Banks' Risk Preferences and its Impact on the Loan Supply Function: An Empirical Investigation for The Republic of Macedonia

Jane Bogoev[1]

Abstract

This paper empirically investigates the existence of a bank lending channel and its determinants in the Republic of Macedonia. According to the results, there is robust statistical evidence in favour of the existence of a bank lending channel. As the most influential bank specific characteristic is the non-performing loans ratio as a proxy variable for banks' risk preferences. This may indicate that banks' risk preferences may be the most influential factor in determining their lending activities. Regarding the rest of the bank specific characteristics, bank liquidity has an opposite sing from what was expected, while there is no strong evidence that bank capital may have an influence over the loan supply function this may be so because the results are sensitive to different estimation methods and the number of instruments created. Asset size does not have any significant impact.

Keywords: Bank Lending Channel, Monetary Policy, 'system' GMM, Non-Performing Loans

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[1] E-mail: janebogoev@yahoo.com; j.bogoev@staffs.ac.uk. The views and opinions expressed in this paper are author's personal and do not represent those of the National Bank of the Republic of Macedonia.

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1. Introduction

The main research aim of this paper is to empirically investigate the existence of a bank lending channel and its determinants in Macedonia. More precisely, this analysis examines the functioning of bank lending channel and how bank specific characteristics affect the loan supply function. According to the empirical literature that examines the determinants of bank lending channel, the most influential bank financial characteristics are seen to be asset size, level of liquidity and capitalisation ratio. Therefore, this paper investigates banks' loan reaction function to changes in the interest rate, conditional on these three characteristics. Additionally, the model is augmented by another bank specific characteristic, i.e. the ratio of non-performing loans (NPL) to total loans as a proxy for banks' risk preferences.

The value addition of this paper to the existing empirical literature is threefold: *first,* it is the first analysis that investigates the bank lending channel in Macedonia. *Second,* it uses a different estimation method, 'system' Generalised Method of Moments (GMM), compared to the other empirical studies that commonly use 'differenced' GMM and *third,* unlike most studies, it augments the model by adding an additional bank specific characteristic to the model, i.e. the ratio of NPL to total outstanding loans.

This paper is organised as follows: Section 2 surveys the existing literature. Section 3 presents stylised facts about the monetary developments and the structure of the banking sector. Section 4 explains the model in detail. Section 5 describes the data used. The empirical results and their interpretation are presented in Section 6, whereas the summary of findings is presented in the final section.

2. Literature Review

The theoretical background of the bank lending channel was initially developed by Bernanke and Blinder (1988 a, b)[2] who modified the traditional IS-LM model by relaxing some of its basic assumptions. Their starting argument is that although the traditional IS-LM model can explain the money and interest rate channel of monetary transmission quite well, one of its main pitfalls is that it analyses the influence of various shocks in the economy only through the money function, giving a negligible role to the other financial instruments, i.e. loans and bonds. More precisely, the IS-LM model treats asymmetrically banks' assets and liabilities, by assigning a special role to money as a bank liability in determining aggregate demand. On the other hand, it treats loans and bonds equally as perfect substitutes for each other and both markets are suppressed by Walras' Law.

In that respect, the main innovations of Bernanke and Blinder model are the abandonment of the assumptions of perfect substitutability of loans and bonds and that financial markets clear only through price. They argue that loans should have a different treatment in the economy from the other financial instruments because they are provided by intermediary institutions, which are specialised in screening and monitoring borrowers in the presence of asymmetric information. These institutions can have an important impact on the monetary transmission mechanism in the economy where market clearance can be achieved not only by changes in the interest rates, but also by the quantity of loans supplied, i.e. credit rationing.

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[2]There are previous attempts in the literature that tackle the issue of existence of bank lending channel, but formally the first model that depicts the lending channel is that of Bernanke and Blinder (1988 a, b).

Thus Bernanke and Blinder (1988 a, b) amend the IS-LM model by substituting the IS curve with the credit-commodity curve (CC). The main difference from the IS-LM model is that now, changes in the interest rate do not only affect the LM curve, but also affect the CC curve through the quantity of loan supply that ultimately may make monetary policy more effective.

Regarding the empirical investigations, one of the first empirical studies that explore the existence of the bank lending channel in the US economy was by Kashyap and Stein (1995). The author examined banks' heterogeneous loan supply function, conditional on their asset size. Their results indicated significant heterogeneous reaction of banks' loan supply function to changes in the interest rate conditional on their asset size, implying the existence of a bank lending channel. Moreover, Kashyap and Stein (2000) and Kishan and Opiela (2000 and 2006) examined the bank lending channel in the US economy by considering two more financial characteristic such as, liquidity and capitalisation ratios, respectively. Their estimates also implied that not only size, but also liquidity and capitalisation ratios have a significant role in the loan supply function.

Related to the euro-area (EMU), several studies have analysed the bank lending channel. The research undertaken by Ehrmann et al. (2001) and Altunbas et al. (2002) have pointed to the existence of a bank lending channel. Namely, banks in the EMU react significantly to changes in monetary policy by changing the quantity of loan supply. Regarding banks' heterogeneous loan supply reaction function in the EMU, conditional on banks' financial characteristics such as, level of liquidity, size and capitalisation, Ehrmann et al. (2001) argue that only the size of the banks matter. Regarding liquidity, it had opposite sign from what was expected, while capitalisation did not have any significant impact. Somewhat different findings are presented in Altunbas et al. (2002). The estimated results indicate that only the level of capitalisation has a significant influence over the banks' lending decisions in the EMU.

Surveying the studies that empirically investigate the existence of bank lending channel in the economies from Central and South-Eastern Europe (CSEE), one of the first analysis that attempts to explore the functioning of the bank lending channel jointly for the eight new EU member states from CSEE is by Schmitz (2004). The results indicate that the bank lending channel is operational mainly through changes in the 3-month EURIBOR rate, but not through changes in the respective domestic referent interest rates. Related to the banks' specific characteristics (size, liquidity, capitalisation and ownership structure), only the ownership structure turned out to be the most significant determinant of the loan supply function, implying that foreign-owned banks are more sensitive in adjusting the quantity of loan supply to changes in the EURIBOR rate than domestic banks.

In a similar vein, Matousek and Sarantis (2008) explore the bank lending channel for the same group of transition economies on an individual basis. The results indicated that, apart from Slovenia and partially in Poland, changes in domestic interest rates do not have any significant impact on the loan supply function, consistent with Schmitz's (2004) findings. Related to the bank specific characteristics, size and liquidity indicators were the most influential factors over the loan supply function in most of the sample economies, which is contrary to Schmitz's findings.

Kohler et al. (2006) investigates the bank lending channel jointly for the three Baltic States. Accordingly, by taking the EURIBOR rate as a reference rate and controlling for the foreign ownership, the estimated results have shown that the lending channel works through the changes in the EURIBOR rate, consistent with the findings of Schmitz (2004). The main determinants of banks' loan supply function turned out to be liquidity, capitalisation and the ownership structure, while banks' size was not significant.

Analysing the bank lending channel at individual country level, there are several studies that provide mixed evidence for Poland. For example, Wrobel and Pawlowska (2002), Havrylchyk and Jurzyk (2005) and Chmielewski (2006) find that bank lending channel operates in Poland through changes in domestic interest rate, which is in contrast to the findings of Schmitz (2004) and Matousek and Sarantis (2008). Regarding the bank specific characteristics, all the three studies provide evidence that liquidity has a significant impact over the bank lending channel, but with the opposite sign from what is predicted by economic theory, which is explained by the structural excess liquidity of the Polish banking system (for more details see section 4). Related to the other bank specific characteristics, the results of Wrobel and Pawlowska (2002) imply that size and capitalisation ratio have a significant impact over the banks' heterogeneous loan supply function. In contrast, the estimates of Havrylchyk and Jurzyk (2005) indicate that the most important determinant of banks' loan supply decisions is the ownership structure, but not the size and capitalisation. Additionally, Chmielewski (2006) argue that the NPL ratio is the major determinant of banks' loan supply function.

In the Czech Republic, Pruteanu-Podpiera (2007) investigates the bank lending channel for the two sub-periods 1996-1998 and 1999-2001, respectively. The results show a significant reaction of the banks' loan supply function to changes in domestic interest rate for the two sub-periods, being stronger for the second sub-period. Analysing the role of banks' specific characteristics, liquidity and capitalisation were seen to be the major determinants of banks' heterogeneous reaction function in the first sub-period, but not in the second. Size, foreign ownership and NPL ratio had a significant impact over the banks' loan supply function but with opposite signs from what was expected, for which the author has not provided any detailed explanation.

In the case of Hungary, Horvath et al. (2006) determine the existence of the bank lending channel through the domestic interest rate while not through the EURIBOR rate, which is contrary to the findings of Schmitz

(2004). The most significant determinants of banks' heterogeneous loan supply function are foreign ownership, size and capitalisation ratios. Liquidity had an insignificant impact, explained by the structural excess liquidity of the banking system.

In Estonia, the analysis conducted by Juks (2004) provides little evidence in favour of the existence of the bank lending channel. The author investigates the responses of banks' loans to changes in the interest rate (the EURIBOR rate is taken as a referent interest rate due to the currency board regime). The estimates have shown that changes in the EURIBOR rate did not have any significant influence over the banks' loan supply function, suggesting the absence of an operational bank lending channel. The reasons for this, according to the author, are related to many non-monetary and non-economic factors associated with the transition process.

Golodniuk (2006) has determined the existence of bank lending channel in Ukraine. Regarding banks' financial characteristics, the capitalisation ratio is seen as a major determinant of the heterogeneous loan supply function. Nevertheless, the impact of capitalisation over the loan supply function may not be robust due to its sensitivity to different ways of measurement.

However, a major weakness in most of the studies arises from the estimation technique applied, given the endogenous nature of the model. Most of the aforementioned studies deal with this problem by using dynamic panel estimation with 'differenced' GMM. This estimation technique was seen to deal most appropriately with the endogenous problem of the model. Nevertheless, there has been a rapid development of understanding and techniques used in dynamic panel analysis in recent years (Arellano and Bover, 1995; Blundell and Bond, 1998 and Roodman, 2006). Given these developments, the use of 'differenced' GMM by majority of these studies does not now seem to be the most appropriate estimator, given the non-stationarity of the data. Thus, 'system' GMM may be more appropriate in the presence of unit root

process than the differenced GMM. The major advantage of using 'system' GMM over 'differenced' GMM when estimating a model with non-stationary data, is that it is more efficient and provides better properties. Therefore, the use of 'system' GMM in estimating the bank lending channel in Macedonia should be the major value addition of this research.

3. Stylised Facts About the Monetary Developments and the Banking System in Macedonia

Since gaining its monetary independence in 1992 till present, the National Bank of the Republic of Macedonia (NBRM) has changed its monetary policy regime twice. Namely, in the initial periods of transition till the end of 1995, the monetary policy regime was oriented towards money supply targeting. However, this strategy led to unsatisfactory results due to unsuccessful stabilization of the price level, negative growth of the Gross Domestic Product (GDP), relatively high fluctuations of the nominal exchange rate and low level of foreign reserves (see table 1). Consequently, due to the instability of the money demand function, high openness of the Macedonian economy and the 'unfavorable' monetary and macroeconomic performances, monetary policy makers in 1996 switched the policy regime towards fixed exchange rate by pegging the domestic currency to the German mark and later on to the Euro. This policy regime is perceived to change the monetary and in some proportion the macroeconomic performances of the economy. For example, as shown in table 1, the price level has been relatively stable, the GDP started growing continually (except in 2001) and the foreign reserves have increased substantially.

Table 1. Basic Macroeconomic Data for the Macedonian Economy (1993-2007)

	Inflation (average)*	GDP (real growth rates)	Unemployment rate (in %)	Average exchange rate MKD/DEM	Average exchange rate MKD/EUR	Gross foreign reserves (millions of US dollars, stock - end of period)
1993	349.8	-7.5	27.7	14.2	/	123.2
1994	121.8	-1.8	30.0	26.6	/	172.4
1995	15.9	-1.1	35.6	26.5	/	282.9
1996	3.0	1.2	31.9	26.6	/	277.5
1997	4.4	1.4	36.0	28.7	/	258.7
1998	0.8	3.4	34.5	31.0	/	323.9
1999	-1.1	4.3	32.4	31.0	/	449.9
2000	5.8	4.5	32.2	31.1	60.7	699.5
2001	5.5	-4.5	30.9	31.1	60.9	755.6
2002	1.8	0.9	31.9	/	61.0	725.3
2003	1.2	2.8	36.7	/	61.3	903.4
2004	-0.4	4.1	37.2	/	61.3	975.3
2005	0.5	4.1	37.3	/	61.3	1324.7
2006	3.2	4.0	36.0	/	61.2	1865.8
2007	2.3	5.9	34.9	/	61.2	2239.6

* Up to 1999, the retail price index was used as official indicator for inflation, while since 2000 till present, the consumer price index is used.

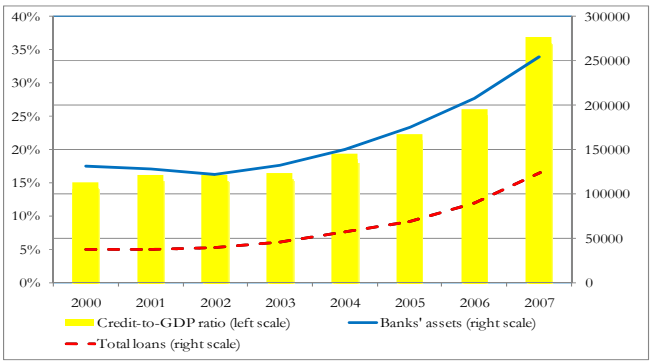
** Estimated data (source: State Statistical Office of the Republic of Macedonia).

Source: NBRM

Analysing the financial system in Macedonia it can be noticed that, as in other transition economies, it is bank dominated. For example, banks' assets were 89% and 91% of total financial assets in 2006 and 2007, respectively (Source: NBRM, 2007 c, p.51). The banking sector has been developing continually in the last ten years, especially since 2000. This can be seen from the aggregated banks' assets that have been growing overtime (see figure 1). A major part in the structure of banks' assets is the outstanding loans to non-financial private sector up to 49% of total banks' assets in 2007 (Source: Author's own calculations from the data from NBRM).

Related to the loan market, it is worth mentioning that the stock of outstanding loans to the non-financial private sector in Macedonia has been increasing continuously over the past ten years (see figure 1), with an average annual growth rate of 19 % during the period 2000-2007 The credit growth has been more pronounced in the last ten years, with annual growth rates of 31% and 39% respectively, indicating a higher level of financial intermediation and development of the banking system. This can also be seen from the continual increase of credit-to-GDP ratio as a proxy indicator of the level of financial intermediation (see figure 1).

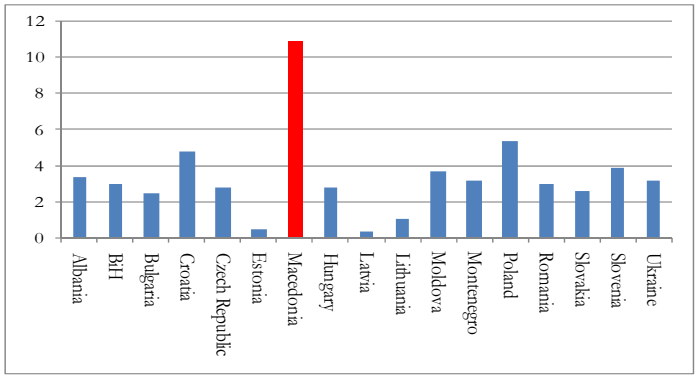
Figure 1: Banks' Assets and Total Outstanding Loans to Non-Financial Private Sector (in millions of denars) and Credit-to-GDP Ratio (in %) in Macedonia (2000-2007)



Source: NBRM, Annual Report 2007

Regarding the total outstanding loans, one of its most important characteristics is the relatively high proportion of NPL, whose average share in total loans for the period 2000-2007 equals around 30%. Compared to the other economies from CSEE, the NPL ratio is at the highest level in 2007 (see figure 2), despite its declining trend throughout the years, i.e. from 46.5% of total loans in 2000 to 10.9% in 2007 (Source: Author's own calculations from the data from European Bank for Reconstruction and Development, Transition Report 2008).

Figure 2: % Share of Non-Performing Loans to Total Loans (2007)



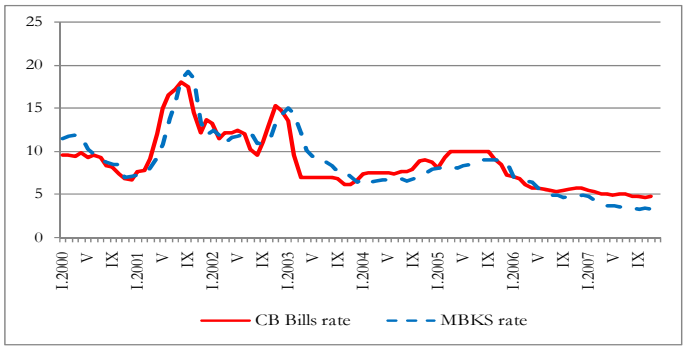
Source: European Bank for Reconstruction and Development (EBRD), Transition Report 2008

In analysing the movements of the key policy rate (CB Bills rate) during the period 2000-2007, in general it can be noticed a declining trend is noticed (see figure 3). CB Bills rate declined from around 10% in the beginning of 2000 to around 5% by the end of 2007. During the analysed period, in 2001 there was a sharp increase in the key policy rate, reaching its peak of almost 18% in September, the main reason being the armed conflict in the country and related military expenditures by the government that substantially increased liquidity. Consequently, for the purpose of maintaining the fixed nominal exchange rate, the NBRM had to intervene in the money market by withdrawing liquidity from the banking system through auctions of CB Bills by raising the interest rate (Source: NBRM, 2001). After the end of the armed conflict,

with the political and economic stabilisation of the country, and the ensuing reduction in the level of liquidity of the banking system, the CB Bills rate in 2002 started to decline. Nevertheless, at the end of 2002 the NBRM had to raise the CB Bills rate again to a level of 15% in order to neutralise the increased liquidity of the banking system and to reduce the depreciation pressures of the Macedonian Denar that were caused by the large fiscal expenditures in the last quarter of 2002 (source: NBRM, 2002). From 2003 onwards, in general, the key policy rate was falling continuously.

Movements in the money market rate (the average weighted interbank interest rate - MBKS), as is shown in figure 3, are similar to the movements in the key policy rate; indicating that there is a relatively high association between the two rates. This can be implied by the estimated correlation coefficient for the period 2000-2007 which is, as expected, relatively high at around 95%. In general, similar to the CB Bills rate, the MBKS was falling continuously over the analysed period. The MBKS declined from nearly 12% at the beginning of 2000, to nearly 3% at the end of 2007, reaching the highest peaks in September 2001 and January 2003 by nearly 19% and 15% respectively, mainly as a result of the sharp increase of the key policy rate; for the reasons explained in the previous paragraph.

Figure 3: Movement of CB Bills and MBKS rates(%) in Macedonia (2000-07)



Source: NBRM

4. The Model and Estimation Method

In examining the bank lending channel and its determinants in Macedonia, variations in banks' outstanding loans to changes in the interest rate will be investigated. The rationale for this, according to the Bernanke and Blinder model, is that a restrictive monetary policy (an increase of the interest rate) will reduce banks' deposits. Consequently, this will affect banks' loan supply because banks cannot completely offset the reduction in deposits with other sources of finance for the reason that, either it may be too costly for them to raise uninsured funds of finance or they have restricted access to non-deposit funding.

Regarding the estimation technique, a dynamic panel model estimated in levels will be used. The reason for using a dynamic panel model is because the theoretical model by Bernanke and Blinder is designed as stock adjustment model, using the stock of loans as the dependent variable. Therefore, it is expected that the stock of loans is dependent on its own past values due to the inertia in the adjustment process caused largely by the presence of long-term loans. The dynamic panel model, unlike the previous empirical studies, is estimated with 'system' GMM. Nevertheless, the main caveat of this method is that it may provide biased estimates due to the large number of instruments created. Thus, in order to counteract the problem of the creation of too many instruments, the number of instruments per period has been reduced by restricting and collapsing the instrument set(s), i.e. Roodman (2006).

The basic model used in this analysis is based on augmented model specification established by Ehrmann et al. 2001. The stock of loans is regressed on, its own lagged value(s), the interest rate, real Gross Domestic Product (GDP), Consumer Price Index (CPI), normalised values of each of the bank specific characteristics and their interaction terms with the referent interest rate. The bank specific characteristics are

liquidity, size, capitalisation ratio, foreign ownership dummy variable and the ratio of non-performing loans to total loans.

The general (unrestricted) model has the following specification:

$$\log(Loans_{it}) = \beta_0 + \sum_{j=1}^{l}\beta_1 \log(Loans_{it-j}) + \sum_{j=1}^{l}\beta_2 MPI_t + \sum_{j=0}^{l}\beta_3 \log(GDP_t) + \sum_{j=0}^{l}\beta_4 \log CPI_t + \sum_{j=0}^{l}\beta_5 X_{it} - \sum_{j=1}^{l}\beta_6 X_{it} MPI_t + \sum_{j=0}^{l}\beta_7 ForOwnDum_{ti} + \sum_{j=0}^{l}\beta_8 MPI_{t-j} ForOwnDum_{ti} + \sum_{j=0}^{l}\beta_9 MPI_t (NPL_{it}/L_{it}) + \varepsilon_{it} \quad [1]$$

Where:

- Loans is banks' outstanding loans;
- MPI is the referent interest rate (the money market rate);
- GDP is the real Gross Domestic Product;
- CPI is the consumer price index;
- X refers to each bank specific characteristic such as liquidity, size and capitalisation ratio;
- $X_{it}MPI_t$ is the interaction term between each bank specific characteristic and the referent interest rate;
- $ForOwnDum_{ti}$ and $MPI_tForOwnDum_{ti}$ are foreign ownership dummy variable and the interaction term with the interest rate, respectively.
- $MPI_tNPL_{ti}/Loans_{ti}$ is the interaction term between the NPL ratio and the referent interest;
- ε_{it} is the error term composed of v_i - group specific time-invariant unobservable bank specific effects plus u_{it} - errors;
- *i* and *t* refer to the bank and time specific subscripts;
- *l* indicates the number of lags used of each variable;

The parameters of interest are β_2, β_6 and β_9. Their statistical significance and the expected sign (as explained later in this section), is an indication of the existence of the bank lending channel and the heterogeneous banks' reaction function to changes in the interest rate. More specifically, parameter β_2 indicates whether bank loans are responsive to changes in the interest rate, while parameters β_6 and β_9 estimate if banks' loan supply function differs among banks, conditional on their specific characteristics. The theoretical model by Bernanke and Blinder assumes that inflation and inflationary expectations are constant. However, in the empirical studies this assumption cannot be made and

therefore, in our empirical model we include all variables, except GDP, in nominal terms in order to make the empirical model as close approximation as possible to the theoretical one. The argument for including GDP in real terms is that we are interested in examining how the aggregate demand (GDP) affects the credit growth. Accordingly, if we include the nominal GDP we cannot establish if changes in loan growth are caused by the real output changes or inflation.

The economic argument for each regressor and the expected *a-priori* sign of the parameters, given in the theoretical model of Bernanke and Blinder and the relevant empirical evidence from previous studies (see section 2), is discussed below. Whether the variable is considered to be endogenous or exogenous is also discussed as this is important in the econometric specification.

The reasons for the lagged dependent variable in the model have been discussed earlier in this section. The sign of the parameter is expected to be positive.

The interest rate is included to indicate if there is a direct response of loans to changes in the interest rate, and its expected sign is negative. In choosing the representative interest rate, we have selected the money market rate (MBKS), consistent with the approach by Worms (2001), Ehrmann et al. (2001), Topi and Vilmunen (2001) and Havrylchyk and Jurzyk (2005). One of the reasons for selecting the MBKS rate instead of the CB Bills rate is because MBKS rate may serve as proxy for "cost of funds" rate, i.e. the rate for financing banks' lending activities. In contrast, the CB Bills rate serves more as a rate of alternative investment for the banks because it represents the price of the CB Bills. Due to the *de facto* fixed exchange rate regime, the major monetary policy instrument conducted by the NBRM is the auctions of CB Bills by which the NBRM regulates the liquidity of the Macedonian banking system. Thus, the commercial banks may decide to invest in CB Bills only if they have excess liquid assets, unlike the MBKS rate that represents the

"costs" of their lending activities. Another arguments for selecting the MBKS rate instead of the CB Bills rate is that the later in majority of the sample period has been administratively determined by the NBRM, while the former is determined by the market principles in the money market. Accordingly, due to the aforementioned arguments, the MBKS rate seems to be more in line with the theoretical foundations of the bank lending channel theory than to the CB Bills rate.

We also considered the inclusion of the 3-month EURIBOR rate as a referent interest rate in the model, as it is done in other studies for CSEE (see section 2). The argument for using the EURIBOR rate is that, due to the high foreign ownership of the banking capital in Macedonia and relatively high proportion of foreign currency and foreign currency indexed loans to total loans; it is expected that foreign-owned banks may react more strongly to changes in the EURIBOR rate than the domestic referent interest rate[3]. However, since the capital account is still not fully liberalised in Macedonia, we do not expect the EURIBOR rate to have any significant impact over the loan supply function and therefore, we disregard it from the model.

The reasons for inclusion of GDP and CPI are to control for the demand side effects and the business cycle in the economy. Namely, a higher price level and GDP are expected to positively influence loans. However, from the current literature it is again not clear whether they should be taken as exogenous or endogenous in the model. Some studies assume that they are exogenous, while other studies assume that they may be endogenous. We assume that they are endogenous because in the framework of Bernanke and Blinder model, changes in loans may affect the overall economic activity. For instance, a higher level of loans may

[3] We consider the EURIBOR rate as a reference foreign rate for the reason that majority of the foreign-owned banks in Macedonia are from the EMU economies, although some foreign-owned banks belong to countries outside the EMU, i.e. Turkey and Iceland.

result in higher aggregate demand through higher investment and/or personal consumption that may induce higher output and the reverse. This may also create a demand pressure that may affect the price level. The estimated signs and size of these two variables should be taken with caution. Namely, CPI and GDP are macroeconomic control variables for loan demand side, under the assumption of homogenous elasticity of loan demand among the borrowers. Nevertheless, this assumption has been criticised in the literature, because they may be capturing something else that is not included in the model. For example, it may be expected that loan elasticity is highly related to changes in CPI and GDP, reflecting the catching-up process of loan demand, which may be probably below the equilibrium level during the initial period of transition. The expected high elasticity may be based upon the higher confidence of economic agents in the macroeconomic environment since in the last 10 years inflation in Macedonia has been relatively low and stable compared to the initial period of transition (see table 1). Additionally, the GDP and CPI may also capture some other non-economic factors that may influence the loan demand. Particularly in the case of Macedonia, the loan demand may also be affected by the transition process that was characterised by chained banking failure in the initial period of transition, with another chained failure of saving houses in a later period. The loan demand may also be affected by the political instability in the region, i.e. NATO intervention in Serbia and Kosovo in 1998 and the armed conflict in Macedonia in 2001. Although the descriptive statistics on GDP and loans do not suggest a straightforward relationship, in Macedonia real GDP fell by 4.5% in 2001, whereas in the subsequent years it had moderate growth reaching the level of the year 2000 in 2004. In contrast, the aggregate level of total loans has been growing continually after 2000 (see figure 1), suggesting almost negative association between the two over this period.

The three bank specific characteristics (liquidity, size and capitalisation) and their interaction terms with the interest rate are added as proxy variables for the informational frictions that banks face in the

financial markets. More specifically, the rationale for considering the liquidity variable is that, according to Kashyap and Stein (2000), in periods of restrictive monetary policy when banks face a withdrawal of deposits, those banks with more liquid assets can more easily offset the withdrawal of deposits. For example, banks in Macedonia can sell some of the Treasury Bills or withdraw their deposits from accounts they keep in banks abroad or cash they keep in the vaults at the Central Bank. Consequently, they may not cut the amount of loans to the same extent as the banks that have less liquid assets available. The sign of this variable and its interaction term with the interest rate, according to the theory are expected to be positive, but in the case of Macedonia where banks have structural excess liquidity, it cannot be *a priori* determined. For example, in Poland (Wrobel and Pawlowska, 2002; Havrylchyk and Jurzyk, 2005, Chmielewski, 2006 and Matousek and Sarantis, 2008) and in the Baltic States (Kohler et al., 2006), whose banking systems also have structural excess liquidity, the sign of liquidity and/or the interaction term between liquidity and the interest rate have been estimated to be negative. A possible explanation for this, according to Wrobel and Pawlowska (2002), is that in Poland liquidity may not be the best distinguishing financial characteristic among banks of the informational frictions they face on the loan market. According to the author, when the banking system is characterised by surplus liquidity, it is difficult to distinguish the heterogeneous loan supply reaction function from the benchmark banks that have been below the average level and those banks that have been above the average level of liquid assets. The reason for this is because in the case of persistent liquidity, almost all banks keep a higher level of liquid assets from what is needed. A different explanation is suggested by Chmielewski (2006) who argues that banks that have accumulated a large amount of securities holdings (liquid assets) and have not hedged against the interest rate risk, find that their opportunity costs increase when monetary policy tightens. Therefore, those banks reduce the quantity of loan supply proportionately more than less liquid ones.

Kohler et al. (2006) argue that the estimated negative sign of liquidity reflects the large accumulation of non-performing loans in some banks, due to the informational asymmetry on the loan market. Consequently, those banks have intentionally built-up a higher buffer of liquid assets in order to hedge against borrowers' default in a case of deposit withdrawal. For these reasons, those banks are more vigilant about their lending activities and they actually cut the loan supply proportionately more when monetary policy tightens, due to worsening of the informational frictions on the loan market.

The explanation for using the asset size and capitalisation ratio is that banks with a higher asset size and/or more capitalised banks have greater access to, and can more easily raise, non-deposit funds in order to offset the withdrawal of deposits in periods of monetary policy tightening. More precisely, bigger and/or more capitalised banks in the case of withdrawal of deposits can issue time deposits or they can more easily borrow from other financial institutions compared to the smaller and/or less capitalised banks, because they are seen as less risky for investors. This will directly affect their risk premium and consequently, the non-deposit sources of funding will become cheaper for them compared to the smaller and/or less capitalised banks (Kashyap and Stein, 1995 and Kishan and Opiela, 2000). In Macedonia, banks still cannot issue time deposits, but they can borrow from banks abroad. Another argument why size and capitalisation may be important determinants is that the costs of searching for and obtaining non-deposit funds relative to total costs are lower for the bigger and/or more capitalised banks (Kashyap and Stein, 1995 and Kishan and Opiela, 2000). Therefore, the sign of these two variables and the signs of their interaction terms with the interest rate are also expected to be positive. In our model we follow the conventional empirical approach in treating these three variables (liquidity, size and capitalisation) as endogenous.

The rationale for adding the interaction term between the ratio of NPL to total loans and the interest rate is to indicate banks' attitudes

towards risk. When a bank has a certain proportion of NPL in its asset portfolio, it usually compensates for the risk of default of its borrowers with a higher mark-up margin between the yield of the risk-free portfolio (risk-free rate) and the current lending rate (Chmielewski, 2006). However, when the monetary policy tightens (an increase of the referent interest rate), the risk free rate increases as well. On the other hand, the bank cannot fully increase its lending rates in order to restore the previous mark-up margins, for the reason that some of the loan contracts have fixed lending rates that makes them sticky. Another reason why the bank cannot fully raise its lending rates is because in periods of monetary tightening informational frictions on the loan market worsen and therefore, by raising the lending rates in the same proportion will attract even more riskier borrowers due to adverse selection and moral hazard problems (Stiglitz and Weiss, 1981). Thus, all of the aforementioned factors will result in reduction of the current mark-up margin that ultimately will increase the risk of a bank default (failure).

The management and/or shareholders of the bank, in order to restore the previous level of risk present in the asset structure (the asset risk), under the assumption that their risk preferences are constant, have three options: *a)* re-allocation of the bank's own funds i.e. the reserve fund, in order to compensate for the potential default of borrowers; *b)* to get additional non-deposit funding and/or to raise additional capital and *c)* to change the asset structure by reducing the newly issued loans. The first option does not give much space for the manoeuvre because of the binding legal capital requirements. The banks usually keep the level of capital (own funds) equal or slightly above the regulatory capital requirements in order to maximise the rate of return. The second option is not desirable for the bank management because in such conditions, banks' costs will be higher due to the high risk premium that the bank has to offer to the potential investors. There are two reasons for this: *first,* the risk premium is directly affected by the higher risk-free rate and *second,* the bank is now perceived as more risky for potential investors due to the presence of NPL and increased borrowers' default that puts

additional pressure on the risk premium. Moreover, the alternative of raising additional capital may also not be feasible in the short-run because, as argued by Bolton and Freixas (2006), it takes time for the legal procedures to be fulfilled; which also seem to be relevant for the case of Macedonia. Accordingly, banks in order to restore the previous level of risk will generally choose the third option (changing their asset structure) mainly by reducing the quantity of loan supply, which is the most likely scenario especially in the short run. Thus, the sign of the interaction coefficient β_9 is expected to be negative because when monetary policy tightens, those banks that have a higher NPL ratio are expected to reduce the quantity of loan supply proportionately more than banks with a lower NPL ratio. Having in mind the relatively high level of the NPL ratio in the CSEE economies, especially in the Macedonian banking system (see figure 2), and the unpleasant experience of borrowers' default particularly during the initial periods of transition, amending the model with a proxy variable for banks' risk preferences may be an essential factor in determining the bank lending channel. Namely, the interaction term indicates different degrees of risk preferences among banks in cutting their loans supply when the monetary policy tightens. This variable provides an additional dimension to the common empirical approach in examining the loan supply function in that it may be an indicator of the healthiness of the banking sector by measuring the level of risk present in banks' asset structure.

A foreign ownership dummy variable and its interaction term with the interest rate are incorporated in the model to control for the effect of foreign ownership in the banking sector. This is seen as an important determinant in the studies conducted for the transition and emerging economies due to the relatively high level of foreign ownership of total banking capital, which is also the case in Macedonia. The signs of both parameters are expected to be positive because, higher foreign involvement in the banking sector indicates better management of the banks and more favourable conditions for granting loans. Furthermore, foreign-owned banks may use their internal capital markets and may act

counter-cyclically when the monetary policy tightens (De Haas and Lelyveld, 2006), which should additionally affect the loan growth. However, due to the divergence between the legal definitions (*de jure*) of foreign owned banks and the one in practise (*de facto*), this variable may not have any significant impact on the bank lending channel. Namely, the bank lending channel may be affected by the foreign owned banks manly through the existence of the internal capital markets where the parent bank may give financial resources to its subsidiary when the monetary policy tightens. Nevertheless, this may not be the case in Macedonia because some of the *de jure* foreign banks are owned by domestic residents who have established their own company abroad. Therefore, the internal capital market does not exist and in reality, it may not affect the bank lending channel and thus, we exclude this variable from the model.

5. Data Issues

We use annual bank balance sheet data obtained from the NBRM. The sample period is from 2000 to 2007. The sample is restricted to this time span in order to get uniformity of the data set and the monetary policy instrument. Regarding the former, the balance sheet items for each individual bank over this period were constructed according to the same accounting methodology with only minor modifications. The balance sheet data before 2000 are not available for all banks and were complied according to a different accounting methodology. Regarding the monetary policy instrument, auctions of CB Bills was the main policy instrument over the whole period analysed, whereas before 2000 the main policy instrument was auction of credit.

The original unbalanced data set that comprises all banks in Macedonia is of 26 banks[4]. The sample was adjusted for mergers and

[4] We do not consider the Macedonian Bank for Development Promotion a.d. Skopje for the reason that it is entirely state owned and is established only for the purpose of

acquisitions among banks by backward aggregation of the balance sheet items. If it is not adjusted for, then there is a sudden jump in the balance sheet items after the acquisition occurs. Backward adjustment of the data for mergers means that the data is more comparable before and after the merger occurred. Although this is the most commonly used approach in the literature (Ehrmann et al., 2001; Gambacorta, 2005; De Haan, 2001; Havrylchyk and Jurzyk, 2005; Prutenau-Podpiera, 2007 and Juks, 2004) and no other approach appears preferable, we have to be aware that this may bias the data because changes in the management of the merged bank and the gained know-how from the staff are not controlled for. Hence, over the whole sample period we work with an unbalanced data set of 20 banks.

The bank specific characteristics (liquidity, size, capital and NPL ratio), have been normalised according to their averages across all banks in the sample and they sum up to zero over all observations (Ehrmann et al., 2001). In other words, they are expressed as deviations from their cross sectional means. The size variable has been additionally normalised to each period mean in order to remove the general trend from this variable because it is in nominal value (Ehrmann et al., 2001). This procedure of normalisation of these three variables is as usual in most of the empirical studies and is according to the equations below, respectively:

$$Size_{it} = logA_{it} - \frac{1}{N_t}\sum_i logA_{it} \qquad [2]$$

$$Liq_{it} = \frac{L_{it}}{A_{it}} - \frac{1}{T}\sum_t\left(\frac{1}{N_t}\sum_i \frac{L_{it}}{A_{it}}\right) \qquad [3]$$

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supporting certain underdeveloped industrial areas of the Macedonian economy. Because of that, this bank is not working according to the market principles as the other banks do and it is excluded from the whole analysis because it may bias the results.

Table 2: Data Description.

Variable:	Description:	Value	Source:
LoansT	Total outstanding loans to non-financial private sector.	Nominal	NBRM
MBKS	Average weighted interbank interest rate.	In % annualised	NBRM
GDPr	Real Gross Domestic Product.	In denars from 1997	SSO and NBRM staff calculations
CPI1	Consumer price index from NBRM.	Index, base year 2000=100	SSO and NBRM staff calculations
REER	Real effective exchange rate, 2003=100.	Index, base year 2003=100	NBRM
Liquid1	Ratio of liquid over total assets. It includes: cash in vault at the NBRM+short term deposits in accounts in banks abroad+CB bills and treasury bills with maturity up to 1 year.	Nominal	NBRM
Liquid2	Ratio of liquid over total assets. It includes:liquidity1+cheques and overdrafts+short term restricted deposits in accounts in banks abroad+short term security holdings issued by banks and saving houses+short term bonds issued by the state+short term credits granted to banks abroad.	Nominal	NBRM
Liquid3	Ratio of liquid over total assets. It includes:liquidity2+cash in vaults in domestic banks+short term restricted deposits in accounts in domestic banks+short term loans granted to domestic financial institutions (banks and saving houses).	Nominal	NBRM
Size	Log of total assets.	Nominal	NBRM
Capital	Ratio of equity plus reserves over total assets.	Nominal	NBRM
ForOwn	Foreign ownership dummy variable.1 if foreign owned, 0 otherwise.	Dummy	NBRM
NPLTratio	Ratio of NPL over total outstanding loans.	Ratio	NBRM

Source: NBRM and State Statistical Office of the Republic of Macedonia (SSO)

$$\text{Cap}_{it} = \frac{C_{it}}{A_{it}} - \frac{1}{T}\sum_{t}\left(\frac{1}{N_t}\sum_{i}\frac{C_{it}}{A_{it}}\right) \quad [4]$$

$$\text{NPLratio}_{it} = \frac{NPL_{it}}{LoansT_{it}} - \frac{1}{T}\sum_{t}\left(\frac{1}{N_t}\sum_{i}\frac{NPL_{it}}{LoansT_{it}}\right) \quad [5]$$

Where:

- A, L and C represent bank assets, liquidity and size respectively;
- N and T indicate the size and the time length of the sample respectively;
- NPL is the value of non-performing loans, LoansT are the total outstanding loans;
- *i* and *t* are group and time specific subscripts.

The main reason for this normalisation is that the average of the interaction term $X_{it}MP_{lt}$ from equation 1 equals to zero and consequently, the coefficient β_6 is interpreted as the direct impact of the interest rate on banks' loans, conditional on these bank financial characteristics (Ehrmann et al., 2001 and Gambacorta, 2005). The sign of this coefficient is expected to be positive. Another reason for the normalisation is that in this way any disturbances caused by minor methodological changes in the balance sheet data can be reduced (Chmielewski, 2006).

There are some limitations of the data in terms of their reliability, methodological consistency and the way they have been collected and backward revised. Some of the data series have minor methodological changes and have not been revised backwards, i.e. balance sheet data for the banks and GDP. However, these are perceived as minor and unlikely to affect the results significantly.

6. Estimation of Results

This section present the estimation results of different model specifications for the banks' loan supply function in respect of total outstanding loans. It is divided into four subsections according to the interaction term of each bank specific characteristic included. A robustness check is presented in subsection 6.3.

In selecting the lag length, we decided to include only the contemporary values of the independent regressors and only one lag of the dependent variable. This was done for two reasons: *first,* because we work with annual data set and therefore, including more time lags does not seem appropriate from an economic viewpoint as adjustment in the financial sector is considered to be relatively quick; and *second,* to get a better specification in a statistical sense in selecting the most parsimonious model.

All model specifications are variants of the general form presented in equation 1. However, in our specification search we were aware of the need to specify as parsimonious model as possible, given the need to keep the number of instruments relatively low, and, that as argued above in section 4, in Macedonia there may be less of a rationale for including certain variables than in some other transition countries. Thus, model 1 is modified in respect of the variables included given theoretical arguments advanced in the literature (see section 3).

By estimating the model with 'system' GMM, in order to circumvent the problem of creation of too many instruments due to relatively small N, we have restricted the instrument set. Thus, the total number of instruments created were reduced considerably and ranges from 23 (tables 3 and 4, appendix 1) to 35 (regression 2, table 3, appendix 1).

In estimating each equation, a battery of diagnostic tests are undertaken, and special attention paid to Hansen test for the validity of the instruments and Arellano-Bond test for second order serial correlation in the error terms. The Hansen test is preferred over the Sargan test because the first one is robust in the presence of heteroscedasticity and/or autocorrelation.

The two-step results with Windmeijer (2005) corrected standard errors for total outstanding loans, classified according to the interaction term of each bank specific characteristic (size, liquidity and

capitalisation), are presented in tables 3, 4 and 5 in appendix 1, respectively. All model specifications reported satisfy the criteria of no second order serial correlation in the residuals. The null hypothesis of Arellano-Bond test cannot be rejected at 10% level of significance (tables 3, 4 and 5 in appendix 1). Regarding the validity of the instruments, the results of Hansen test point to non rejection of the null hypothesis of validity of the over-identifying restrictions at 10% level of significance (see tables 3, 4 and 5 in appendix 1).

Where possible, a comparison of the results will be done with the empirical studies conducted for the CSEE economies given that the financial structures in these countries are more like those of Macedonia than those of the developed economies.

In the interpretation of results, the main emphasis will be on short-run estimates. The 3-year long-run cumulative effect will be briefly discussed. The rationale for choosing this period is that in the process of economic transition, other non-economic factors, such as legal reforms, are likely to affect the impact of the right hand side variables over a longer time period. The 3-year cumulative effect, the overall long-run effect[5] and the respective multipliers are provided in tables 6, 7 and 8 in appendix 2.

6.1 Interpretation of the Results for Variables Common to all Model Specifications

The first lag of outstanding loans is, as expected, highly significant and has a positive sign. The coefficient varies from 0.4 (tables 4 and 5,

[5] The overall long-run effect is calculated with the following formula: $\sum_{t} \beta_t$ / (1 - $\sum_{l=1} y_{t-l}$), where β is the coefficient(s) of the independent variable, y is the coefficient(s) of the lagged dependent variable, t is the time subscript and l indicates the number of lags.

appendix 1) to 0.9 (regression 3, table 3, appendix 1), being the highest in the models containing the interaction term of size. The magnitude of this coefficient implies high inertia in the adjustment process of the stock of loans so that high proportion of the current value is determined from the own past value, which may be due to the growing proportion of long-term loans (see section 4). Compared to estimates for other economies, this coefficient is much higher. For example, in the Czech Republic estimates range from -0.11 to 0.078 (Pruteanu-Podpiera, 2007) and this is based on quarterly data. In Ukraine the estimate is 0.12 (Golodnuik, 2006) while in Slovenia, Poland and Hungary the highest estimates are 0.2, 0.3 and 0.3, respectively (Matousek and Sarantis, 2008).

The money market rate (MBKS) in all regressions is negative as expected and is highly significant. The size of the estimates ranges from -5% (tables 3 and 4, appendix 1) to -11% (regression 3, table 5, appendix 1), depending on the model specification. This indicates the existence of a bank lending channel, implying that banks' loan supply function is responsive to changes in interest rate. The sensitivity of loan supply to changes in the interest rate has been estimated as much higher in other economies from CSEE i.e. for the Baltic States it ranges from 12% to 20% (Kohler et al. 2006). However, a more sluggish reaction of loan supply to changes in interest rate is estimated to be 1.3% to 2.2% in Poland (Havrylchyk and Jurzyk 2005) and for the aggregate level of the CSEE economies it has been estimated to be around 2% (Schmitz 2004). The 3-year long-run cumulative effect of MBKS rate is stronger and ranges from -10% (table 7, appendix 2) to - 20% (table 6, appendix 2) with the 3-year multipliers ranging from 1.6 to 2.8 (see tables 6, 7 and 8 in appendix 2).

The price level (CPI) is positive as expected in all model specifications. However, whether it is significant depends upon the benchmark balance sheet item taken and the definition of liquidity used. The CPI has a statistically significant impact in two out of three model specifications containing the interaction term with size (table 3, appendix 1), depending on the definition of liquidity taken. In the model

specification containing the interaction term with capital, it enters significantly only in the regression with the second definition of liquidity (regression 2, table 5, appendix 1); while it does not enter significantly in any of the models containing the interaction term with liquidity (table 4, appendix 1). In the regressions where the price level coefficient is statistically significant, the variation in magnitude of the estimated coefficient is relatively low and ranges from 2.2 (regression 2, table 5, appendix 1) to 4.9 (regression 1, table 3, appendix 1), indicating a high elasticity of the stock of total loans to changes in the price level. This estimated loan elasticity to variations in price level in Macedonia is high compared to estimates for Hungary where the price elasticity is estimated to be much lower between 0.1 to 0.2 (Horvath et al., 2006). In Poland estimates of the price elasticity are more spread out and range from 2 to 10 depending from the model specification (Chmielewski, 2006). Some of the possible reasons for this relatively high sensitivity of loans to price variations in Macedonia are discussed in section 4. The 3-year long-run cumulative effect of the price level is much stronger. The coefficients range from 4.4 (see table 8, appendix 2) to 12.2 (table 6, appendix 2).

The other macroeconomic control variable, GDP, in most of the estimates has a negative sign, which is contrary to what is normally expected. Some possible reasons are considered in section 4. GDP has also been estimated to have a negative effect in many other studies. For example, it is negative in most of the estimates for Poland (Chmielewski, 2006), Slovenia and Hungary (Matousek and Sarantis, 2008) and in some of the estimates for Netherlands (De Haan, 2001) as well as in France and Spain (Ehrmann et al., 2001).

In this study, the effect of GDP is significant only in the third regression containing the interaction term with size (see table 3 in appendix 1). In this specification the size of the coefficient indicates a high elasticity of the stock of loans to output fluctuations. A one percent increase in GDP, on average ceteris paribus, results in reduction of the stock of total loans by 3%. For similar specifications, other studies have estimated coefficients of a comparable size: Poland (Chmielewski,

2006), Slovenia and Hungary (Matousek and Sarantis, 2008). The 3-year long-run cumulative effect of GDP is stronger with multipliers ranging from 1.6 to 2.8 (see tables 6, 7 and 8 in appendix 2).

6.2 Interpretation of the Bank Specific Variables

Regarding the bank specific characteristic that acts as a proxy measure for the banks' attitude towards risk (the interaction term of NPL with the interest rate), according to the results from all the model specifications presented in tables 3, 4 and 5 in appendix 1, it appears to play an important role over the banks' loan supply function. This variable is highly significant and negative, as expected, in all regressions. It is robust to the different model specifications in respect of size and significance of the coefficient, regardless of the bank specific characteristics included. Thus the results indicate that the ratio of non-performing loans may be one of the major determinants of banks' loan supply decisions and may be a good proxy-measure for banks' risk preferences. It implies that when monetary policy tightens, those banks with a higher NPL ratio reduce the quantity of loan supply proportionately more than banks with lower NPL ratio. These results are broadly in line with Chmielewski (2006) where this variable was estimated to be an important determinant for the bank lending channel in Poland, but not with Pruteanu-Podpiera (2007) for the case of Czech Republic, where it had the contrary sign from what was expected (see section 2).

The interaction term of size with the interest rate is insignificant in all three regressions presented in table 3, appendix 1. This suggests that differences in size among banks do not play any significant role in banks' loan supply adjustment when the monetary policy changes. However, there is significant heterogeneous loan supply adjustment among banks in respect of the non-performing loans (see previous section).

The interaction term with liquidity is significant in all three model specifications presented in table 4, appendix 1, being slightly stronger for the second (broader) definition of liquidity. Liquidity may be a proxy variable for the different degree of informational frictions that banks face in the loan market. However, the sign is negative and contrary to economic theory. This coefficient indicates that more liquid banks cut the quantity of loan supply more than proportion when monetary policy tightens compared to less liquid ones.

Similar results, where the interaction term of liquidity is estimated with a negative sign, are presented in the studies by Wrobel and Pawlowska (2002), Havrylchyk and Jurzyk (2005), Chmielewski (2006) and Matousek and Sarantis (2008) conducted for the Polish banking sector and in Kohler et al. (2006) for the Baltic States. Possible explanations for this are presented in section 4. Overall, it seems that the explanation provided by Kohler et al. (2006) coincides with the developments on the Macedonian loan market.

The estimates from the three model specifications in respect of the interaction term with capital are statistically significant as reported in table 5, appendix 1, indicating that banking capital may be an important determinant of the loan supply function. Moreover, this coefficient turned out to be statistically significant and positive as expected in the estimation controlling for the narrowest definition of liquidity (liquid1) estimated with one-step system GMM estimator and in all three model specifications estimated with differenced GMM[6]. However, this variable was estimated to be statistically insignificant in all three regressions estimated with two-step system GMM with Windmeijer (2005) corrected standard errors estimated only by restricting the number of lags used as instruments[7]. In summary, the empirical evidence presented in respect of banking capital as a determinant of the bank lending channel in Macedonia varies with the estimation method and the instruments used

[6] These results are available from the author upon request.
[7] These results are also available from the author upon request.

for the endogenous variables. There is no strong evidence in favour of banking capital being a distinguishing proxy characteristic among banks for the different degrees of informational frictions they face on the loan market.

6.3 Robustness of the Results[8]

The robustness of results has been checked by using different GMM estimators. More precisely, we have re-estimated the same model specifications for the two-step system GMM estimator with Windmeijer (2005) corrected standard errors by restricting the number of lags used as an instrument for each endogenous and/or predetermined variable(s), using the STATA default command xtdpd. We have also re-run the same model specifications with the one-step system GMM estimator with robust standard errors. As additional informal robustness check of the estimates, suggested by Roodman (2006) and Bond (2002), is applied to verify if the estimates of the lagged dependent variable lie between the estimates using FE and OLS. The first method tends to bias the estimates downwards, while the second method tends to bias the estimates upwards.

In re-estimating the same regressions by restricting the number of lags used as instruments, the results regarding the significance and sign of the coefficients are broadly consistent with the two-step estimates reported in the previous subsections and moreover, the magnitude of the coefficients is quite similar as well. The most noticeable difference is that now, the interaction term between capital and the interest rate is insignificant in all three regressions, unlike before (see table 5 in appendix 1), indicating that the estimates are affected by the greater number of instruments created.

In the estimated results with a one-step system GMM estimator with robust standard errors, the results regarding the significance, signs and

[8] The results discussed in this section are available from the author upon request.

size of the estimates are in line with the two-step system GMM estimates presented in the previous subsections.

According to the previously mentioned informal check of robustness, it indicates that the reported estimates in the previous two subsections may be acceptable because the estimates of the lagged dependent variables (the stock of total loans), lie between the estimates obtained by FE and OLS (see the last two columns in tables 3, 4 and 5 in appendix 1) in all but one model specifications, (the exception is regression 3 in table 3, appendix 1).

7. Summary

The aim of this paper was to empirically investigate the bank lending channel and its determinants in the Republic of Macedonia. Given the recent developments in econometric techniques, we use a different estimation method from the rest of the empirical studies in this area that is arguably preferable given the non-stationarity of our data. The factors that were considered to affect the bank lending channel were bank size, liquidity and capitalisation ratio. Unlike most studies, this analysis has included in the model the NPL ratio as a possibly important factor affecting the loan supply function in Macedonia.

The estimates provide evidence in favour of the existence of a bank lending channel. Changes in the interest rate do have significant influence on the loan supply function. Of the bank specific factors as the most influential bank specific characteristics is estimated to be the NPL ratio. This may indicate that banks' risk preference is one of the most important determinant over the bank lending decisions. Regarding the rest of the bank specific characteristics, bank liquidity was estimated with the opposite sign from what is normally argued in the literature, but having in mind that the Macedonian banking system has persistent excess liquidity, the results are in line with the findings by Wrobel and Pawlowska (2002), Havrylchyk and Jurzyk (2005) and Chmielewski (2006) for Poland and Kohler et al. (2006) for the Baltic States; whose

banking systems also have persistent excess liquidity. These findings are robust to different model specifications and different estimation methods.

The evidence on the effect of banking capital is mixed. There is no strong evidence that bank capital may have an influence over the loan supply function; the results are sensitive to different estimation methods and the number of instruments created. The results suggest that asset size does not have any significant influence over the bank lending channel. Bank size was not found to play an important role over the banks' loan supply decisions.

Overall, this analysis has presented empirical evidence indicating that banks indeed, are sensitive to changes in the interest rate and react by adjusting their quantity of loans supplied.

References

Arellano, M.,and Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies, 58: 277-297

Arellano, M., and Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error-Components Models. Journal of Econometrics, 68: 29-51

Ashcraft, A. B. (2006). New Evidence on the Lending Channel. Journal of Money, Credit and Banking, 38: 751–775

Bernanke, B., and Blinder, A. (1988 a). Credit, Money, and Aggregate Demand. American Economic Review, 78(2): 435-439

Bernanke, B., and Blinder, A. (1988 b). 'Credit, Money, and Aggregate Demand. *National Bureau of Economic Research Working Paper* No: 2534

Bernanke, B., and Mihov, I. (1998). Measuring Monetary Policy. Quarterly Journal of Economics, 113(3): 869-902

Blundell, R., and Bond S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. Journal of Econometrics, 87: 115-43

Bolton, P., and Freixas, X. (2006). Corporate Finance and the Monetary Transmission Mechanism. The Review of Financial Studies, 19(3): 829-70

Bond, S. (2002). Dynamic Panel Data Models: A guide to micro data methods and practice. Institute for Fiscal Studies London Working Paper No: 09/02

Chmielewski, T. (2006). Bank Risks, Risk Preferences and Lending. *Munich Personal RePEc Archive*, Online at <http://mpra.ub.uni-muenchen.de/5131/ MPRA Paper No. 5131, posted 07. November 2007 / 04:27>

De Haan, L. (2001). The Credit Channel in the Netherlands: Evidence from Bank Balance Sheets. European Central Bank Working Paper No: 98

De Haas, R.T.A., and Van Lelyveld, I. (2006) Foreign Banks and Credit Stability in Central and Eastern Europe. A panel data analysis. Journal of Banking and Finance, 30: 1927-1952

Ehrmann, M., Gambacorta L., Martinez-Pages J., Sevesrte P., and Worms A. (2001). Financial System and the Role of Banks in Monetary Policy Transmission in the Euro Area. European Central Bank Working Paper No: 105

European Bank for Reconstruction and Development (2008). Transition Report: Growth in transition 2008. London, European Bank for Reconstruction and Development

Gambacorta, L. (2005). Inside the Bank Lending Channel. European Economic Review, 49: 1737-1759

Hahn, J., Kuersteiner, J., and Cho M. H. (2004). Asymptotic Distribution of Misspecified Random Effects Estimator for a Dynamic Panel Model with Fixed Effects When Both n and T are Large. Economic Letters, 84: 117-125

Havrylchyk, O., and Jurzyk E. (2005). Does the Bank Lending Channel Work in a Transition Economy? A Case of Poland. European University Viadrina, mimeo.

Horvath, C., Kreko J., and Naszodi A. (2006). Is There a Bank Lending Channel in Hungary? Evidence From Bank Panel Data. Magyar Nemzeti Bank Working Paper No: 2006/7

Juks, R. (2004) The Importance of the Bank-Lending Channel in Estonia: Evidence from Micro-Economic Data. Working Papers of Eesti Pank No: 6

Kashyap, A. K., and Stein, J. C. (1995). The Impact of Monetary Policy on Bank Balance Sheets. Carnegie-Rochester Conference Series on Public Policy, 42: 151-195

Kashyap, A. K., and Stein J. C. (2000). What Do a Million Observation on Banks Say About the Transmission of Monetary Policy?. American Economic Review, 90: 407-428

Kishan, R., and Opiela, T. (2000). Bank Size, Bank Capital, and the Bank Lending Channel. Journal of Money, Credit and Banking, 32(1): 121-140

Kohler, M., Hommel, J., and Grote, M. (2005). The Role of Banks in the Transmission of Monetary Policy in the Baltics. Zentrum für Europäische Wirtschaftsforschung Discussion Paper No: 10

Loupias, F., Savignac F., and Sevestre, P. (2003) Is There a Bank-Lending Channel in France? Evidence from bank panel data', Banque De France Working Paper No: 92

Martinez-Pages, J., and Hernando, I. (2001). Is There a Bank Lending Channel of Monetary Policy in Spain?. European Central Bank Working Paper No: 99

Matousek, R., and Sarantis, N. (2008). The Bank Lending Channel and Monetary Transmission in Central and Eastern European Countries. Journal of Comparative Economics, available on-line: <http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WHV-4THC1DT-2&_user=10&_rdoc=1&_fmt=&_orig=search &_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid =10&md5=24745b9f6141b83feabfbd5d2c6f0089>

National Bank of the Republic of Macedonia (2007, a). Annual Report 2007. Skopje, National Bank of the Republic of Macedonia

National Bank of the Republic of Macedonia (2002). Annual Report 2002. Skopje, National Bank of the Republic of Macedonia

National Bank of the Republic of Macedonia (2001). Annual Report 2001. Skopje, National Bank of the Republic of Macedonia

National Bank of the Republic of Macedonia (2007, b). Annual Report on Banking System and Banking Supervision of the Republic of Macedonia 2007. Skopje, National Bank of the Republic of Macedonia

National Bank of the Republic of Macedonia (2007, c). Annual Report for the Financial Stability in the Republic of Macedonia in 2007. Skopje, National Bank of the Republic of Macedonia

Pruteanu-Podpiera, A. M. (2007)The Role of Banks in the Czech Monetary Policy Transmission Mechanism. Economics of Transition, 15(2): 393-428

Roodman, D. (2008). A Short Note on the Theme of Too Many Instruments. Centre for Global Development Working Paper No: 125, available on the web-site: <http://www.google.co.uk/search?hl=en&q=Roodman %2C+D. +%282007%29+A+short+ note + on+ the+ theme +of+ too +many+ instruments. +&btnG=Google+ Search&meta>

Roodman, D. (2006). How to do xtabond2: An Introduction to 'Difference' and 'System' GMM in STATA. Center for Global Development, *Working Paper* No: 103 (December). <http://www.cgdev.org/content/publications/detail/11619>

Schmitz, B. (2004). What Role Banks Play in Monetary Policy Transmission in EU New Member Countries?. Center for European Integration Studies (ZEI), Bonn Graduate School of Economics, University of Bonn

Stiglitz, J. E., and Weiss A. (1981). Credit rationing in markets with imperfect information. American Economic Review, 71(3): 393-410

Windmeijer, F. (2005) A Finite Sample Correction for the Variance of Linear Efficient two-step GMM Estimators. Journal of Econometrics, 126: 25-51

Wrobel, E., and Pawlowska, M. (2002). Monetary Transmission in Poland: some evidence on interest rate and credit channels. National Bank of Poland Working Paper, No: 24

Appendix 1.

Table 3. Estimates of outstanding loans with interaction effects with respect to size, two-step system GMM with Windmeijer (2005) corrected standard errors (W-C S.E.) by restricting and collapsing the instrument set with the command xtabond2

	Regression 1	Regression 2	Regression 3
VARIABLES:	Controlling for liquid1	Controlling for liquid2	Controlling for liquid3
L.lLoansT	**0.794***	**0.811****	**0.921****
W-C S.E.	-0.402	0.345	-0.406
p-value	0.063	0.030	0.035
MBKS	**-0.066****	**-0.049***	**-0.07****
W-C S.E.	-0.024	0.025	-0.028
p-value	0.013	0.063	0.022
lCPI1	**4.906***	**3.386***	4.213
W-C S.E.	-2.447	1.894	-3.885
p-value	0.060	0.090	0.292
lGDPr	-1.621	-1.603	**-3.181****
W-C S.E.	-1.458	2.656	-1.513
p-value	0.280	0.553	0.049
CapitalNorm	0.487	-0.039	-0.755
W-C S.E.	-1.905	1.372	-0.705
p-value	0.801	0.977	0.298
Liquid1Norm	-0.319		
W-C S.E.	-1.656		
p-value	0.849		
Liquid2Norm		-0.598	
W-C S.E.		0.626	
p-value		0.352	
Liquid3Norm			-0.404
W-C S.E.			-1.591
p-value			0.802
SizeMBKS	-0.005	-0.011	-0.019
W-C S.E.	-0.015	0.014	-0.019
p-value	0.742	0.451	0.329
NPLTMBKS	**-0.018***	**-0.011***	**-0.019*****
W-C S.E.	-0.009	0.006	-0.006
p-value	0.058	0.081	0.006
Constant	0.189	6.827	20.840
W-C S.E.	-18.980	24.252	-21.910
p-value	0.992	0.781	0.353
Number of observations	125	125	125
Number of banks	20	20	20
Number of instruments	23	35	29
Number of lags for the differenced equation	4-5	2-5	3-5
Number of lags for the level equation	1	1	2
F test (p-value)	F(8, 19) = 72.64 (0.000)	F(8, 19) = 46.71 (0.000)	F(8, 19) = 112.09 (0.000)
AR(1)/(p-value)	-1.04 (0.297)	-1.82 (0.069)	-1.86 (0.063)
AR(2)/(p-value)	-1.44 (0.150)	-1.27 (0.203)	-1.39 (0.165)
Hansen (p-value)	chi2(14) = 9.88 (0.771)	chi2(26) = 5.77 (1.00)	chi2(20) = 10.54 (0.957)
Diff. in Hansen (p-value)	chi2(8) = 3.92 (0.864)	chi2(8) = -3.54 (1.00)	chi2(8) = 2.39 (0.967)
Estimates of L.lLoansT with FE	0.586	0.415	0.392
Estimates of L.lLoansT with OLS	0.858	0.907	0.864

*** / ** / * denotes significance at 1%, 5% and 10% level of significance, respectively.

Computations have been done in STATA 10

Table 4. Estimates of outstanding loans with interaction effects with respect to liquidity, two-step system GMM with Windmeijer (2005) corrected standard errors (W-C S.E.) by restricting and collapsing the instrument set with the command xtabond2

	Regression 1	Regression 2	Regression 3
VARIABLES:	Liquidity 1	Liquidity 2	Liquidity 3
L.lLoansT	**0.577*** **	**0.390** **	**0.534*** **
W-C S.E.	-0.180	-0.181	-0.132
p-value	0.005	0.045	0.001
MBKS	**-0.061** **	**-0.064** *	**-0.054*** **
W-C S.E.	-0.022	-0.034	-0.019
p-value	0.013	0.074	0.010
lCPI1	4.670	2.223	3.032
W-C S.E.	-3.444	-1.881	-2.066
p-value	0.191	0.252	0.159
lGDPr	-0.136	1.397	0.590
W-C S.E.	-1.508	-1.759	-1.296
p-value	0.929	0.437	0.654
SizeNorm	0.422	**0.810*** **	**0.543** **
W-C S.E.	-0.293	-0.177	-0.202
p-value	0.166	0.000	0.014
CapitalNorm	0.325	0.340	0.246
W-C S.E.	-0.906	-0.554	-0.733
p-value	0.724	0.547	0.741
Liquid1MBKS	**-0.132** *		
W-C S.E.	-0.074		
p-value	0.090		
Liquid2MBKS		**-0.200** *	
W-C S.E.		-0.102	
p-value		0.065	
Liquid3MBKS			**-0.091** *
W-C S.E.			-0.048
p-value			0.072
NPLTMBKS	**-0.02*** **	**-0.018*** **	**-0.016*** **
W-C S.E.	-0.006	-0.005	-0.004
p-value	0.007	0.001	0.001
Constant	-14.030	-18.730	-14.650
W-C S.E.	-17.060	-15.200	-14.630
p-value	0.421	0.233	0.329
Number of observations	125	125	125
Number of banks	20	20	20
Number of instruments	34	24	23
Number of lags for the differenced equation	4-6	3-4	4-5
Number of lags for the level equation	2-3	1	1
F test (p-value)	F(8, 19) = 180.68 (0.000)	F(8, 19) = 207.47 (0.000)	F(8, 19) = 112.54 (0.000)
AR(1)/(p-value)	-1.56 (0.207)	-1.45 (0.146)	-1.35 (0.177)
AR(2)/(p-value)	-1.56 (0.119)	-1.18 (0.237)	-1.49 (0.135)
Hansen (p-value)	chi2(25) = 11.63 (0.989)	chi2(15) = 9.62 (0.843)	chi2(14) = 10.21 (0.747)
Diff. in Hansen (p-value)	chi2(14) = 1.45 (1.00)	chi2(8) = 0.74 (0.999)	chi2(8) = 6.12 (0.634)
Estimates of L.lLoansT with FE	0.369	0.326	0.294
Estimates of L.lLoansT with OLS	0.733	0.847	0.811

*** / ** / * denotes significance at 1%, 5% and 10% level of significance, respectively.

Computations have been done in STATA 10

Table 5. Estimates of outstanding loans with interaction effects with respect to capital, two-step system GMM with Windmeijer (2005) corrected standard errors (W-C S.E.) by restricting and collapsing the instrument set with the command xtabond2

	Regression 1	Regression 2	Regression 3
VARIABLES:	Controlling for liquid1	Controlling for liquid2	Controlling for liquid3
L.lLoansT	**0.623*** **	**0.563*** **	**0.389***
W-C S.E.	-0.139	-0.118	-0.215
p-value	0.000	0.000	0.086
MBKS	**-0.060*** **	**-0.056** **	**-0.113*** **
W-C S.E.	-0.020	-0.027	-0.033
p-value	0.008	0.049	0.003
lCPI1	0.742	**2.248***	0.067
W-C S.E.	-1.800	-1.142	-1.581
p-value	0.685	0.064	0.967
lGDPr	0.388	0.730	-0.317
W-C S.E.	-0.994	-1.164	-1.487
p-value	0.701	0.538	0.834
SizeNorm	**0.581*** **	**0.715*** **	**0.824*** **
W-C S.E.	-0.135	-0.210	-0.239
p-value	0.000	0.003	0.003
Liquid1Norm	0.045		
W-C S.E.	-0.331		
p-value	0.895		
Liquid2Norm		-0.424	
W-C S.E.		-0.409	
p-value		0.313	
Liquid3Norm			-1.457
W-C S.E.			-0.917
p-value			0.129
CapitalMBKS	**0.085*** **	**0.093*** **	**0.067***
W-C S.E.	-0.021	-0.017	-0.035
p-value	0.001	0.000	0.072
NPLTMBKS	**-0.014*** **	**-0.019*** **	**-0.015*** **
W-C S.E.	-0.004	-0.005	-0.002
p-value	0.001	0.002	0.000
Constant	-2.576	-13.130	12.960
W-C S.E.	-8.778	-13.410	-17.900
p-value	0.772	0.340	0.478
Number of observations	125	125	125
Number of banks	20	20	20
Number of instruments	24	30	24
Number of lags for the differenced equation	2-3	2-4	2-3
Number of lags for the level equation	1	1	1
F test (p-value)	F(8, 19) = 153.79 (0.000)	F(8, 19) = 101.74 (0.000)	F(8, 19) = 139.04 (0.000)
AR(1)/(p-value)	-0.96 (0.336)	-0.98 (0.327)	-1.56 (0.120)
AR(2)/(p-value)	-1.60 (0.110)	-1.62 (0.106)	-0.92 (0.360)
Hansen (p-value)	chi2(15) = 3.97 (0.998)	chi2(21) = 6.45 (0.999)	chi2(15) = 6.95 (0.959)
Diff. in Hansen (p-value)	chi2(8) = 1.57 (0.991)	chi2(8) = -9.77 (1.00)	chi2(8) = -3.02 (1.00)
Estimates of L.lLoansT with FE	0.452	0.367	0.330
Estimates of L.lLoansT with OLS	0.685	0.726	0.706

*** / ** / * denotes significance at 1%, 5% and 10% level of significance, respectively.

Computations have been done in STATA 10

Appendix 2. Long-run coefficients of total outstanding loans, two-step system GMM estimates with Windmeijer (2005) corrected standard errors

Table 6. Long-run estimates of total outstanding loans with interaction effects with respect to size, two-step system GMM with Windmeijer (2005) corrected standard errors (W-C S.E.)

Variables:	1st YEAR	2nd YEAR	3rd YEAR	3-year cumulative	3-year multiplier:	Long-run	Long-run multiplier
MBKS	-0.066	-0.052	-0.046	-0.165	2.494	-0.320	4.854
lCPI1	4.906	3.895	3.436	12.238	2.494	23.816	4.854
lGDPr	-1.621	-1.287	-1.135	-4.043	2.494	-7.869	4.854
CapitalNorm	0.487	0.387	0.341	1.215	2.494	2.364	4.854
Liquid1Norm	-0.319	-0.253	-0.223	-0.796	2.494	-1.549	4.854
SizeMBKS	-0.005	-0.004	-0.003	-0.012	2.494	-0.024	4.854
NPLTMBKS	-0.018	-0.014	-0.013	-0.045	2.494	-0.087	4.854
MBKS	-0.049	-0.040	-0.036	-0.124	2.539	-0.259	5.291
lCPI1	3.386	2.746	2.464	8.596	2.539	17.915	5.291
lGDPr	-1.603	-1.300	-1.167	-4.070	2.539	-8.481	5.291
CapitalNorm	-0.039	-0.032	-0.028	-0.099	2.539	-0.206	5.291
Liquid2Norm	-0.598	-0.485	-0.435	-1.518	2.539	-3.164	5.291
SizeMBKS	-0.011	-0.009	-0.008	-0.028	2.539	-0.058	5.291
NPLTMBKS	-0.011	-0.009	-0.008	-0.028	2.539	-0.058	5.291
MBKS	-0.070	-0.064	-0.063	-0.197	2.819	-0.886	12.658
lCPI1	4.213	3.880	3.784	11.877	2.819	53.329	12.658
lGDPr	-3.181	-2.930	-2.857	-8.968	2.819	-40.266	12.658
CapitalNorm	-0.755	-0.695	-0.678	-2.129	2.819	-9.557	12.658
Liquid3Norm	-0.404	-0.372	-0.363	-1.139	2.819	-5.114	12.658
SizeMBKS	-0.019	-0.018	-0.017	-0.054	2.819	-0.243	12.658
NPLTMBKS	-0.019	-0.017	-0.017	-0.054	2.819	-0.241	12.658

Table 7. Long-run estimates of total outstanding loans with interaction effects with respect to liquidity, two-step system GMM with Windmeijer (2005) corrected standard errors (W-C S.E.)

Variables:	1st YEAR	2nd YEAR	3rd YEAR	3-year cumulative	3-year multiplier:	Long-run	Long-run multiplier
MBKS	-0.061	-0.035	-0.025	-0.121	1.980	-0.144	2.364
lCPI1	4.670	2.695	1.882	9.246	1.980	11.040	2.364
lGDPr	-0.136	-0.078	-0.055	-0.269	1.980	-0.322	2.364
SizeNorm	0.422	0.243	0.170	0.836	1.980	0.998	2.364
CapitalNorm	0.325	0.188	0.131	0.643	1.980	0.768	2.364
Liquid1MBKS	-0.132	-0.076	-0.053	-0.261	1.980	-0.312	2.364
NPLTMBKS	-0.020	-0.012	-0.008	-0.040	1.980	-0.047	2.364
MBKS	-0.064	-0.025	-0.014	-0.103	1.612	-0.105	1.639
lCPI1	2.223	0.867	0.494	3.584	1.612	3.644	1.639
lGDPr	1.397	0.545	0.310	2.252	1.612	2.290	1.639
SizeNorm	0.810	0.316	0.180	1.306	1.612	1.328	1.639
CapitalNorm	0.340	0.133	0.076	0.548	1.612	0.557	1.639
Liquid2MBKS	-0.200	-0.078	-0.044	-0.322	1.612	-0.328	1.639
NPLTMBKS	-0.018	-0.007	-0.004	-0.029	1.612	-0.030	1.639
MBKS	-0.054	-0.029	-0.019	-0.102	1.889	-0.116	2.146
lCPI1	3.032	1.619	1.077	5.728	1.889	6.506	2.146
lGDPr	0.590	0.315	0.210	1.115	1.889	1.266	2.146
SizeNorm	0.543	0.290	0.193	1.026	1.889	1.165	2.146
CapitalNorm	0.246	0.131	0.087	0.465	1.889	0.528	2.146
Liquid3MBKS	-0.091	-0.049	-0.032	-0.172	1.889	-0.195	2.146
NPLTMBKS	-0.016	-0.009	-0.006	-0.030	1.889	-0.034	2.146

Table 8. Long-run estimates of total outstanding loans with interaction effects with respect to capital, two-step system GMM with Windmeijer (2005) corrected standard errors (W-C S.E.)

Variables:	1st YEAR	2nd YEAR	3rd YEAR	3-year cumulative	3-year multiplier:	Long-run	Long-run multiplier
MBKS	-0.060	-0.037	-0.027	-0.125	2.081	-0.159	2.653
lCPI1	0.742	0.462	0.340	1.544	2.081	1.968	2.653
lGDPr	0.388	0.242	0.178	0.807	2.081	1.029	2.653
SizeNorm	0.581	0.362	0.266	1.209	2.081	1.541	2.653
Liquid1Norm	0.045	0.028	0.020	0.093	2.081	0.118	2.653
CapitalMBKS	0.085	0.053	0.039	0.177	2.081	0.225	2.653
NPLTMBKS	-0.014	-0.009	-0.006	-0.029	2.081	-0.037	2.653
MBKS	-0.056	-0.032	-0.022	-0.109	1.950	-0.128	2.288
lCPI1	2.248	1.266	0.870	4.384	1.950	5.144	2.288
lGDPr	0.730	0.411	0.282	1.423	1.950	1.670	2.288
SizeNorm	0.715	0.403	0.277	1.394	1.950	1.636	2.288
Liquid2Norm	-0.424	-0.239	-0.164	-0.827	1.950	-0.970	2.288
CapitalMBKS	0.093	0.052	0.036	0.181	1.950	0.213	2.288
NPLTMBKS	-0.019	-0.011	-0.007	-0.037	1.950	-0.043	2.288
MBKS	-0.113	-0.044	-0.025	-0.182	1.610	-0.185	1.637
lCPI1	0.067	0.026	0.015	0.108	1.610	0.109	1.637
lGDPr	-0.317	-0.123	-0.070	-0.510	1.610	-0.519	1.637
SizeNorm	0.824	0.321	0.182	1.327	1.610	1.349	1.637
Liquid3Norm	-1.457	-0.567	-0.322	-2.346	1.610	-2.385	1.637
CapitalMBKS	0.067	0.026	0.015	0.108	1.610	0.110	1.637
NPLTMBKS	-0.015	-0.006	-0.003	-0.024	1.610	-0.025	1.637