and the interest rate spread in our country were relatively high for a long period limiting thus the access to capital and inhibiting economic growth. Although there has been a trend towards lower lending rates and narrower spreads in recent years, they are still relatively high. Until now, the factors that determine lending rates and interest rate spreads are usually analysed with economic intuition, through expert opinions and by studying the dynamics of certain categories, which are usually considered to influence the interest rate policy of the banks. These factors includes the low level of savings and consequently the low supply of loans, insufficient competition in the domestic banking system, the inefficiency and low profitability of banks, uncertainty in the economic environment, the inherited low quality of loan portfolios, institutional limitations, etc.

For the best of our knowledge, this paper is the first empirical analysis of the determinants of lending rates and interest rate spreads in our country. The methodology used is that of a panel estimation of a sample of 17 banks over the period from 2001 to the first half of 2009. The main aim of this research is to empirically estimate the key driving factors that influence lending rates and interest rate spreads, so that certain

conclusions can be drawn regarding policy measures that could lead to lower lending rates and narrower interest rate spreads. In addition, it is interesting to compare the results of this research with the results of previous qualitative analysis regarding the main factors that influence banks' interest rate policy. Certainly, bearing in mind that this is the first attempt of an empirical quantification of these issues, the results should be interpreted with caution.

The paper is structured as follows. Section 2 reviews the literature. Section 3 briefly describes the developments in interest rates and the domestic banking system over the past years. Section 4 contains an explanation of the data and the methodology used, while Section 5 presents the econometric results. Section 6 presents the results of the decomposition of the interest rate spread as an alternative method of evaluating the factors that determine interest rate spreads. Section 7 concludes and suggests some policy recommendations.

2. Literature review

Interest rates and interest rate spreads are the subject of numerous empirical analyses, both for developed and developing countries. Depending on the purposes of the research as well as on data availability and the specific characteristics of a particular banking system, these issues are treated in various manners, ranging from simple accounting identities through regression techniques to more sophisticated econometric models.

One part of the literature is based on the influential dealer model introduced by Ho and Saunders (1981), who use a two-stage procedure for econometric estimation of the relative influence of particular micro- and macro-factors of the formation of banks' interest rate spreads.¹ Brock and Rojas-Suarez (2000) apply this method to a sample of five Latin American countries. They conclude that interest rate spreads in the 1990s were dominated by liquidity and capital adequacy developments at the micro-level and interest

¹The first step includes an estimation of the pure interest spread by regressing the spread on a set of variables related to the specific features of a particular bank (mainly CAMEL indicators). The pure spread estimated by this way is then explained on the basis of key macroeconomic indicators, as well as variables related to the market structure within banks operate.

rate volatility, inflation and growth at the macro-level, with some variation in the results across countries. The research by Saunders and Schumacher (2000) on a sample of seven OECD-countries for the 1988-1995 period concludes that bank capitalisation, market structure and interest rate volatility are the main determinants of interest rate spreads, whereas according to Afanasieff *at al.* (2002) macroeconomic variables appear to be the most important factors in the case of Brazil.

The second alternative approach is more eclectic, based on a single-stage regression technique. It is oriented towards the specification of a behavioural model of banks through the inclusion of various potential determinants of interest rate spreads. For instance, using panel estimation Demirgüç-Kunt and Huizinga (1999) examine the determinants of interest rate spreads in 80 countries over the period from 1988 to 1995. Based on a set of variables related to bank specifics, macroeconomic indicators, explicit and implicit taxes, the entire financial structure and regulatory and institutional factors, they find that net-interest rate spreads react positively to the growth of bank capitalisation, the share of loans in total assets, the foreign ownership of the bank, bank size defined using total assets, operating costs, inflation and the short-term money market real interest rate. By contrast, they find a negative effect from non-interest-bearing assets, whereas the rate of economic growth has no effect on interest rate spreads. Similar to this is Naceur's (2003) research on Tunisia for the period from 1980 to 2000, which comes to comparable results. Furthermore, Randall (1998) finds a dominant influence of operating costs on high interest rate spreads in the East-Caribbean region. According to him, operating costs account for 23% of interest rate spread in the 1991-1996 period.

Our research is heavily based on the work by Čihák (2004), who analyses the determinants of lending rates and interest rate spreads in Croatia between 1999 and 2003. Čihák supposes that interest rate spread is a function of the deposit rate, total assets, market share, and the share of non-performing loans in total loans, liquidity, capital adequacy, dummy variables for privatised and green-field banks, as well as the Treasury bill rate and the EURIBOR rate as general factors. The empirical results show the existence of an inverse relation between lending rates and interest rate spreads, on the one hand, and bank size (total assets), liquidity and foreign ownership, on the other. In addition, he finds that market share, non-performing loans, deposit rates and money

market rates have a positive effect on lending rates and interest rate spreads. Capital adequacy has a different effect on lending rates. To quote the author, ‘...banks with higher capital adequacy have lower lending rates, but they have even lower deposit rates, so that their spreads are higher than in banks with lower capital adequacy’ (Čihák 2004, p20).

In the literature attempts have also been made to quantify the effects of institutional and regulatory changes on the behaviour of banks in financial intermediation. In this context, Claeys and Vennet (2003) carry out a systematic comparative analysis of the determinants of interest rate spreads of banks in Central and Eastern European and Western European countries. According to their results, concentration levels, operative efficiency, capital adequacy and risk management are important determinants of interest rate spreads in both groups of countries. Institutional reforms initially cause risky bank behaviour, which is manifested in higher interest rate spreads. However, as institutional reforms advance, they result in narrower spreads as a result of greater competitive pressure. These results contrast with the research by Barajas *et al.* (1999) on the effects of financial liberalisation measures in Colombia in the early 1990s. They find that liberalisation has no direct impact towards narrower interest rate spreads. They conclude that the effects are mainly related to the change of the level of significance of particular factors which affect the interest rate spread.

3. A brief review of the developments in the domestic banking system

In the period 2000 to 2008, a continuous decrease in lending rates and a narrowing of interest rate spreads in the domestic banking system took place. This trend was the result of several developments that occurred in the recent years, such as the rise in the efficiency and profitability of the banking system, greater competition, the widening of the spectrum and quality of the financial services offered by the banks, the rise in deposits, the decrease in the riskiness of banks’ loan portfolios, as well as the permanent growth in the volume of banks’ activities and the improvement in the quality of their performance. In the last few years, banks’ interest rate policy has contributed towards a

gradual approaching of the lending rates and interest rate spreads to those in the more developed countries in the region (Figure 1).

The trend towards a narrowing of interest rate spreads was interrupted in the first half of 2009, when lending rates in the domestic banking system increased, which consequently caused a widening of interest rate spreads. The increase in lending rates is only one dimension of the tightening of banks' credit policy in the first half of 2009 (a gradual tightening of banks' credit policy started in the second half of 2008), which is mainly the result of worsening perceptions by banks of the risks they are taking in circumstances characterized by contraction in the domestic economy. However, it is also the result of the measures taken by the central bank as a prudential response to the consequences of the global economic crisis.

Banks' profitability and efficiency are often considered as the main factors that determine interest rates and interest rate spreads. The continuous trend of expanding bank activities in recent years, as well as the reallocation of low-interest-bearing assets into high-interest-bearing assets, had a direct positive impact on the improvement of banks' profitability and efficiency. However, the trend of continuous improvement in banks' profitability and efficiency was interrupted in 2008, when profits were 6.6% lower than in 2007. In addition, banks' profits were four times lower in the first half of 2009 compared to the same period in 2008.

The narrowing of interest rate spreads in the previous period is also related to superior bank efficiency. In particular, the more dynamic growth of net-interest income, compared to the growth in operating costs, results in a higher degree of coverage (see Figure 2). For instance, in 2001, net-interest income, i.e. the income that comes from regular activities, covered only half of operating costs, while in the years 2006-2008, it completely covered operating costs. However, in 2008, the coverage of operating costs by banks' net-interest income declined by 1.6 percentage points, and, in the first half of 2009, by 9.2 points more. This probably reflects a worsening of the efficiency of the domestic banking system during the period from the end of 2007 to the first half of 2009. However, it is difficult to reach a clear-cut conclusion on the reasons for the fall in coverage, since it might also reflect the effects of the current world-wide crisis.

Therefore, it could be concluded that the recent worsening in banks' profitability and efficiency is one of the main factors that caused wider interest rate spreads in the first half of 2009.

The degree of competition in the banking system is also considered a very important factor which impacts on banks' interest rate policy. As of June 2009, the banking system consisted of 18 banks, of which 17 perform universal banking activities. The banking system is characterized by a relatively high, but acceptable, level of concentration, which has been declining over the past several years, with the exception of the first half of 2009 (see Figure 3). The highest level of concentration is present in banks' deposit activity, which, as measured by the Herfindahl index², equalled 1.865 as of June 2009. This index equalled 1.784 for banks' credit activity and 1.591 for banks' assets. The high level of concentration in banks' deposit activity can also be seen through the CR3³ indicator, which is around 70% during the period under study. The degree of concentration in banks' total loans and assets has been strengthening throughout the period, and at the end of the first half of 2009 it reached levels of 70.3% and 66.3%, respectively. The high level of concentration in the three largest banks⁴ points out their dominant market position and theoretically it is an opportunity for maintaining high interest rates, which bring high profits. However, practice indicates that competition within the oligopoly structure of the domestic banking system causes lending rates to decline (a trend that other banks have started to follow), which consequently narrows the interest rate spreads.

Both the continuous strengthening of confidence in the banking system and the high propensity to save have contributed to continuous deposit growth (Figure 4). For

² The Herfindahl index is calculated according to the formula $HI = \sum_{j=1}^n (S)_j^2$, where S denotes each bank's share in the total amount of the analysed category (e.g. total assets, total deposits, etc.), while n denotes the total number of banks in the system. When the index ranges between 1.000 and 1.800, the level of concentration in the banking system is generally considered acceptable.

³ The CR3 indicator represents the share of assets (i.e. the category that is analysed) of the three credit institutions with largest assets (i.e. category that is analysed) in total assets (i.e. category that is analysed) of the banking system.

⁴ For the purposes of this paper, banks are classified in two groups, according to the size of their assets: large banks and other banks. The group of large banks consists of the three banks with the largest absolute amount of assets, whereas all the other banks belong to the second group.

instance, deposits of non-financial entities had an annual growth rate of 31.9% in 2007, which is the highest rate in the period, with the exception of deposit growth in 2001 due to the introduction of the euro. Deposit growth has enabled a strong increase in banks' credit activity, which reached the highest annual growth rate of 39.1% in 2007, thus contributing to continuous strengthening of financial intermediation. However, as a consequence of the general deceleration in domestic economic activity, deposits experienced slower growth in 2008 (by only 9.5%), whereas during the first half of 2009 they had a negative annual growth rate of 0.1% (in comparison to June 2008). The decrease in the deposit core, the tightened lending conditions by commercial banks and the macro-prudential measures taken by the country's central bank have resulted in a significant deceleration of credit growth. For instance, gross loans to non-financial entities increased by 34.4% in 2008, whereas in the period from June 2008 to June 2009 they increased by only 14.4%. Despite the increase in the degree of financial intermediation in the past ten years, this indicator measured by the share of banks' assets in GDP is still lower in comparison to the European banking system.⁵ Therefore, the insufficient degree of financial intermediation in the domestic banking system can be considered one of the factors maintaining relatively high levels of lending rates and wide interest rate spreads.

In the past ten years, there was a decrease in the riskiness of banks' loan portfolios (see Figure 5). For instance, at the end of June 2009, the share of non-performing credit exposure⁶ in total credit exposure equalled 7.6%. In comparison with the peak share of 41.3% at the end of 1999, this is a substantial improvement in the quality of banks' loan portfolio.⁷ This indicator shows that only 7.6% of the collected domestic savings are inefficiently allocated, in contrast to 41.3% in the past. These positive developments in the riskiness level of loan portfolio point out the improvement in banks' credit policies

⁵ At the end of 2008, the degree of financial intermediation measured as a share of the banks' assets in GDP was 63.7% in Serbia, 79.6% in Poland, 91.1% in Slovakia, 93.5% in Bulgaria and 136.7% in Slovenia (ECB 2009 and web-pages of the respective national central banks).

⁶For the purposes of this paper, the term non-performing credit exposure is related to the credit exposure classified in categories of risk C, D and E.

⁷ However, this improvement is partially a result of the changed methodology since March 2002. The decline in the indicators' level at the end of 2002, compared to the end of 2001, is largely the result of the changed methodology for classification of on-balance sheet and off-balance sheet items, which contributed towards a wider scope of banks' total credit exposure.

and procedures for credit risk management, as well as better financial discipline. However, the riskiness of banks' loan portfolio increased slightly during 2008 and the first half of 2009. The transformation of the financial crisis into a real sector crisis inevitably causes worsening balance sheets for domestic borrowers, thus worsening the quality of credit exposure. Besides, the share of non-performing credit exposure in total credit exposure, compared with other countries⁸, indicates that this share is still relatively high. This holds even if the comparison is made for the end of 2007, when the banking system's loan portfolio was characterized as having the lowest riskiness of the whole sample period. This is considered one of the main reasons for maintaining relatively high lending rates and wide interest rate spreads. The recent increase in the riskiness of banks' loan portfolio and the worsening prospects for the direction of future movements in riskiness narrow the possibility for any significant decrease in banks' lending rates.

The developments in the banking system during the period under review are related to higher profitability, more efficiency and greater stability in a more competitive environment. This can be considered a combination of changes that have contributed to a decrease in lending rates and a narrowing of interest rate spreads. However, the analysis of particular indicators shows that there is still room for improvement in banks' operations, and consequently, for positive developments in banks' interest rate policy. Moreover, and mostly as a result of the indirect effects of the global economic and financial crisis on the domestic banking system, banks had poorer performances over most activities over the past year and half (December 2007 to June 2009), which narrows the possibilities for any significant decrease in banks' lending rates and a narrowing of interest rate spreads in the short run. One of the key long run challenges for domestic banks is the gradual return to the previous paths of continuous improvement in profitability and efficiency (without deterioration in the soundness and stability of banks' operations), through widening the base for income generation, while at the same time controlling the most important cost components. The increase in banks' profitability and efficiency would ensure an increase in their capital base, as well as an increase in their

⁸In comparison, as of December 2008, the share of non-performing loans in total loans by countries was as follows: 1.6% in Slovenia, 2.9% in Hungary, 3.1% in Czech Republic, 4.4% in Poland and 5.3% in Serbia (IMF 2009).

total activities, which would inevitably lead to a greater degree of competition in the banking system, a decrease in lending rates and a narrowing of interest rate spreads.

4. Data and methodology

As one of the most frequently used approaches for the paper's purpose, we use panel estimation in order to analyse the factors that determine lending rates and interest rate spreads in the domestic banking system. The data used are primarily determined by the theoretical and empirical literature. However, data availability is our main constraint.

The panel includes domestic commercial banks. We use quarterly data in order to increase the number of observations.⁹ The database of the National Bank of the Republic of Macedonia (NBRM) is our main data source, with the exception of the EURIBOR data, which are taken from the Deutsche Bundesbank.

The entire data base covers the period from the first quarter of 2001 to the second quarter of 2009. Data exist for 27 banks, which have been functioning throughout the entire period or in some parts of it. However, there is a lack of data for few banks, which started operations after 2001, merged with or were acquired by other banks, went bankrupt in the meantime or did not perform typical banking activities. In other words, several banks have functioned over a relatively short time period and thus their impact is relatively small. Therefore, we decide to exclude these banks from our data sample, without however reducing its representativeness.¹⁰

After these transformations, the sample is unbalanced, and consists of 17 commercial banks for the period from the first quarter of 2001 to the second quarter of 2009 (14 banks at the beginning and 16 at the end of the period), or a total of 558 available observations. Within the sample, 13 banks are covered during the entire period, whereas 4 banks are covered only during one part of the period. The banks in the sample represent the entire banking system (see Table 1). In addition, they permit a good

⁹ When the original frequency of the data is monthly (e.g. interest rates), quarterly data are calculated as an average of the monthly data.

¹⁰ If the purpose of the paper was to analyse the reasons why banks merge or go bankrupt, the exclusion of these banks from the sample would be methodologically wrong.

coverage of the banking system on the basis of the market share according to total assets (see Table 2).

The choice of variables in our study is mostly affected by the approach applied in other empirical studies, as well as by the determinants suggested by the literature. Thus, we use the lending rate and the interest rate spread as dependent variables. The independent variables include the deposit rate (as the main cost of the banks), and other variables which are bank-specific, i.e. total assets, the market share according to total assets, non-performing loans, liquidity, capital adequacy, the return on assets, operating costs and the share of foreign capital. Changes in the macroeconomic environment are captured by the interest rate on the central bank bills and the 3-month EURIBOR rate. A dummy variable is also added to capture the change in the methodology of calculating interest rates in 2005. (Appendix 1 contains a detailed description of the variables' construction).

An advantage of the panel estimation is the possibility of using data with variation both across time and across section. This enables better performance during estimation since this variation eliminates part of the disadvantages of the simple time series or cross-section analyses. The variation in the entire sample can be seen in Table 3, whereas Appendix 3 contains basic statistics by groups of banks according to their size. As seen, bank size differs notably across banks and certain differences can be also noticed in the characteristics of particular variables by bank. This means that heteroskedasticity may be present in the econometric estimation.

Following the standard panel estimation, we use fixed effects.¹¹ This method takes into account differences between cross-sections (banks) by allowing the constant term to differ across banks, whereas the coefficients on the explanatory variables are the same for all banks, and it assumes that the independent variables are correlated with the unobserved effects. Fixed effects are theoretically preferred for these types of samples, since the sample is not a random draw from a wider population, but is pre-determined. In addition, in order to enrich our analysis, we try random effects estimation. We use feasible GLS, which assumes heteroskedasticity, without correlation between cross-

¹¹ Robust standard errors are used in the estimation.

sections.¹² It is assumed that there is an AR(1) autocorrelation within cross-sections and that the coefficient of this auto-regressive process is common across all sections.

Besides the theoretical preference for fixed effects, the Hausman specification test rejects the use of random effects. Therefore, the discussion of the results focuses mainly on fixed effects results. However, there are no big differences among results according to the two methods, except for the significance of some of the variables. This indirectly indicates that the results are fairly stable.

5. Empirical results

The results from the panel estimation of lending rates and interest rate spreads in the domestic banking system generally confirm the previous non-quantitative assessments of the main factors that caused relatively high lending rates and wide interest rate spreads for a longer time period. The sensitivity of the results for some variables to a change in the estimation method or a change in the combination of variables included in the estimation indicates that one needs to be careful when interpreting the intensity of the influence of particular factors on lending rates and interest rate spreads. However, in general, the results are fairly stable and they are mostly in accordance with expectations. Therefore, this study could be used as an indicator of the direction of the influence of certain factors. In addition, the results could help to draw useful conclusions regarding the necessary changes in the banking system, that would cause lower rates and narrower spreads improving thus the access to bank finance and increasing efficiency in the banking operations.

5.1 Factors that determine lending rates

The factors affecting lending rates are initially examined by defining a set of variables which are directly related to bank balance sheets and bank characteristics, and are expected to have a strong influence on lending rates, such as deposit rates, bank assets, market share, the share of non-performing loans in total credit exposure, bank

¹² The panel would have to be balanced in order to be able to take into account the contemporaneous correlation between cross-sections.

liquidity, capital adequacy, operating costs and the share of foreign capital. All the variables enter the regressions with one lag, which is recommended both from the statistical (i.e. avoiding endogeneity problems) and the economic point of view (i.e. the existence of a certain delay in the occurrence of effects of a particular change).

Taking into account the history of high share of non-performing loans in the balance sheet of domestic banks, they are usually treated as one of the main determinants of high lending rates. Therefore, after initially finding an insignificant effect of this variable¹³, we modify the specification in order to analyse the probable prolonged transmission of the costs of bad loan portfolio to the interest rates. The new specification includes this variable with up to 4 time lags (see Specification 1 in Table 4), which can be explained by the slower adaptation of banks' interest rate policy to changes in this variable. Formal statistical tests for the joint significance of these coefficients indicate that the lags are jointly significant and positive. Therefore, the time lags are maintained in the following specifications as well, when the coefficients are again jointly significant.

The inclusion of the effects of monetary policy and of structural and macroeconomic factors is done with two additional groups of variables. The first group includes the central bank policy rate and the foreign interest rate (see Specification 2), which causes a certain worsening of the results. Then the effect of the methodological change of the calculation of the interest rates in 2005 is analysed by adding a dummy variable (see Specification 3). This is the preferred specification, since it includes the variables that are recommended in the literature, and the results are mostly in accordance with expectations. The results of feasible GLS estimation are shown in the last specification, which corresponds to the preferred version with fixed effects. As noted before, FGLS estimation assumes heteroskedasticity and AR(1) autocorrelation within cross-sections, with a common auto-regressive coefficient for all cross-sections.

In all specifications, the statistical tests show that the variables used are jointly strongly significant (the p-value of the F-test, that is the χ^2 test, is less than 0.001). Moreover, in all specifications with fixed effects, R^2 adjusted shows that the independent variables explain most of the changes of lending rates.

¹³ This specification is not showed in the results.

Analytically, *the deposit rate* is statistically significant in explaining lending rates, regardless of the method and independent variables used. However, the intensity of its effect is considerably less than expected, which would be close to 1; instead it ranges between 0.2 and 0.6. According to the preferred version, an increase in the deposit rate of 1 percentage point causes an increase in the lending rate by 0.3 percentage points. The incomplete transmission of deposit rates into lending rates could be partially explained by the degree of competition. Thus, the increase in deposit rates often reflects the strategy of a bank to maintain or increase its market share regarding deposits. Due to the need to maintain its position in the market for credit, the change in deposit rates is only incompletely transmitted to lending rates. The incomplete transmission could also be explained by the compensation of the cost increase through the adaptation of other categories of bank balance sheets. On the other hand, the low coefficient of the deposit rate could also reflect the fact that they are not the only source of bank financing. This explanation is based on the results which show a relatively strong influence of central bank bills as opportunity costs, as well as the somewhat weaker influence of the foreign interest rate as an indicator of financing from abroad.

Total assets or bank size should in principle reflect ‘economies of scale’, and thus a rise in bank assets should contribute to lower lending rates. At the same time, the increase in assets could also mean higher competition and potentially higher bank efficiency, which would contribute to a downward adjustment of the interest rates. The results are in line with the economic theory. The coefficient on the bank assets is negative and shows that a doubling of the assets causes a fall in the lending rate by 1.2 percentage points (in the preferred specification). The coefficient on total assets is negative and statistically significant in all specifications; the effect is even bigger than in the preferred specification.

Market share is an indicator of the market power of the bank and its ability to achieve higher income by maintaining higher lending rates. The panel estimation of lending rates confirms that this is true in the case of our country. The empirical findings show that the coefficient of the market share is always positive and statistically significant. According to the preferred specification, an increase in the market share by 1 percentage point will cause an increase in the lending rates by 0.3 percentage points,

ranging from 0.2 to 0.6 percentage points in the various specifications. These results suggest that a more concentrated domestic banking sector may cause a rise in the cost of credit.

Non-performing loans, defined as the share of credit exposure classified in categories of risk C, D and E in the total credit exposure, are expected to have a strong influence on the process of formulation of the lending rates *ex ante*. Namely, the recognition of impairment losses on the basis of a relatively high share of non-performing loans in the total loan portfolio means higher costs for the banks. Consequently, it is expected that they will be included in the interest rates. On the basis of coefficients in the preferred specification, the cumulative effect indicates that, in the long run, an increase in the share of ‘bad loans’ in the total loan portfolio by 1 percentage point will result in an increase in the lending rates by 0.05 percentage points. The fact that in all specifications the coefficients are statistically significant but positive only at the fourth lag confirms the prolonged effect of this factor on the lending rates. In order to analyse whether the behaviour of the big banks regarding ‘bad loans’ differs from the behaviour of the other banks in the sample, an interaction variable is included, constructed as the product of ‘bad loans’, and a dummy variable for the three big banks. However, the coefficient of the interaction variable seems to be insignificant, and therefore these results are not presented here.

Contrary to the expectations of the existence of an inverse relationship between *bank liquidity* and lending rates, liquidity is found to be insignificant in almost all specifications. It is statistically significant only in the preferred specification, but the coefficient is positive. Hence it does not correspond to previous expectations, whereas the size of the coefficient is almost negligible. One of the possible explanations for this relationship is the low return on highly liquid assets. That is, banks with higher amounts of highly liquid assets try to compensate for their lower return through higher interest income. On the other hand, if liquidity is disaggregated into the liquidity of big banks and of other banks (Appendix 3), it can be seen that big banks have a considerably lower share of liquid assets in total deposits, which suggests that the effect of liquidity on interest rates might be partially related to the bank size.

Capital adequacy is generally expected to be inversely related to lending rates, as banks with higher capital adequacy have the possibility of maintaining an interest rate policy with lower lending rates. In other words, it is possible that the higher capital adequacy is a result of the lower size of bank assets, whose growth could be achieved by lower lending rates, meaning that they will be more competitive in the credit market. The higher capital adequacy also implies potential possession of additional sources of credit financing, and thus a possibility for lower pricing of loans. In our case, the results on capital adequacy are in accordance with these interpretations. It has an expected negative effect and is strongly statistically significant in all specifications (except the first one). However, the effect of capital adequacy is relatively low (between -0.03 and -0.01). According to the preferred specification, an increase in capital adequacy by 1 percentage point will cause a cut in the lending rate by 0.03 percentage points.

As part of the variables directly related to the balance sheets of the banks, we also use the *rate of return on average assets (ROAA)* which is considered an indicator of bank profitability.¹⁴ Its coefficient is statistically significant in all specifications estimated, but the direction of the effect is not in line with the theory. It is expected that an increase in bank profitability will create a potential for a lower price of loans and thus a further increase in the volume of activities leading to a higher market share in the credit market. However, our estimates indicate a positive influence of ROAA on lending rates, with the size of the effect being in the range of 0.04 to 0.1. Therefore, this deviation of the results from the economic intuition requires careful interpretation. Possible explanation will be the lack of competition in the domestic banking system; banks are able to increase their lending rates even in circumstances of rising profitability.

We also analyse the effect of *operating costs*, which are expected to play an important role in the interest rate policy of the banks. Nevertheless, operating costs are insignificant in all specifications, which is contrary to theoretical expectations. We also assess the effect of the *share of foreign ownership* on lending rates, which is expected to

¹⁴ It was pointed out that including profitability in the regression might introduce endogeneity. However, there is a negligible change of the results when profitability is removed (both in the estimation of the lending rates and the interest rate spreads). We believe that this reaction indicates that there are no serious consequences arising from potential endogeneity on these grounds. In addition, in some parts of the period analysed, a considerable part of bank profitability can be seen the result of factors that are directly related to interest rates (i.e. non-interest income). Therefore, we decide to include profitability in our estimation.

be negative under the hypothesis that foreign banks operate more efficiently. This assumption is confirmed only in the first two specifications, whereas in the remaining ones, including the preferred specification, the effect of foreign ownership is statistically insignificant.

The pass-through effect, namely the transmission of the effect of a change in the central bank policy rate to bank interest rates is usually analysed through other econometric techniques, such as VAR and VECM. However, in order to study the effect of the variables closely related to macroeconomic management, we decide to include the *policy rate of the National Bank of the Republic of Macedonia (i.e. the central bank bills' rate)*. The policy rate also captures the influence of the macroeconomic environment. Explicitly, under a fixed exchange rate regime and a relatively liberalised regime of capital mobility, it is expected that the foreign interest rate will have a considerable effect. This is particularly due to the fact that, as part of the loan portfolio of the commercial banks, there is a high share of loans with a foreign exchange clause and loans in foreign currency, whose price should mostly depend on changes in the foreign interest rate. Therefore, in order to better capture the effect of macroeconomic factors, besides the interest rate of the central bank bills, we also use the *3-month EURIBOR* rate as proxy for foreign interest rates.¹⁵ The coefficient of the NBRM policy rate is very significant in all specifications where it is included, and shows a relatively strong influence ranging between 0.2 and 0.5. This means that the increase in the interest rate on central bank bills by 1 percentage point causes an increase in lending rates by 0.4 percentage points in the next quarter (according to the preferred specification). Even though this effect is the expected one, its intensity is considerably stronger than what is usually considered to be the case for our country. The results for the 3-month EURIBOR rate are somewhat unstable since statistical significance is sensitive to both the estimation method and the combination of the variables. In the preferred specification, the coefficient is statistically significant and shows that an increase in the EURIBOR rate by 1 percentage point causes an increase in the lending rate by 0.2 percentage points.

¹⁵ In theory, the monetary policy of a country under fixed rates should follow the monetary policy pursued by the anchor-country. Therefore, it is *a priori* expected that the domestic policy rate will be highly correlated with the foreign rate. However, in practice this correlation is very low, which enables the inclusion of both variables in the estimation.

We also correct for the effect of a *change in the methodology of calculating interest rates in 2005* by the inclusion of a dummy variable. The dummy is significant in both specifications in which it is included and shows that the lending rate is somewhat lower after 2005 chiefly due to the methodological change. Furthermore, in order to analyse the possible effect of other factors, which are not explicitly included, we include *year dummies*. Nevertheless, they are statistically insignificant having a relatively limited effect on the results; therefore, that specification is not shown.

5.2 Factors determining interest rate spreads

The next step in our analysis is the panel estimation of interest rate spreads, defined as the difference between lending and deposit rates, that is an *ex ante* spread. Spreads could be defined in two ways: *ex ante* spreads (being the difference between contracted lending and deposit rates) and *ex post* spreads (being the difference between realised interest income and interest costs). Both approaches have advantages and disadvantages. Since we are interested in analysing the factors that influence the interest rate policy of the banks we decide to use the *ex ante* spread. The estimation method and the specification of variables included in the panel estimation of the interest rate spread are in essence the same as those used in the estimation of lending rates (see Table 5), with the exception of two elements: first, the deposit rate is no longer used as an independent variable, since it is an input in the calculation of the interest rate spread and, second, it is not expected that the central bank bills' rate and the foreign rate would directly affect the spread, bearing in mind the fact that they should affect both lending and deposit rates that is, the interest rate spread should not reflect monetary effects. Therefore, a new variable is constructed as the difference between the central bank policy rate and the EURIBOR rate (hereinafter denoted as the interest rate differential). In order to facilitate better comparison, the same specifications used for lending rates are presented, and the third specification is again the preferred one. It can be noticed that most of the variables are now insignificant, particularly in GLS estimation. The variables are again jointly significant in all specifications (p-value is lower than 0.001), whereas the adjusted R^2 shows that the variables used in the fixed effects specifications explain most of the variations of the interest rate spread.

Bank assets again have a stable effect, and are statistically significant in all specifications. The coefficient on this variable has the expected sign, indicating that higher assets cause a narrowing of the interest rate spread, so banks with higher growth can become more competitive. According to the preferred specification, the doubling of assets causes a decrease in the interest rate spread by 0.9 percentage points. *Market share* is also statistically significant in all specifications with fixed effects and has the expected sign. An increase in the market share by 1 percentage point causes an increase in the spread by 0.2 and 0.5 percentage points. Further, *liquidity*, *capital adequacy* and *operating costs* are significant only in some of the specifications, and their effect is rather small. Unlike the case of lending rates, the effect of *non-performing loans* on the interest rate spread is insignificant, and this is also true for the joint effect of time lags. The relation between ROAA as an indicator of *bank profitability* and the interest rate spread is positive, and shows that profitable banks increase their spreads, which could again be interpreted as an indicator of insufficient competition in the banking system. Further, the effect of the *share of foreign capital* indicates that spreads fall as foreign ownership rises, which is in line with what would be expected. However, the effect of this variable is relatively weak. In the preferred specification, an increase in the share of foreign capital by 10 percentage points causes a narrowing of the spread by only 0.1 percentage points. The *interest rate differential* appears to be an important element in determining the interest rate spread. Its coefficient is statistically significant and positive in all specifications and methods, showing that an increase in the interest rate differential causes wider interest rate spreads. In the preferred specification, an increase between the domestic and foreign rate by 1 percentage point causes an increase in the interest rate spread by 0.4 percentage points. The economic interpretation of these results is not straightforward, because of the various possible scenarios. One scenario would be that the differential increases because of the increase in the domestic policy rate, which stimulates investment in central bank bills and thus causes higher lending rates and higher spread, and lowers the supply of credit. An alternative scenario would suggest that the differential widens because of a fall in foreign interest rates implying that the effect on the lowering of deposit rates is larger relative to the possible fall of lending rates, which again widens the interest rate spread. Despite the various channels of transmission, the

empirical results reveal that the interest rate differential has a very important role in the formulation of the banks' interest rate policy. Finally, as in the case of the lending rates, *the methodological change in 2005* does have a statistically significant effect on the interest rate spread.

6. Decomposition of the interest rate spread

Besides the panel estimation of interest rate spreads, we also carry out a decomposition of the interest rate spread into its main components. This is a relatively simple method of identifying the factors that determine the interest rate spread. The decomposition is carried out by disaggregating the spread into its cost components in order to measure their relative contribution to the interest rate spread. To this end, the following formula is used:

$$i^l - i^d = o + l + i^d r / (1 - r) + d + p + \tau [p - o - l - i^d r / (1 - r) - d] \quad (1)$$

where

i^l is the lending rate;

i^d is the deposit rate;

o is the relation between operating costs and total gross loans (operating costs are weighted with the share of total gross loans in total assets);

l is the relation between total impairment losses and total gross loans;

r is the reserve requirement rate;

d is the relation between insurance premiums on deposits and total gross loans;

τ is the profit tax rate; and

p is the profit margin of the banks' credit activity (calculated as a residual after the calculation of the other components).

The results (see Table 6) reveal that, in the first half of 2008 and 2009, the interest rate spread is not sufficient to cover the cost components, implying a negative profit margin on the banks' credit activity. The negative profit margin is a result of several related factors: 1) growth of operating costs; 2) decelerating credit activity; 3) worsening loan portfolio quality, i.e. increased impairment losses. Despite the higher lending rates,

these factors cause a narrowing of the interest rate spread in the last year (June 2008-June 2009).

As far as cost components are concerned, the largest component of the interest rate spread is operating costs, followed by impairment losses. On an annual basis, the share of operating costs and impairment losses in the interest rate spread has increased by 0.2 and 0.1 percentage points, respectively. The comparison of the contribution of operating costs and impairment losses to the interest rate spread in other countries (see Figure 6) shows that our country is among the countries which have a high share of these two cost components in the determination of the interest rate spread.

7. Conclusion

The interest rate policy implemented by the domestic commercial banks was for a long time assessed as a policy of high and non-flexible interest rates. However, the identification of the causes of the maintenance of high lending rates and wide interest rate spreads was so far based on qualitative assessments. The factors most frequently mentioned as the main reasons for high interest rates were the low level of savings and consequently the low supply of loans, insufficient competition in the banking system, the unsatisfactory efficiency and profitability of commercial banks, uncertainty in the economic environment, the inherited low quality of loan portfolios and institutional constraints. The downward trend of the price of loans and the narrowing of interest rate spreads in recent years indicate a gradual elimination of the constraining influence of these factors. Therefore, it is necessary to apply a more quantitative approach to detect the factors that influence the interest rate policy of the banks.

The main conclusion of the paper is related to the results regarding the size of the bank assets and the market share, which indicate a considerable use of the banks' market power in determining their lending rates and interest rate spreads. These variables may be treated as key variables since their effect is found to be large and relatively stable across various specifications used in the estimation process. According to the empirical results, an increase in the bank size and a decrease in the market share of certain banks (i.e. higher competition) will cause a further fall in the lending rates and a narrowing of the interest rate spreads. Taking into account the current structure of the domestic banking system - high concentration and large number of banks- the results point out the need for further consolidation through mergers and/or acquisitions of smaller banks. This may contribute to the creation of bigger and stronger banks, which will increase competition and contribute to lower lending costs and narrower interest rate spreads.

The decrease in the costs of financing (deposit rates) will certainly cause a decrease in the price of loans, although this factor has a relatively weaker influence than expected. In addition, the rise in the central bank bill rate and the EURIBOR rate (both as an opportunity cost and a real cost, respectively) has a considerable effect in the rise of the lending rates, as expected. In accordance with previous research, an improvement in the

quality of the loan portfolio also proved to be an important factor influencing the banks' interest rate policy. Capital adequacy as an additional indicator of the quality of banks' balance sheets also enables a more aggressive interest rate policy leading to lower lending rates and narrower interest rate spreads.

On the other hand, the results show that operating costs do not affect lending rates and interest rate spreads. These results are not in line both with previous empirical findings and the standard theory that views cost elements as the main component of spread. This implies that there is a considerable scope for future research in this area. For example, the introduction of alternative cost indicators may provide a better explanation of the determination of the interest rates and interest rate spreads.

References

- Afanasiëff, T. S., Lhacer, P. M. V. and M. I. Nakane (2002), 'The Determinants of Bank Interest Spreads in Brazil', *Banco Central do Brazil, Working Papers Series* no 46.
- Barajas, A., Steiner, R. and N. Salazar (1999), 'Interest Spreads in Banking in Colombia 1974-96', *IMF Staff Papers*, 46, 196-224.
- Brock, P. L. and L. Rojas-Suarez (2000), 'Understanding the Behaviour of Bank Spreads in Latin America', *Journal of Development Economics*, 63, 113-134.
- Claeys, S. and R. V. Vennet (2003), 'Determinants of Bank Interest Margins in Central and Eastern Europe: a Comparison with the West', *Working Papers of Faculty of Economics and Business Administration, Ghent University*, Belgium 03/203.
- Čihák, M. (2004), 'The Determinants of Lending Rates and Domestic Spreads in Croatia', *In Republic of Croatia: Selected Issues and Statistical Appendix; IMF Country Report* No. 04/251.
- Demirgüç-Kunt, A. and H. Huizinga (1999), 'Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence', *World Bank Economic Review*, 13, no 2.
- ECB (2000), *EU Banking Sector Stability*, August.
- Ho, T. S. Y., and A. Saunders (1981), 'The Determinants of Bank Interest Margins: Theory and Empirical Evidence', *Journal of Financial and Quantitative Analysis*, 16, 581-600.
- IMF (2009), *Global Financial Stability Report*, April.
- Naceur, S.B. (2003), 'The Determinants of the Tunisian Banking Industry Profitability: Panel Evidence' *Université Libre de Tunis Working Papers*.
- Randall, R. (1998), 'Interest Rate Spreads in the Eastern Caribbean', *IMF Working Paper* No. 98/59.
- Saunders, A. and L. Schumacher (2000), 'The Determinants of Bank Interest Rate Margins: an International Study', *Journal of International Money and Finance*, 19, 813-832.

Tables and figures

Table 1. Indicators of the banking system and the banks in the sample

	Date	Number of banks	Total assets (in mil. denars)	Total deposits (in mil. denars)	Equity (in mil. denars)	Total loans (in mil. denars)	Highly liquid assets (in mil. denars)	Number of employees
Entire banking system	31.03.2001	22	74,922	40,064	19,153	37,288	9,351	3,813
Banks in the sample	31.03.2001	14	65,773	37,190	15,083	31,433	8,379	3,404
Coverage of the sample (%)		63.6	87.8	92.8	78.7	84.3	89.6	89.3
Entire banking system	30.06.2009	18	248,345	176,555	30,735	170,698	38,267	6,094
Banks in the sample	30.06.2009	16	239,206	172,388	28,259	166,591	36,942	5,830
Coverage of the sample (%)		88.9	96.3	97.6	91.9	97.6	96.5	95.7

Table 2. Size of banks in the banking system and in the sample (market share according to total assets)

	Date	Number of banks	Total market share by bank assets (%)	Banks with market share above 10%	Banks with market share between 2% and 10%	Banks with market share below 10%
Entire banking system	31.03.2001	22	100	2	9	11
Banks in the sample	31.03.2001	14	87.8	2	7	5
Entire banking system	30.06.2009	18	100	3	8	7
Banks in the sample	30.06.2009	16	96.3	3	7	6

Table 3. Basic statistics for the entire banking system (by banks)

	lend_rate	depos_rate	spread	assets	share	npl	liquidity	capital_ad	roa	policy	euribor	operating	foreign
mean	0.138	0.039	0.100	8,493	0.06	0.14	0.56	0.46	0.00	0.08	0.03	84.3	0.54
median	0.126	0.033	0.090	2,753	0.02	0.10	0.35	0.35	0.01	0.07	0.03	34.6	0.58
minimum	0.060	0.007	0.027	348	0.00	0.00	0.06	0.10	-0.64	0.05	0.01	5.8	0.00
maximum	0.300	0.177	0.259	64,012	0.34	0.84	9.27	3.43	0.18	0.17	0.05	485	1.00
standard deviation	0.047	0.026	0.042	13,120	0.08	0.15	0.90	0.38	0.06	0.03	0.01	110	0.41
nr. of observations	558	558	558	557	557	557	557	557	557	578	578	557	557

Table 4. Results of the panel estimation of lending rates

	1	2	3	4
	fixed effects	fixed effects	fixed effects	GLS
deposit rate (-1)	0.585*** (0.069)	0.322*** (0.079)	0.314*** (0.072)	0.200*** (0.041)
logarithm of total bank assets (-1)	-0.049*** (0.006)	-0.035*** (0.006)	-0.018*** (0.006)	-0.027*** (0.003)
market share (-1)	0.588*** (0.100)	0.482*** (0.089)	0.314*** (0.085)	0.213*** (0.040)
non-performing loans (-1)	-0.042 (0.031)	-0.007 (0.028)	-0.001 (0.026)	-0.025 (0.015)
non-performing loans (-2)	0.010 (0.039)	0.009 (0.036)	0.009 (0.035)	0.023* (0.014)
non-performing loans (-3)	0.002 (0.041)	-0.005 (0.035)	-0.005 (0.035)	0.014 (0.013)
non-performing loans (-4)	0.082*** (0.031)	0.055** (0.027)	0.048** (0.024)	0.045*** (0.012)
liquidity (-1)	0.001 (0.003)	0.002 (0.003)	0.005* (0.003)	0.000 (0.002)
capital adequacy (-1)	-0.003 (0.008)	-0.021*** (0.007)	-0.032*** (0.007)	-0.011** (0.005)
rate of return on average assets (-1)	0.099*** (0.023)	0.108*** (0.021)	0.111*** (0.021)	0.036** (0.014)
logarithm of operating costs (-1)	0.004 (0.006)	0.000 (0.006)	-0.002 (0.005)	0.001 (0.002)
share of foreign ownership(-1)	-0.021*** (0.007)	-0.011* (0.007)	-0.005 (0.006)	0.001 (0.004)
policy rate of NBRM (-1)		0.494*** (0.056)	0.420*** (0.052)	0.209*** (0.026)
3-month EURIBOR (-1)		0.221 (0.135)	0.209* (0.123)	0.201** (0.088)
dummy variable 2005			-0.026*** (0.003)	-0.012*** (0.002)
constant term	0.469*** (0.033)	0.339*** (0.034)	0.241*** (0.034)	0.306*** (0.025)
Observations	531	531	531	531
Number of banks	17	17	17	17
R-squared adjusted	0.569	0.645	0.696	
F	57.38	65.43	74.89	
Prob>F	0.00	0.00	0.00	
chi2				621.0
Prob>chi2				0.00
ll	1211	1264	1306	1584
rho	0.515	0.545	0.627	0.693
corr	-0.443	-0.203	-0.163	
sigma_u	0.0262	0.0252	0.0277	
sigma_e	0.0254	0.0231	0.0213	

Notes: dependent variable: lending rates; standard errors are given in brackets

*Significance level of 10%, ** Significance level of 5%, *** Significance level of 1%.

Table 5. Results of the panel estimation of interest rate spreads

	1	2	3	4
	fixed effects	fixed effects	fixed effects	GLS
logarithm of total bank assets (-1)	-0.046*** (0.007)	-0.030*** (0.006)	-0.013* (0.007)	-0.014*** (0.004)
market share (-1)	0.506*** (0.118)	0.367*** (0.097)	0.202** (0.092)	0.031 (0.050)
non-performing loans (-1)	-0.072** (0.033)	-0.051* (0.030)	-0.048 (0.030)	-0.026 (0.018)
non-performing loans (-2)	0.011 (0.043)	0.010 (0.039)	0.010 (0.039)	0.014 (0.017)
non-performing loans (-3)	0.020 (0.045)	0.023 (0.043)	0.022 (0.043)	0.028* (0.017)
non-performing loans (-4)	0.060* (0.033)	0.033 (0.031)	0.023 (0.029)	0.004 (0.015)
liquidity (-1)	0.001 (0.003)	0.004 (0.003)	0.007** (0.003)	0.004* (0.003)
capital adequacy (-1)	0.004 (0.008)	-0.004 (0.008)	-0.017** (0.009)	0.006 (0.006)
rate of return on average assets (-1)	0.075*** (0.027)	0.087*** (0.024)	0.087*** (0.024)	0.017 (0.019)
logarithm of operating costs (-1)	0.003 (0.007)	0.001 (0.007)	-0.000 (0.007)	0.006* (0.003)
share of foreign ownership(-1)	-0.031*** (0.008)	-0.021*** (0.008)	-0.014* (0.007)	0.000 (0.005)
interest rate differential (-1)		0.439*** (0.051)	0.375*** (0.049)	0.164*** (0.032)
dummy variable 2005			-0.028*** (0.003)	-0.020*** (0.003)
constant term	0.448*** (0.036)	0.302*** (0.036)	0.197*** (0.038)	0.177*** (0.032)
Observations	545	545	545	545
Number of bank	17	17	17	17
R-squared adjusted	0.391	0.492	0.560	
F	39.31	47.66	58.91	
Prob>F				
chi2				201.7
Prob>chi2				
ll	1178	1228	1268	1511
rho	0.458	0.431	0.513	0.695
corr	-0.506	-0.230	-0.173	
sigma_u	0.0263	0.0227	0.0249	
sigma_e	0.0286	0.0261	0.0243	

Notes: dependent variable: interest rate spreads; standard errors are given in brackets.

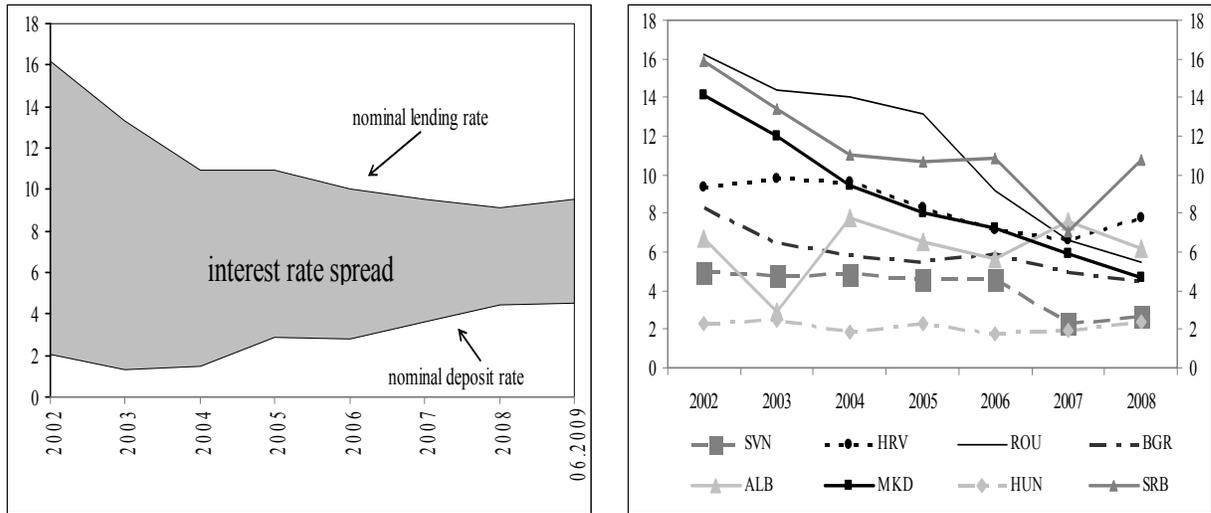
*Significance level of 10%, ** Significance level of 5%, *** Significance level of 1%.

Table 6. Decomposition of the interest rate spreads in the first half of 2008 and of 2009

Decomposition of the interest rate spread	30.06.2008		30.06.2009	
	in percentage points	Percentage share of the components in the interest rate spread	in percentage points	Percentage share of the components in the interest rate spread
Interest rate spread	5.18	100.0%	4.77	100.0%
Cost components (factors)	5.53	106.7%	5.77	121.0%
Operating costs	3.22	62.0%	3.40	71.2%
Impairment losses	1.39	26.8%	1.50	31.5%
Deposit insurance premium	0.49	9.5%	0.37	7.8%
Reserve requirements	0.43	8.3%	0.50	10.6%
Profit margin of the banks' credit activity, before taxation	-0.34	-6.7%	-1.00	-21.0%
Profit taxes	0.00	0.0%	0.00	0.0%
Profit margin of the banks' credit activity	-0.34	-6.7%	-1.00	-21.0%

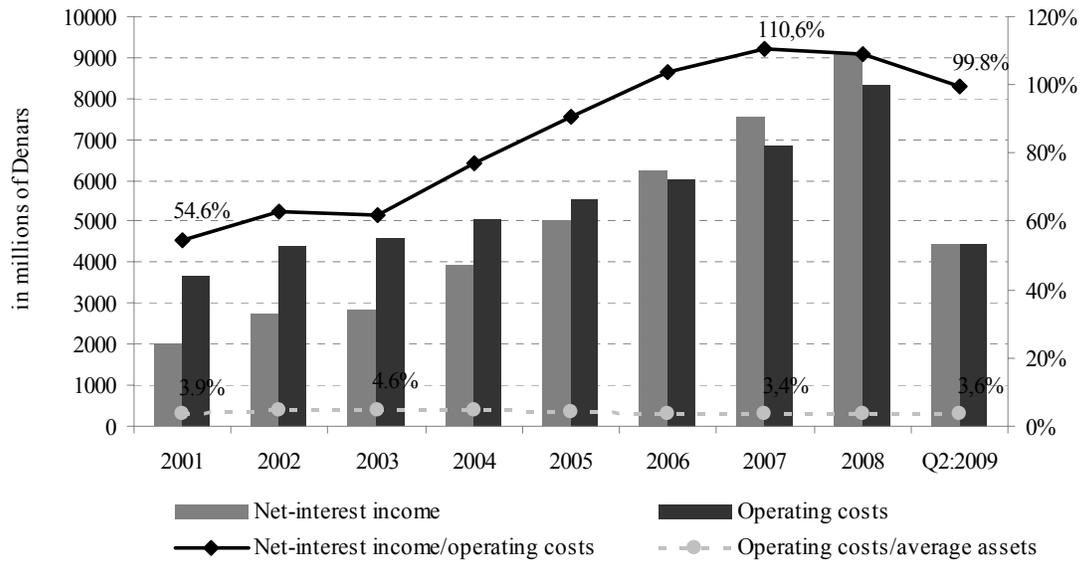
Source: NBRM

Figure 1. Comparison of interest rate spreads (in per cent)



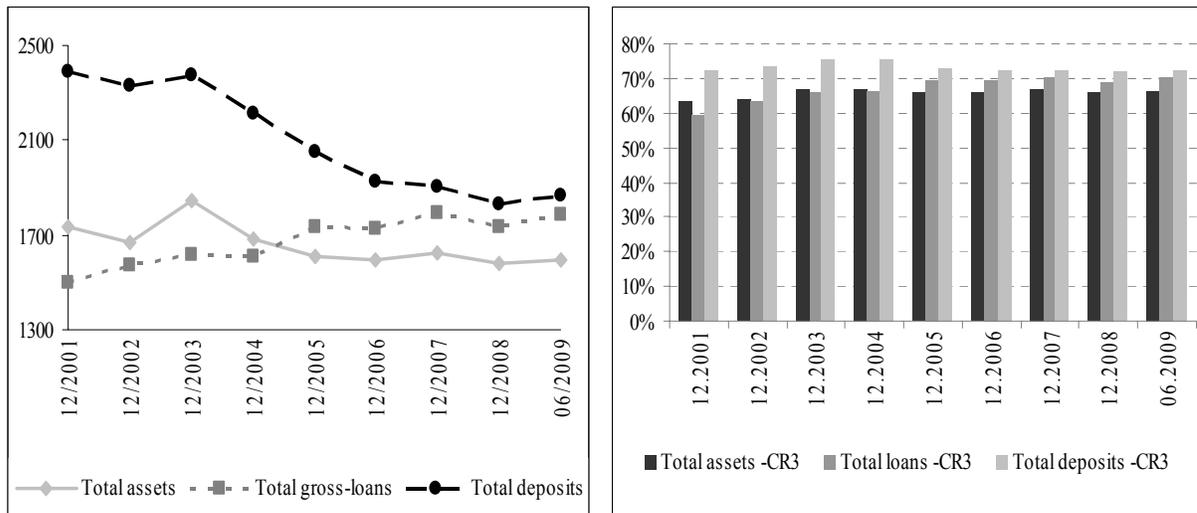
Source: NBRM and EBRD

Figure 2. Coverage of operating costs by net-interest income and their share in average assets



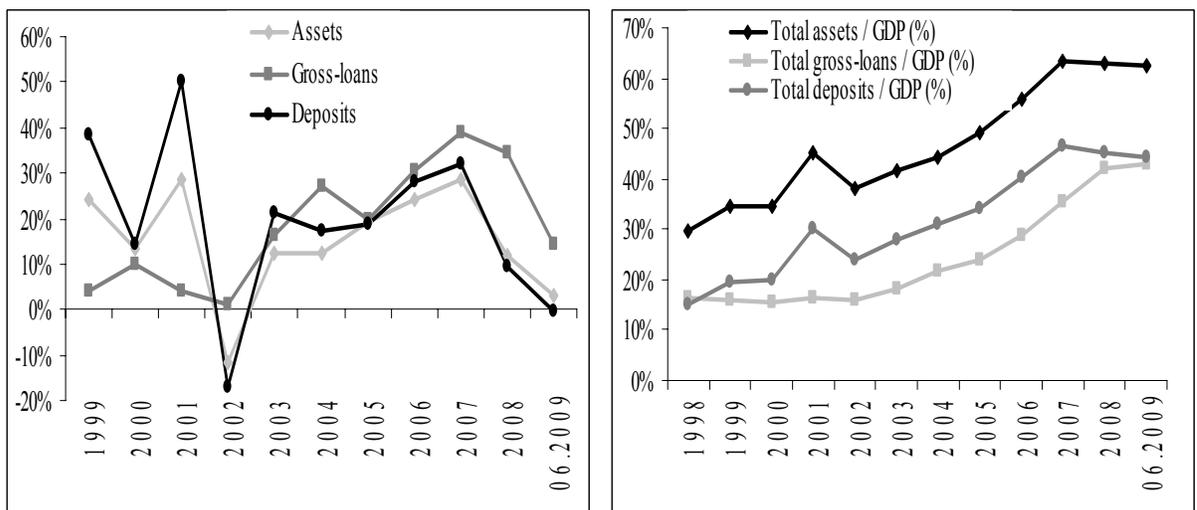
Source: NBRM

Figure 3. Herfindahl index and CR3 for the domestic banking system



Source: NBRM

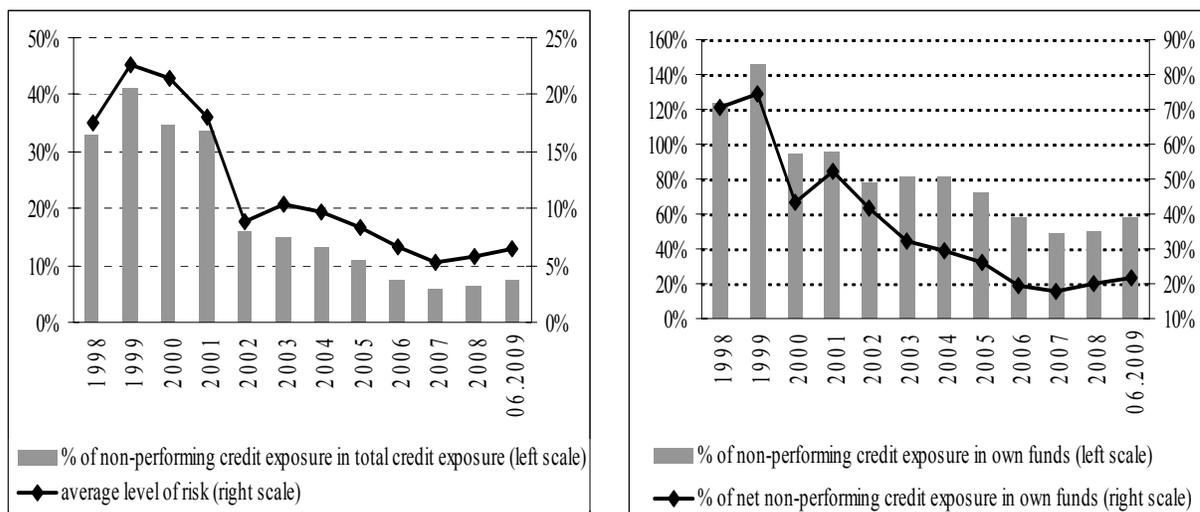
Figure 4. Assets, gross loans and deposits: financial intermediation (annual changes, in per cent)



Note: Indicators for financial intermediation at the end of the first half of 2009 are calculated according to estimated data on GDP for 2008.

Source: NBRM.

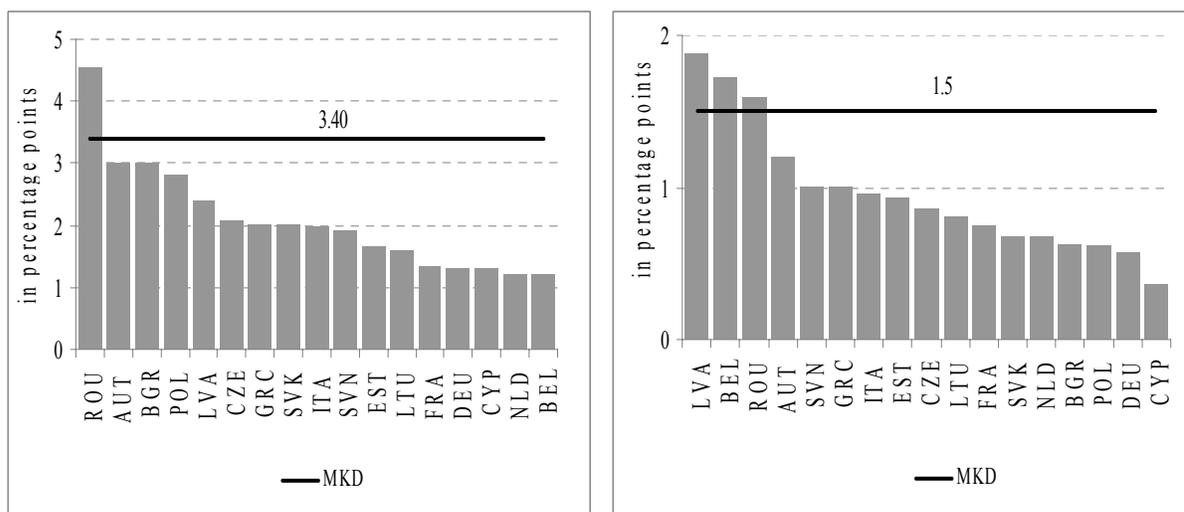
Figure 5. Indicators of the riskiness level of banks' loan portfolios



Note: Net non-performing credit exposure is related to the credit exposure classified in categories of risk C, D and E, decreased by the respective impairment losses. The average level of riskiness is calculated as a share of impairment losses in total credit exposure.

Source: NBRM

Figure 6. Operating costs/gross loans (left-hand axis) and Impairment losses/gross loans (right-hand axis)



Note: The data for all countries are calculated for 2008, with exception of data for our country, which are calculated for the first half of 2009.

Source: NBRM calculations based on data from banks and ECB (2009).

Appendices

Appendix 1. Variables' description and construction (All variables are in pe cents, unless noted otherwise)

lend_rate	<p>lending rate - quarterly average of monthly interest rates, by banks. In accordance with available data for particular periods, the calculation of the lending rate is carried out in the following way:</p> <ul style="list-style-type: none"> • the interest rate on denar loans is used for 2001; • for the 2002-2004 period, the aggregate interest rate is used, calculated as a weighted average of the available interest rates on denar loans (enterprises and households) and interest rates on total foreign exchange loans (all maturities and sectors); and • for the 2005-2009 period, the data used are in accordance with the New Methodology of the NBRM for the Calculation of Banks' Interest Rates, i.e. the interest rate data are related to all currencies, maturities and sectors.
depos_rate	<p>deposit rate - quarterly average of monthly interest rates, by banks. In accordance with available data for particular periods, the calculation of the deposit rate is carried out in the following way:</p> <ul style="list-style-type: none"> • the interest rate on denar deposits is used for 2001; • for the 2002-2004 period, the aggregate interest rate is used, calculated as a weighted average of interest rates on denar time deposits of households with a maturity of 1-3 months without a foreign exchange clause and interest rates on total foreign currency deposits of households; and • for the 2005-2009 period, the data used are in accordance with the New Methodology of the NBRM for the Calculation of Banks' Interest Rates, i.e. the interest rate data are related to all currencies, maturities and sectors.
spread	interest rate spread - the difference between the lending and the deposit rate in the quarter
assets	natural logarithm of total assets of the bank
share	market share according to total assets - total assets of the bank divided by total assets of the entire banking system
npl	non-performing loans - share of credit exposure classified in categories of risk C, D and E in total credit exposure. Credit exposure is consisted of: regular loans, non-performing loans, regular interest, other claims and off-balance sheet items
liquidity	share of highly liquid assets in total deposits of non-financial entities . The highly liquid assets are a sum of: cash and balances with the NBRM, NBRM central bank bills, short-term placements in government securities and correspondent accounts with foreign banks. Total deposits of non-financial entities are a sum of: deposits of enterprises, households, government and other clients (including non-profit institutions serving households and non-residents - non-financial entities), without deposits from banks.

Appendix 1: continued

capital_ad	coefficient of capital adequacy - own funds divided by risk-weighted assets, which include credit risk - weighted assets and other risks - weighted assets
roa	rate of return on average assets (ROAA) - calculated on quarterly basis as profit (or loss) divided by average assets. The profit (or loss) is a cumulative flow during one year. Average assets are an arithmetic mean of the size of assets on the date for which the rate is being calculated and the size of assets at the end of the previous year. In order to get the rate on the annual level, the quarterly rate is multiplied by four and divided by the number of past quarters in the year. That is, on 31.03 it is multiplied by 4; on 30.06 it is multiplied by 2; on 30.09 it is multiplied by 1.333 (4/3) and on 31.12 it is multiplied by 1.
policy	average quarterly interest rate of central bank bills - calculated as a weighted average of monthly interest rates of central bank bills for all maturities
euribor	average quarterly 3-month EURIBOR - calculated as an average of average monthly rates of 3-month EURIBOR
pol_eur	interest rate differential - calculated as a difference between the interest rate on central bank bills and the 3-month EURIBOR in the quarter
operating	natural logarithm of operating costs (which are consisted of: costs of employees, depreciation, material costs, costs for services, costs for representation and business trips, deposit insurance premiums)
foreign	share of foreign ownership (foreign shareholders) in the total number of issued shares
dum2005	dummy variable for the introduction of the new Methodology of the NBRM for the Calculation of Banks' Interest Rates in 2005 (dum2005=1 since 2005, 0 otherwise)

Appendix 2. Correlation matrix of variables in the panel estimation

	lend_rate	depos_rate	spread	assets	share	npl	liquidity	capital_ad	roa	operating	policy	euribor	foreign
lend_rate	1												
depos_rate	0.46	1											
spread	0.83	-0.11	1										
assets	-0.47	-0.14	-0.44	1									
share	-0.21	-0.09	-0.17	0.85	1								
npl	0.55	0.50	0.30	-0.33		1							
liquidity	0.22		0.27	-0.42	-0.24	0.17	1						
capital_ad	0.28		0.32	-0.62	-0.42	0.18	0.44	1					
roa	-0.17	-0.11	-0.13	0.24	0.11	-0.49	-0.15		1				
operating	-0.33		-0.32	0.92	0.85	-0.14	-0.30	-0.63		1			
policy	0.53	0.34	0.38	-0.17		0.30		0.23		-0.17	1		
euribor		0.35	-0.21				0.12					1	
foreign	-0.17	-0.25				-0.31	0.21	0.26		0.09	-0.16		1

*Only the correlation coefficients with a significance level of less than 0.05 are shown. Coefficients higher than 0.6 are shown in **bold**.

Appendix 3. Summary statistics of variables by groups of banks (all banks, group of 3 biggest banks, and the group of other banks)

All banks

	lend_rate	depos_rate	spread	assets	share	npl	liquidity	capital_ad	roa	policy	euribor	operating	foreign
mean	0.138	0.039	0.100	8,493	0.06	0.14	0.56	0.46	0.00	0.08	0.03	84.3	0.54
median	0.126	0.033	0.090	2,753	0.02	0.10	0.35	0.35	0.01	0.07	0.03	34.6	0.58
minimum	0.060	0.007	0.027	348	0.00	0.00	0.06	0.10	-0.64	0.05	0.01	5.8	0.00
maximum	0.300	0.177	0.259	64,012	0.34	0.84	9.27	3.43	0.18	0.17	0.05	485	1.00
standard deviation	0.047	0.026	0.042	13,120	0.08	0.15	0.90	0.38	0.06	0.03	0.01	110	0.41
nr. of observations	558	558	558	557	557	557	557	557	557	578	578	557	557

3 biggest banks

	lend_rate	depos_rate	spread	assets	share	npl	liquidity	capital_ad	roa	policy	euribor	operating	foreign
mean	0.119	0.034	0.084	32,107	0.22	0.13	0.20	0.17	0.01	0.08	0.03	282	0.64
median	0.101	0.028	0.079	29,870	0.24	0.10	0.16	0.15	0.02	0.07	0.03	317	0.73
minimum	0.080	0.012	0.033	5,679	0.08	0.03	0.06	0.10	-0.07	0.05	0.01	41.4	0.06
maximum	0.265	0.115	0.170	64,012	0.34	0.68	0.77	0.32	0.04	0.17	0.05	485	0.94
standard deviation	0.039	0.025	0.034	14,970	0.06	0.12	0.14	0.05	0.02	0.03	0.01	114	0.32
nr. of observations	102	102	102	102	102	102	102	102	102	102	102	102	102

Other banks

	lend_rate	depos_rate	spread	assets	share	npl	liquidity	capital_ad	roa	policy	euribor	operating	foreign
mean	0.143	0.040	0.103	3,199	0.02	0.15	0.64	0.52	-0.01	0.08	0.03	40	0.52
median	0.131	0.035	0.094	2,064	0.02	0.10	0.39	0.39	0.01	0.07	0.03	28.2	0.43
minimum	0.060	0.007	0.027	348	0.00	0.00	0.08	0.11	-0.64	0.05	0.01	5.8	0.00
maximum	0.300	0.177	0.259	14,659	0.06	0.84	9.27	3.43	0.18	0.17	0.05	209	1.00
standard deviation	0.047	0.027	0.043	2,755	0.01	0.15	0.98	0.39	0.07	0.03	0.01	34.5	0.42
nr. of observations	456	456	456	455	455	455	455	455	455	476	476	455	455

Discussion

Heather Gibson¹⁶
Bank of Greece

This paper addresses an important issue for policy makers. It examines the determinants of lending rates and interest rate spreads in a banking system still in the early stages of development. Given the importance of financial intermediation in the development and smooth operation of any economy, its efficient execution is of paramount importance. By focusing on questions of economies of scale in banking and the potential role for market power in shaping interest rates and spreads, this paper contributes significantly to shaping policy.

I will not summarise the paper since the authors themselves have already done a very good job at doing that. Instead, I want to focus my remarks on a number of issues which arise from the paper.

First, there are the results for lending rates. The paper is structured in such a way that the determinants of both lending rates and spreads are discussed as being very similar. Yet I see quite an important difference. I would suggest that the way the results on interest rates spreads are presented is entirely logical. For lending rates, I am less sure.

Let me be more explicit. Lending rates are primarily determined by the central bank policy rate and the transmission mechanism; that is how changes in policy rates feed through to changes in interest rates. The other determinants (competition, assets, foreign rates, etc) are bound to have a marginal effect – they offset or enhance the pass through.

I would suggest therefore that the paper is written in a way that reflects that observation. Explicitly, the official rate should not be the last factor discussed as in some way representative of macroeconomic factors. Instead it should be given the prominence it deserves by being the first determinant discussed with the other factors being secondary effects.

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With respect to the lending rate equation, I would also question the presence of the deposit rate in its currency form. The argument is that the deposit rate represents the costs of funds. True. But is it the case that banks first set deposit rates, see how much funding comes in and then set lending rates? It is more likely that lending and deposit rates are jointly determined. Both are crucially dependent on monetary policy and the transmission of policy rate changes to bank interest rates.

Thus I would explore further the possibility of jointly modelling these rates – rather than assuming that the deposit rate is exogenous and thus can be included on the right-hand side of the lending rate equation.

A second issue is the conflicting effects from bank size and market share. One of the key policy results for the paper is the strong effects of both bank assets and market shares. A rise in bank assets reduces interest rate spreads (economies of scale); an increase in market shares increases spreads (via decreasing competition).

This highlights an interesting dilemma that small countries face. Do they encourage size or competition? The authors suggest that merging small banks may allow a country to reap the benefits of both economies of scale and competition. However, this is surely only a temporary measure. The conflict is real and one that should be occupying policy makers.

My third point relates to the role of the time trend. I was not convinced that the time trend plays any role, far less capturing macroeconomic effects. The time trend suggests a monotonic relationship between some macroeconomic effect and the spreads. I would have thought that, if there are still macroeconomic effects to be captured, then time dummies would be a more appropriate way. It would certainly be much less restrictive than including a time trend by allowing the time effects to be nonlinear.

Finally, there is the role played by profitability. I do not think that profitability is helpful in the regressions. It is clearly endogenous (especially if both profitability and lending rates or spreads are persistent – in this case simply adding lagged profitability does not eliminate endogeneity).

The fact that the impact of profitability in the lending equation is contrary to expectations may simply reflect the endogeneity of profitability. In the lending equation, the effect is expected to be negative – a rise in profitability reduces lending rates. However, in fact the result is positive. This is then interpreted as indicating the importance of competition: higher profitability implies lower competition which leads to a higher lending rate. But if profitability is just competition, then surely this is covered by market share and profitability is redundant in the equation.

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