What Role do Banks play in Monetary Policy Transmission in EU New Member Countries?

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Abstract

After the accession of the candidate countries to the European Union in 2004, the European Central Bank will soon need to pursue monetary policy in an enlarged euro zone. The paper empirically investigates the role of banks in monetary policy transmission in the EU new member countries. Banks are of major importance for the financing of firms and thus the adjustment of their lending in response to monetary policy actions potentially constitutes an important channel through which monetary policy works. Banks are exposed to problems of asymmetric information therefore it is shown that a change in interest rates has distributional effects across banks facing different degrees of informational asymmetries. This paper tests the prediction that banks differ in the characteristics such as relative size, level of liquidity, capitalization and ownership structure contributing to various reactions in response to monetary tightening.

JEL codes: E50, E52, G21, C23, P 34

Key words: monetary policy, bank lending channel, EU-accession countries, balance sheet data

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1. Introduction

Ten Central and Eastern European Countries (CEEC) have applied for membership in the European Union (EU) and eight of them will join on May 1, 2004 as has been agreed at the Copenhagen Summit.[2] The basic principle of the accession negotiations has been that all applicant countries must adopt existing EU law, the so called Acquis Communautaire. Therefore the new member states will participate in the EMU but with derogations. While not yet adopting the euro, they will be committed to joining the single currency at a later stage upon fulfillment of the convergence criteria laid down in the treaty.[3] The new members have to join the European Exchange Rate Mechanisms (ERM II) for at least two years before joining the EMU, so they could introduce the single currency, conditional on the fulfillment of the convergence criteria, in 2006 the earliest.

Since January 1999 the European Central Bank (ECB) has assumed the responsibility for monetary policy in the euro area. Currently there are 12 EMU member states, a number which will increase soon. The ECB will need to have an accurate assessment of the monetary transmission mechanism in the acceding countries to pursue a common monetary policy in an enlarged euro zone. In particular, asymmetries in the monetary transmission between current and future members of EMU are of policy interest. The transmission of monetary policy can operate through the interest rate, several asset price channels, expectation and uncertainty channels, and the credit channel. Conventional explanations of how interest rate effects reflect the impact of monetary policy on consumption and investment expenditure fail to explain the empirical evidence. The focus of research has therefore shifted towards the credit channel. As pointed out e.g. in Bernanke and Gertler (1995) and Cecchetti (1995), the credit channel is important in the presence of asymmetric information in financial markets. Because of such asymmetries between borrowers and lenders, some firms of the private sector depend on the banking system for external finance. Financial intermediaries such as banks are able to build relationships with their borrowers that reduce informational asymmetry and permit monitoring of borrower activities.

The financial sectors in the acceding countries differ from those in the EU in several aspects. First, the average of the eight countries is characterized by a low level of financial intermediation. Banking assets in percent of GDP amount to one third of the euro area average of 265 % of GDP, domestic credit to only 65% of GDP compared to 135 % in the euro area[4]. This low level of intermediation is not only a legacy of the socialist system in which banking did not exist but also a

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[2] The paper concentrates on the EU new member countries which belong to the transition economies; hence Malta and Cyprus are left out in the following analysis.

[3] ECB (2004), p. 45.

consequence of the strong economic downturns in the early 1990s which were accompanied by bad-debt problems and corporate defaults. At the same time the private banking sector had to be established and the necessary legal framework had to be set in place. Banking crises in several EU new member countries reduced banks' assets further and adversely affected their lending behavior due to the preference to hold government securities or liquid assets on their balance sheets.[5]

Second, the capital markets are underdeveloped and financing is strongly bank-dominated. In the EU new member countries, capital markets provide only little funding to the corporate sector as an external source of finance. Taking into account that GDP levels are still quite low, the volume of the capital markets in absolute terms is small, in an international context only the capital markets of Poland, the Czech Republic and Hungary play some role. The stock market capitalization in percent of GDP is only 16% compared to 72% in the euro area. The ratio of bank credit over stock market capitalization is an indicator for the importance of market-based compared to bank-based financing. The euro area, which is banking dominated compared with the U.S.A. or UK, has a ratio of 1.8; the CEEC countries show a ratio of 2.8, which shows that bank credit is the major source of financing for the corporate sector, besides internal financing, which often also takes place through inter-company loans extended by the foreign parent company.

Third, a high degree of foreign involvement can be observed in almost all financial market segments of EU new member countries, but is particularly strong in the banking sector.[6] About two thirds of banks are foreign-owned and in most EU new member countries at least four out of five of the biggest banks are foreign-owned.[7] Most foreign owners are West European banks reflecting the fact that the degree of integration of the EU new member countries' banking markets with the euro area is already high.

The banking sector itself had to undergo deep reforms during the transition from a centrally planned to a market economy. In the first half of the 1990s the banking sector experienced a boom, licenses were easy to get and, therefore, the number of banks increased strongly, e.g. in the case of Hungary by almost 50%. In the second half of the 1990s, the sector experienced a period of strong consolidation due to stronger competition from foreign banks and implementation and stricter application of banking regulation by the supervisory authorities. In Hungary the number of banks dropped to pre-transition figures, the percentage of domestic-owned banks decreased from 70% in 1990 to 18% in 2000.

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[4] See for more detailed information on the financial sectors in EU new member countries ECB (2002).
[5] See ECB (2002).
[6] See also ECB (2004).
[7] See ECB (2002).

Taking the important role of bank credit for corporate financing and the strong dynamics in the banking sector into account, particularly interesting questions from a monetary policy viewpoint are: What is the role of banks in monetary transmission in the EU new member countries? Do the effects of monetary policy depend on the type of bank? Are current and future EMU members different in this respect?

The present paper aims at analyzing the bank lending channel of monetary policy transmission in the EU new member countries: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia. It makes use of a panel of balance sheet data covering 261 banks in this region. Bank lending in EU new member countries is found to already react strongly to the euro area interest rate. Furthermore, the banking sector can be subdivided into two groups according to the ownership structure. The foreign-owned banks show a much stronger response to euro area monetary policy than the domestic-owned competitors. Finally, there is some weak evidence for a bank lending channel operating through the size of a bank.

The remainder of the paper is organized as follows. Section 2 gives a short overview of the theoretical background of the credit channel and shows the main results of the empirical literature. Section 3 will introduce the microeconomic and macroeconomic data and show some descriptive figures for the bank characteristics. Section 4 presents the estimation strategy and results and the last section concludes.

2. Literature Review

The credit view of the monetary transmission mechanism emphasizes the relevance of asymmetric information between lenders and borrowers, which can result in adverse selection and moral hazard problems in financial markets. The literature focuses on two different channels following from the credit view: the broad or balance sheet channel and the narrow or bank lending channel. With respect to the bank lending channel, Mishkin (1996) points out that banks play a special role in the financial system, because they are well suited to solve problems of asymmetric information in credit markets by building long-term relationships with their borrowers and an by their monitoring activities. This type of intermediated finance cannot easily be replicated by impersonal securities markets and, therefore, firms without access to stock and bond markets depend on the banking system for external finance.

According to the bank lending channel, a restrictive monetary policy will decrease bank reserves and thus lead to a decline in the amount of reservable bank deposits a bank can attract. In the case of imperfect substitutability of retail bank deposits with other sources of funds; loan supply will

contract in reaction to restrictive monetary policy. The strength of the reaction depends on the informational frictions a bank faces when trying to attract new funds and the ability to rearrange the asset side of its balance sheet. If banks have a special role in solving the asymmetric information problem, they will act as lenders to a specific type of borrowers. This includes for example small, new or innovative firms without access to stock and bond markets, which have to use retained earnings to finance investment or borrow from banks. After a bank loan supply contraction these companies in particular face a 'credit crunch' in addition to the monetary policy effects through the interest rate channel. Thus, a contractionary monetary impulse affects investment projects financed by bank credit more than stock and bond financed projects. In this respect, the bank lending channel differs from the interest rate channel. The existence of a bank lending channel leads to asymmetric effects of monetary policy on the investment behavior of firms.[8] Two key factors thus determine the effectiveness of monetary policy through the bank lending channel:

1) The extent to which banks rely on reservable deposit financing and adjust their loan supply schedules following changes in bank reserves, and

2) The extent to which certain borrowers are bank-dependent and cannot easily offset these shifts in bank loan supply.

Numerous studies use aggregate credit volumes to prove the existence of a bank lending channel; Bernanke and Blinder (1992) show that changes in the stance of monetary policy are followed by significant movements in aggregate bank lending volume. This is consistent with the lending view, but as Cecchetti (1995), among others, argues, the result also allows another interpretation: Economic activity is being depressed via standard interest rate effects, and it is a decline in loan demand, rather than loan supply, that drives the result. He concludes that it is almost impossible to extract from aggregate data the information needed to properly identify the different channels of monetary transmission, since the overall effect is the same; only the distributional consequences across banks and firms are different.

Kashyap and Stein (1995 and 2000) develop a new approach by studying the monetary transmission mechanism with microeconomic data of individual bank balance sheets. In their panel data analysis, they use quarterly data of every insured U.S. commercial bank from 1976 to 1993. Proxies for the informational asymmetries of a bank are the liquidity of its balance sheet and its size measured in total assets. They find that the impact of monetary policy on lending is stronger for banks with less liquid balance sheets. Moreover, this pattern is largely attributable to smaller banks. Their result

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[8] An analysis of the second factor would rely on investment data at an individual firm level which is hardly available for transition economies at this point, thus this paper concentrates on the first factor.

supports the existence of a bank lending channel in the U.S.. Peek and Rosengren (1995), Kishan and Opiela (2000) and Van den Heuvel (2002) among others emphasize that a bank's equity position can affect the strength of the lending channel by mitigating the adverse selection or moral hazard problems in the market for non-reservable bank liabilities. Comparing two banks which have equally risky assets, the liabilities of the bank with the lower equity ratio are more risky because it has less equity to absorb future losses. The paper by Kishan and Opiela (2000) investigates this hypothesis empirically. They examine quarterly balance sheets of U.S. banks from 1980 to 1995 and find that the loans of small and undercapitalized (capitalization <5%) banks are most responsive to monetary policy. They point out that a central bank policy which aims at increasing capital requirements to support the stability of the banking system could lead at the same time to a banking system that is less responsive to monetary policy.

For Europe de Bondt (1999) and Favero, Giavazzi and Flabbi (1999) are early empirical studies of the role of banks in monetary transmission. Favero, Giavazzi and Flabbi (1999) use a cross section of bank's balance sheet data from the database BankScope for France, Germany, Italy and Spain to perform case studies on the response of banks to the monetary tightening in 1992. Although they do not find evidence of a significant response of bank loans to the monetary contraction, they can show significant differences both across countries and across banks of different sizes in the factors that allow them to shield their supply of loans from a squeeze in liquidity. De Bondt (1999) considers six European countries (Germany, France, Italy, the United Kingdom, Belgium and the Netherlands) and runs estimations for each country separately with bank-level data for the time period of 1990-1995. His findings provide strong support for the existence of a bank lending channel in Germany, Belgium and the Netherlands, in these countries the loan supply effects are especially strong for small and relatively illiquid banks.

The bank lending channel has attracted attention with the start of the European Monetary Union. Ehrmann et al. (2003) investigate the financial systems and the role of banks in monetary policy transmission in the euro area as a whole. They check whether banks with different characteristics like size, liquidity and capitalization react differently to monetary policy. The authors compare results gained with data from national central banks with the results when publicly available data of BankScope is used. They conclude that the results differ because BankScope suffers from a representation bias. Since small banks are not covered adequately, the micro econometric distributional effects are estimated on a selected sample of banks and are overall not very robust. The central bank datasets however are able to produce very stable results. They suggest that the liquidity position of a bank determines its loan supply response to monetary policy. The less liquid,

the stronger is the reaction of a bank. The bank characteristics size and capitalization do not seem to play a decisive role. The overall macroeconomic quantitative effect that bank lending contracts significantly after a monetary tightening both on the euro area aggregate as well as on the country level is robust across the two types of datasets.

Parallel to the approach of Kishan and Opiela (2000) for the US, Altunbas et al. (2002) investigate in a panel study for Europe the bank lending channel in the euro area. Using BankScope balance sheet data they estimate the response of bank lending to changes in the monetary policy stance between 1991 and 1999. They find that across the EMU system undercapitalized banks of any size tend to respond more to a change in policy than banks with a higher capitalization.

Gambacorta (2004) uses banks' prices instead of loan quantities to investigate the bank lending channel. Studying cross-sectional differences in banks interest rates of 73 Italian banks he finds that interest rates on short-term lending of liquid and well-capitalized banks react less to a monetary policy shock.

Ashcraft (2001) discusses the importance of ownership structure for the working of the lending channel. He argues that affiliated banks react less sensitively to increases in the monetary policy interest rate because the presence of internal capital markets weakens the influence of the financial constraint faced by the subsidiary bank. He finds evidence for this hypothesis in an analysis of U.S. banking data on affiliated and non-affiliated banks. De Bondt (1999) subdivides the sample between foreign and domestic-owned banks, putting forward that foreign-owned banks may have better access to the international capital markets and other foreign sources of funds than much larger wholly domestic-owned banks. Monetary policy contractions may be tempered by the ability of international banks to borrow funds offshore. He finds stronger evidence for a lending channel when foreign banks are dropped from the sample. Pill (1997) goes even further in his paper by arguing that the credit channel may even work in the opposite direction to the interest rate channel in a small open economy. After an increase in domestic interest rates the incentive to raise funds abroad to finance domestic lending increases. Banks with better access to foreign sources of funds will enjoy a comparative advantage over banks that are dependent on domestic non-deposit funding, foreign-owned banks are therefore likely to gain market share. He finds evidence for this behavior in Spain between 1985-1996 when foreign-owned banks increased their lending to Spanish residents following an unanticipated rise in official interest rates.

Only two papers deal with emerging and transition economies. Vazquez (2003) looks at the international evidence on the lending channel of monetary transmission. The bank lending channel can be expected to be even stronger in countries with less developed capital markets, where firms

can rely only on banks for external financing. Therefore, he suggests using cross-country variation to investigate the loan supply response with respect to monetary policy. He uses data from Worldscope (similar to BankScope) on 832 banks in emerging and developed countries during 1986-1998, to test for systematic cross-sectional differences in the response of loan growth to money market rates. The results support the hypothesis that the bank lending channel is particularly strong in emerging countries, and this effect is even stronger for smaller banks.

Opiela (2002) analyzes the behavior of Polish banks between 1995 and 1999. The paper identifies differentially applied deposit guarantees as another decisive bank characteristic which shapes the loan supply behavior of banks to monetary policy. Banks with explicit full deposit guarantees given by the government contract their loan supply less than banks with only partial guarantees. Furthermore there is evidence that the fully guaranteed banks have a higher ability to raise low-reserve or uninsured time deposits after a monetary contraction. Explicit deposit guarantees play thus a role in reducing the informational frictions a bank faces when drawing new funds.

In summary, the theoretical and empirical literature finds that bank characteristics like size, liquidity, capitalization, deposit guarantees, and ownership structure determine its loan supply response after a restrictive monetary policy action. These characteristics reflect the informational frictions a bank faces when trying to attract new funds to finance its loan supply. The prediction is that the more liquid a bank's balance sheet, the easier it is for the bank to reshuffle funds on the asset side of its balance sheet to shield its lending activity from restrictive policy shocks. The bigger a bank and the higher its capitalization, the more easily it can attract new funds through non-reservable deposits or issuing certificates of deposits to secure its loan portfolio. Being affiliated with a larger institution or foreign-owned decreases the effects of asymmetric information in the local capital market, since the bank has access to an internal or foreign capital market in addition to the local market for deposits.

The bank lending channel has been empirically analyzed for the U.S. and the current EMU members; but a study for the future monetary union members is so far missing. This paper aims at closing this gap by performing a panel analysis of the bank lending channel in the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia.

3. Data

3.1. Micro Data

I use annual balance sheet data dating from 1990 to 2001 for 261 banks operating in the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia. The data stem from two issues)[9] of BankScope, a commercially distributed database.[10] It contains yearly balance sheets and profit and loss data for individual banks in a large number of countries. Overall, the banking sample for the EU new member countries covers on average between 70-90% of total banking assets.[11]

Financial institutions which do not fulfill the two main functions of financial intermediation, taking in deposits and extending loans such as investment houses are excluded from the sample. Table 1 gives an overview of the representation of the different countries in the sample.

Year\Country	CZ	EE	HU	LV	LT	PL	SK	SI	ALL
1990	4	0	7	0	0	0	1	2	14
1991	7	1	9	0	0	7	3	2	28
1992	13	4	19	2	2	22	5	7	74
1993	17	7	24	7	7	28	7	10	107
1994	24	9	32	15	7	40	12	14	155
1995	27	11	34	19	6	43	15	19	174
1996	28	10	27	17	7	42	19	25	175
1997	28	10	29	23	8	44	22	25	189
1998	25	4	28	20	8	41	22	21	169
1999	27	4	32	19	8	44	19	20	173
2000	26	4	34	20	9	40	20	20	173
2001	16	3	22	14	5	21	13	15	109

Table 1: Number of banks by year and country in the sample.

The majority of banks reside in Poland, Hungary and the Czech Republic. In the early years the sample size is rather small but shows quite well the fast increase in bank start-ups at the beginning of the transition process, as well as the consolidation process later on. A lot of new banks were

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[9] BankScope keeps only the last eight years of data, so that a lot of banks which terminated their business around 1997 did not have enough time observations to make the panel data analysis feasible. Therefore I decided to merge two issues, January 1997 and September 2002, of the database.
[10] BankScope is maintained by the company Bureau van Dijks and Fitch IBCA.
[11] Own calculations. I compared total assets for each country from my sample with data in the International Financial Statistics for the asset side of the banking sector (data series 20-22).

established, but many of them stopped to exist after a few years of operations or merged with other banks. As a result, my panel is an unbalanced one with the number of observations varying across banks.

I use the balance sheet data denominated in local currency. Alternatively, one could convert the balance sheets in US dollars. This, however, would lead to the inclusion of exchange rate fluctuations vis-à-vis the dollar which could have diminished the comparability between banks' balance sheets across countries and years. The BankScope data base offers the choice between consolidated and unconsolidated balance sheets. In order to assess financial constraints and informational asymmetries of a bank, it is important to know whether a bank is in fact a subsidiary of another, potentially large and well-known bank. In such cases, using the subsidiary's unconsolidated balance sheet would lead to a biased measurement of the informational frictions the bank faces. For the purpose of this paper I opted for consolidated balance sheets whenever available, and unconsolidated balance sheets otherwise.

Before the data was used for estimation I set observations with zero or negative capitalization to be missing, furthermore observations for capitalization above the 95th percentile were dropped. In the case of loan growth rates I drop observations above the 95th percentile of the distribution in order to correct for mergers, acquisitions and start-ups, which result in extremely high growth rates. At the same time I try to keep the sample size as large as possible, so only very few implausible observations below the 1st percentile of the loan growth distribution were deleted.

The ownership structure of all banks is examined for each separate year and is introduced as a dummy variable.[12] The foreign ownership dummy is 1 for foreign-owned banks and zero otherwise. A bank is considered to be foreign-owned if foreign shareholders own a majority of its outstanding shares. When a domestic-owned bank was taken over in year T, it is included as a domestic-owned bank for T and all years before T, whereas it is included as a foreign-owned bank for T+1 and all later years.[13] For a few cases, where no ownership information was available, the ownership variable is coded as missing.

The following three figures give an overview of the evolution of the bank characteristics in the respective countries. Size is measured by the log of total assets. Since total assets are in domestic currency, they are not directly comparable across countries. In order to make a cross-country comparison still feasible I show in Figure 1 the coefficient of variation of size, which is defined as the standard deviation divided by the mean multiplied by hundred.

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[12] Data on ownership structure for each bank are provided by Ralph de Haas and Iman van Lelyveld from the De Nederlandsche Bank (DNB).
[13] A more detailed description of that data series can be found in the De Haas and Van Lelyveld (2003).
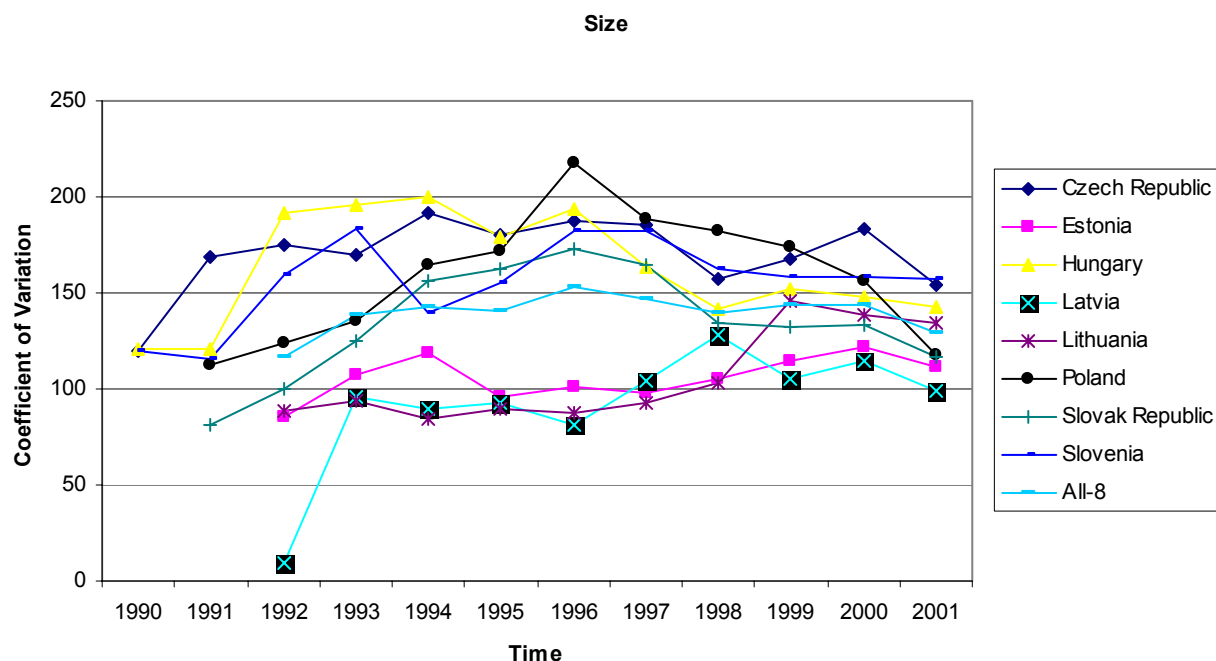
Size

Figure 1: Coefficient of variation[14] for size for each country per year.

A high value stands for a wide variation of banks' total assets in that country and year. During the whole time span of the sample the coefficient of variation is between 100 and 200, meaning that the standard deviation is up to twice as large as the mean of total assets. For the Baltic countries it is a bit lower than for the rest of the countries. Towards the end of the sample the different country values converge slightly, so that there are between 100 and 150, this can be interpreted that the smaller banks grew faster than the bigger banks.

Liquidity is defined as the ratio of liquid assets to total assets. I consider cash, due from banks, treasury bills and government securities as liquid assets. A convergence of liquidity rations can also be observed at the end of the sample period, as can be seen in Figure 2, the portion of liquid assets to total assets stabilizes between 30-45% of total assets. A remarkable exception to this is Estonia, where the banks hold much less liquid assets than in any other country. This may be due to the fact that only four big Scandinavian banks operate in Estonia and these banks can manage their liquidity according to West European standards.

Capitalization is given by the ratio of equity over total assets. The average capitalization is relatively high in the EU new member countries, between 10-15% as can be seen in Figure 3. The Czech banks seem to be at the lower end with a capitalization below 10 % which is low even in international comparison. Lithuania and, for most of the sample time, Slovenia are at the higher

end. Also, I find a convergence process, as all countries except the Czech Republic and Lithuania converge very strongly to about 10-12% capitalization.
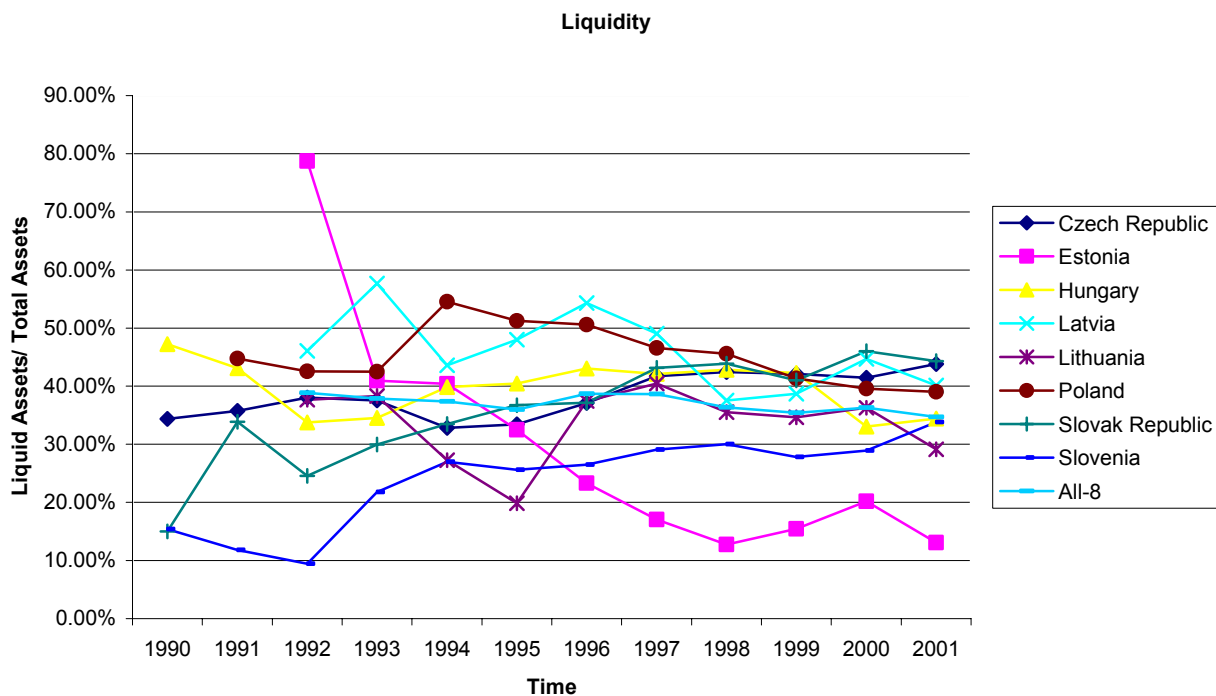
Liquidity

Figure 2: Average liquidity of banks in percentage points in each country per year
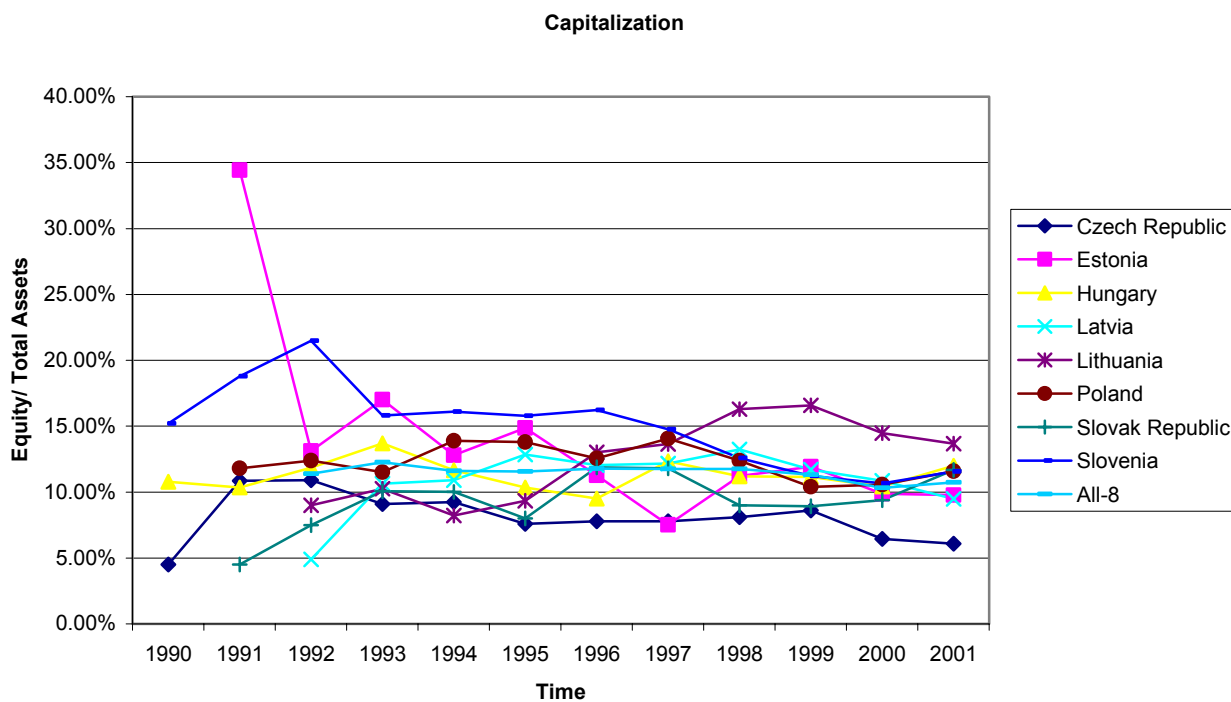
Capitalization

Figure 3: Average capitalization of banks in percentage points in each country per year.

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[14] Coefficient of Variation is defined as (Standard Deviation of Total Assets / Mean of Total Assets) * 100.

Foreign involvement in the banking markets of the EU new member countries has steadily increased over the sample period which can be seen in Figure 4. The share of foreign-owned banks increased from about 10 % in 1993 to over 50% in 2001 and the number of foreign-owned banks exceeded the number of domestic-owned banks for the first time in 2000.
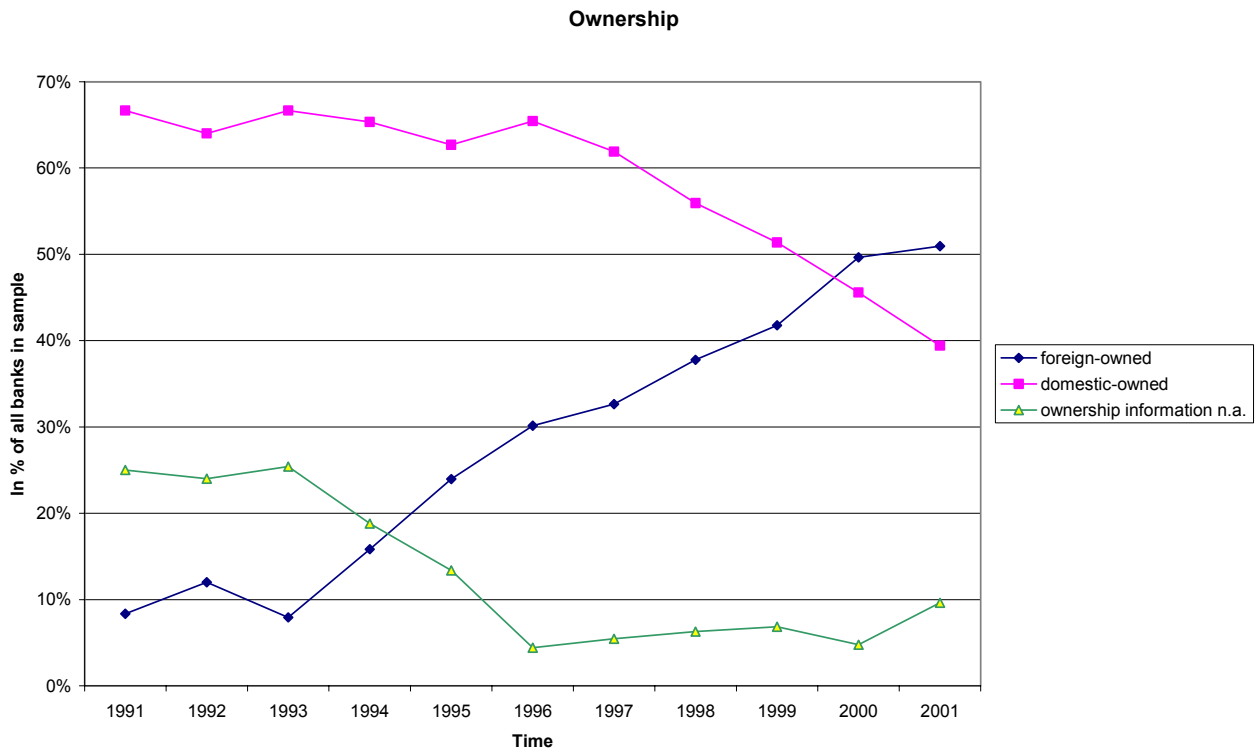
Ownership

Figure 4: Ownership structure in percent over all banks in the sample in the respective year

3.2 Macro Data

Annual macroeconomic data for interest rates, inflation rates, GDP and real effective exchange rates are taken from the International Financial Statistics or the respective central bank. As a monetary policy indicator I use short-term interest rates, in most cases 3-months money market rates.

4. Estimation Strategy and Results

The objective is to investigate how banks adjust their lending behavior in response to monetary policy conditions. This is implemented by analyzing how bank credit growth reacts to changes in the monetary policy indicator and in other credit demand and supply factors. The estimation approach also allows to examine whether banks that differ in the characteristics such as relative size, level of liquidity, capitalization and ownership structure show various reactions in response to monetary policy. Such a differential response is taken as evidence for the adjustment of their loan

supply following a monetary policy change and, therefore, for the existence of a bank lending channel of monetary policy transmission.

The estimation strategy is based on the econometric specification used by Ehrmann et al. (2003). I use the following general econometric specification:

$$\Delta \log (L_{it}) = a_i + \sum_{j=1}^{l} b_j \Delta \log L_{it-j} + \sum_{j=0}^{l} c_j \Delta r_{t-j} + \sum_{j=0}^{l} d_j \Delta \log GDP_{t-j} +$$

$$\sum_{j=0}^{l} e_j \inf_{t-j} + \sum_{j=0}^{l} f_j \Delta reer_{t-j} + gx_{it-1} + \sum_{j=0}^{l} h_j x_{it-1} \Delta r_{t-j} + \varepsilon_{it}$$

Where i=1,…, N and t=1,…, T. Here N is the number of banks in the sample and T is the maximum number of periods, and l the number of lags included in the regression.

$\Delta \log L_{it}$ is the real loan growth of bank i in year t, I choose the growth rate because it is assumed that a bank reacts to a change in the monetary policy indicator by adjusting the new loans. Since the bank lending channel investigates real loan supply, I use the respective annual country inflation rate to correct the nominal loan growth taken from the balance sheets of the database. Δr_t is the first difference of a nominal short-term interest rate which represents the monetary policy indicator. I test directly the relevance of the most important foreign interest rate for the EU new member countries, the euro area rate[15], because it could be a good instrument for the domestic interest rates since there existed more or less fixed exchange rate regimes for some of the countries over the sample length. Alternatively, the banks could look at the euro area rate because a high percentage of bank deposits and loans were and are denominated in German marks or euros[16] and the foreign-owned banks in particular might use the euro area capital markets. A positive change in the interest rate should be followed by a reduction in loan growth, implying a negative coefficient. $\Delta \log(GDP_t)$ is the growth rate of real GDP. I include the growth rate of GDP to control for the potential effects of the business cycle on loan demand. Positive real GDP growth should lead to an increase in credit growth at each bank. The variable $\inf_t$ represents the inflation rate in period t and is added to control for potential macroeconomic effects. In times of high inflation rates I expect a negative sign for the coefficient since high inflation often comes along with an economic disruption which could induce lower credit growth. $\Delta reer_t$ is the percentage change of the real effective exchange rate for year t and the respective country. A positive change stands for an appreciation.

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[15] From 1990 to 1998 the FIBOR 3 months rate as relevant interest rate is used, for 1999-2001 the respective EURIBOR rate.
[16] See Schardax and Reininger (2001).

Although the inclusion of the reer growth is non-standard in this literature I include it as a macro factor due to its importance for small open economies. An appreciation can lead to a current account deficit which is associated with a capital balance surplus. The net capital inflow could ease lending for the final borrowers through the banking sector, so a positive coefficient is expected. The bank specific characteristics are given as x_{it} and are defined below. The characteristics are chosen to capture the degree to which a bank suffers from informational friction in financial markets when it tries to raise new funds after a monetary contraction. The interaction term consist of the product of the bank characteristic multiplied with the monetary policy indicator. The model allows for fixed effects across banks, as indicated by the bank specific intercept a_i.[17]

In the model, the distributional effects of monetary policy should be reflected in a significant interaction term of the bank specific characteristic with the monetary policy indicator. The usual assumptions found in the literature are that a small, less liquid or less capitalized bank reacts more strongly to a monetary policy change than a bank with a high value of the respective bank characteristic. Furthermore foreign-owned banks potentially have access to foreign capital markets either by themselves or through the internal capital markets of their mother companies so that they react less to a monetary tightening. This would imply positive coefficients on the interaction terms. For estimation purposes the four measures for bank characteristics include size, liquidity, capitalization, and ownership structure and are defined as follows:

$$Size_{ijt} = \left(\log A_{ijt} - \frac{1}{N_{jt}} \sum_{ij} \log A_{ijt} \right) / \frac{1}{N_{jt}} \sum_{ij} \log A_{ijt}$$

$$Liquidity_{it} = \frac{L_{it}}{A_{it}} - \frac{1}{T} \sum_t \left(\frac{1}{N_t} \sum_i \frac{L_{it}}{A_{it}} \right)$$

$$Capitalisation_{it} = \frac{C_{it}}{A_{it}} - \frac{1}{T} \sum_t \left(\frac{1}{N_t} \sum_i \frac{C_{it}}{A_{it}} \right)$$

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[17] In order to choose between a random or fixed effect specification the Hausman test is used. The Hausman test rejected in each case the random effects specification. The hypothesis that a pooled simple OLS regression does better than fixed effects has been rejected as well.

$$Ownership_{it} = \begin{cases} 1, & if \ foreign-owned \ in \ year \ t \\ 0, & otherwise \end{cases}$$

Size is measured by the log of total assets, A_{ijt}, with $j=1,\ldots,8$. Here j is the number of the country where the bank is situated.[18] Liquidity is defined as the ratio of liquid assets L_{it} to total assets A_{it}. Capitalization is given by the ratio of equity C_{it} over total assets A_{it}. The foreign ownership dummy is 1 for foreign-owned banks and zero otherwise.

For the estimations I normalize the first three variables with respect to their average across all the banks in the respective sample. On average the interaction term is therefore zero, so that the coefficient of the monetary policy indicator can be interpreted directly as the overall monetary policy effect on loan growth. In case of size, I do not normalize with the sample mean, but with respect to the annual mean in each country and divide it by the respective mean. I do this in order to establish a relative criterion which is independent of exchange rate fluctuations and differing inflation rates, taking into account that size is measured in nominal terms. All bank characteristics are used in lags because of endogeneity, e.g. a high current loan growth will lead to an increase in current total assets and, as a consequence, the size criterion will increase.

In the next paragraphs I present the regression results of three sets of estimates in Tables 2-4. The first set uses the "standard" choice of variables; the second set adapts specifically the estimation strategy to the environment of the EU new member countries. The third set tests for robustness with regard to time and borrower effects. Since the lags of the dependent variable never turned out to be significant, I apply a static fixed panel estimator. Depending on the specification between 700-1000 observations are used.

The first set employs the macroeconomic and microeconomic variables commonly used in the literature to answer the question how bank lending behaves in EU new member countries over the full sample period. I examine both the respective domestic monetary policy indicator and the euro area monetary policy indicator separately for their relevance for banks' loan growth. I include the bank characteristics size, liquidity and capitalization to test for the existence of a bank lending channel. The results can be found in Table 2.

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[18] Countries are ordered alphabetically, so Czech Republic=1, Estonia=2,…, Slovenia=8.

Surprisingly the estimation results of specifications 1-4 of Table 2 show that the domestic monetary policy indicator does not have an effect on the lending behavior of banks. A rise in the short term interest rate does not influence real loan growth in a significant way, the relevant coefficients are even positive. But, as can be deducted from specifications 5-8, loan growth reacts negatively to a rise in the euro area monetary policy indicator, and the coefficient is significant. A one percentage point increase in the euro area short term rate reduces loan growth by 1.8 percent in the current and by 2 percent in the following year. Thus banks in the EU new member countries do not appear to react to their respective national monetary policy indicators but they respond strongly to monetary policy in the euro area.

The euro area rate could be relevant for the EU new member countries, since it could be a good instrument for the domestic interest rates because there existed more or less fixed exchange rate regimes for some countries over the sample length. I find this interpretation in the context of the estimations less plausible since the correlations between the interest rate changes of the euro area and the domestic short term rates are only in one case significantly different from zero. Alternatively, bank behavior could be geared to the euro area rate because a sizeable percentage of bank deposits and loans were and are denominated in German marks or euros[19]. In 2000 foreign-denominated credit in percent of total credit was 18.5% in the Czech Republic, 38.0% in Hungary and 23.7% in Poland[20], the three most important countries of the sample. Furthermore the foreign-owned banks might use the euro area capital markets for refinancing. I will return to this issue below.

With respect to the influence of macroeconomic factors on each bank's loan growth the following results emerge. Real GDP growth and the inflation rate[21] are important determinants of bank lending. Higher overall activity reflected by positive real GDP growth increases loan demand and therefore loan growth. A one percentage point GDP increase has a 1.4-1.8 % positive impact on loan growth in the current and is followed by a 1-1.8% rise in the next year. One percentage point higher inflation leads to 0.5-0.7% lower real loan growth of in the current year. The negative effect of inflation on bank lending could result from the high prevailing inflation rates in the beginning of transition which were signals of macroeconomic disturbances which led to lower credit growth.

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[19] See Schardax and Reininger (2001).

[20] See for more detailed information Schardax and Reininger (2001), p. 34-39. In 2000 13.8 % and 20.9% of total credit was foreign-denominated in the Slovak Republic and Slovenia respectively.

[21] For each country's banks the respective national GDP and inflation data are used.

Table 2: Estimation Results for Standard Set of Variables (1990-2001)

Dependent Variable: Loan Growth								
Variables	1	2	3	4	5	6	7	8
MPI Domestic	**0.0009**	**0.0006**	**0.0012**	**0.0010**				
	0.686	0.776	0.571	0.639				
MPI(-1) Domestic	**0.0015**	**0.0014**	**0.0021**	**0.0016**				
	0.373	0.410	0.218	0.328				
MPI Euro Area					-0.0186 **	-0.0193 **	-0.0183 *	-0.0187 **
					0.049	0.048	0.055	0.049
MPI (-1) Euro Area					-0.0204 **	-0.0206 **	-0.0201 **	-0.0205 **
					0.028	0.030	0.031	0.028
GDP Growth	**0.0172** ***	**0.0174** ***	**0.0175** ***	**0.0178** ***	0.0141 ***	0.0142 ***	0.0142 ***	0.0141 ***
	0.001	0.001	0.001	0.001	0.004	0.004	0.004	0.004
GDP Growth(-1)	**0.0185** ***	**0.0184** ***	**0.0173** ***	**0.0179** ***	0.0095 **	0.0095 **	0.0096 **	0.0095 **
	0.000	0.000	0.001	0.000	0.014	0.013	0.013	0.014
Inflation	**-0.0065** ***	**-0.0065** ***	**-0.0071** ***	**-0.0067** ***	-0.0048 ***	-0.0048 ***	-0.0047 ***	-0.0048 ***
	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000
Size	**-0.6846** ***	**-0.6533** **	**-0.7153** ***	**-0.7082** ***	-0.5433 **	-0.5182 **	-0.5457 **	-0.5415 **
	0.010	0.016	0.007	0.008	0.015	0.038	0.014	0.015
Liquidity	**0.6865** ***	**0.6805** ***	**0.7935** ***	**0.6823** ***	0.6884 ***	0.6873 ***	0.7165 ***	0.6874 ***
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Capitalization	**0.0084** ***	**0.0084** ***	**0.0079** ***	**0.0073** **	0.0102 ***	0.0101 ***	0.0101 ***	0.0098 ***
	0.006	0.007	0.010	0.026	0.000	0.000	0.000	0.006
Size*MPI		**0.0106**				0.0182		
		0.470				0.758		
Size*MPI(-1)		**0.0047**				0.0047		
		0.613				0.934		
Liquidity*MPI			**0.0086**				0.0179	
			0.436				0.727	
Liquidity*MPI(-1)			**0.0155** **				0.0159	
			0.045				0.741	
Capitalization*MPI				-0.0002				0.0000
				0.459				0.996
Capital.*MPI(-1)				-0.0002				-0.0004
				0.453				0.791
R²(within)	0.1727	0.1737	0.1789	0.1742	0.1883	0.1884	0.1885	0.1884
obs.	965	965	965	965	1041	1041	1041	1041

Note: P-values are reported below the estimated coefficients.

***, **, * indicate significance at 1%, 5%, 10% level respectively.

The estimated coefficients of the bank characteristics keep the sign and their magnitude irrespective of the inclusion of other characteristics and interaction terms. The magnitude of the coefficients cannot easily be interpreted due to the mean correction explained above, so the interpretation focuses on the sign and significance of the coefficients.

The coefficient of size is negative and significant in all estimations. On average bigger banks have lower loan growth. Since the former state-owned banks are among the bigger banks, that result suggests that the newcomers are more dynamic in the credit market than the incumbents. The liquidity variable has a positive and significant coefficient, which means that more liquid banks have on average higher loan growth than less liquid banks. The capitalization variable has a positive significant coefficient, which can be interpreted that better capitalized banks have on average higher loan growth.

The importance of differential effects of monetary policy on smaller, less liquid and less capitalized banks is tested by including interaction terms of the bank characteristics and the monetary policy indicator in the specifications 2-4 and 6-8 of Table 2. I do this, first, with respect to the domestic monetary policy indicator (Table 2, specifications 2-4) and then with respect to the euro area monetary policy indicator (Table 2, specifications 6-8). Throughout the specifications, the results for the standard bank characteristics do not provide evidence for a differential loan supply response and thus the existence of a lending channel does not appear to work neither for the domestic monetary policy nor for the euro area monetary policy.

The interaction term of size and the monetary policy indicator is positive, as expected, but not significant at all. The loan supply reaction of an individual bank to monetary policy does not depend on its size, therefore, either the banks do not suffer as much from informational frictions or the criterion is not a good criterion in the EU new member countries to proxy the informational frictions a bank faces.

The same is true for the interaction term of the liquidity variable with the monetary policy indicator, which has a positive sign as predicted, but is only once significantly different from zero. A positive and significant coefficient for the interaction term of liquidity and the domestic monetary policy is only found in specification 3. Since the domestic interest rate does not influence credit growth in any significant way, I conclude that this coefficient cannot be seen as an indicator for the existence of a bank lending channel. More liquid banks do not appear to react differently to monetary policy than less liquid ones.

The interaction term of capitalization with the monetary policy indicator sometimes even has an unpredicted negative sign, but it is always insignificant. The role of capitalization therefore remains

unclear, better capitalized banks do not react differently to a monetary policy shock than other banks. Capitalization does not seem to be a good indicator for the informational frictions a bank faces, at least not in the EU new member countries. One explanation for this phenomenon could be that overall the banks in the EU new member countries are quite comfortably capitalized; therefore it could be that capitalization does not play such a relevant role in determining the informational asymmetries a bank faces. Also it could be expected that the bank capital effect is strong for undercapitalized banks but not as relevant for well capitalized banks which could weaken the capitalization effect.[22]

This evidence contradicts the lending channel hypothesis that bigger, more liquid and higher capitalized banks should face less informational frictions on the financial markets when trying to draw new funds in order to isolate their loan supply from a restrictive monetary policy. So the standard choice of bank characteristics does not find that monetary policy effects depend on the type of bank.

The second set of estimates is augmented by changes in the real effective exchange rate as an additional macroeconomic variable and an ownership dummy as the fourth bank characteristic in order to adapt the regressions to the specific accession country environment. Furthermore, the two monetary policy indicators are used simultaneously. Results for these specifications are presented in Table 3.

The inclusion of the real effective exchange rate growth is non-standard in this literature, but I add it due to its importance for small open economies. In all specifications of Table 3 the coefficient of real effective exchange rate growth is positive as expected, and in six out of seven specifications the coefficient is significant.[23] A one percentage point appreciation in the real effective exchange rate leads to a 0.5 percent increase in real loan growth. Also I allow both monetary policy indicators to affect simultaneously credit growth.

In view of the increasing foreign ownership in the banking sector, it is important to investigate whether the effects of monetary policy depend on the ownership structure. I introduce an interaction term of the ownership dummy and the monetary policy indicator in Table 3; specifications 4-7, respectively for the domestic and the euro area monetary policy indicator.

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[22] Such non-linear effects could be examined by explicitly modelling threshold effects.

[23] Testing for the robustness of these results the estimations were done with and without the real effective exchange rate variable and keeping the sample constant (since not all countries have full time series of real effective exchange rate data). This did not change the results.

Table 3: Estimation Results with Real Effective Exchange Rates and Ownership Structure, 1990-2001

Table 3: Dependent Variable: Loan Growth							
Variables	1	2	3	4	5	6	7
MPI Domestic	**0.0006**		**-0.0025**	**-0.0023**	**-0.0046** *	**-0.0052** *	**-0.0046** *
	0.813		*0.350*	*0.506*	*0.098*	*0.063*	*0.099*
MPI(-1) Domestic	**0.0032** *		**0.0025**	**0.0030**	**0.0033** *	**0.0033** *	**0.0033** *
	0.086		*0.177*	*0.200*	*0.091*	*0.099*	*0.094*
MPI Euro Area		**-0.0232** **	**-0.0188** *	**-0.0163**	**-0.0061**	**-0.0058**	**-0.0036**
		0.022	*0.073*	*0.140*	*0.671*	*0.689*	*0.804*
MPI (-1) Euro Area		**-0.0349** ***	**-0.0376** ***	**-0.0385** ***	**-0.0173**	**-0.0158**	**-0.0188**
		0.001	*0.003*	*0.003*	*0.249*	*0.294*	*0.210*
GDP Growth	**0.0222** ***	**0.0132** ***	**0.0167** ***	**0.0157** ***	**0.0171** ***	**0.0172** ***	**0.0164** **
	0.000	*0.009*	*0.004*	*0.008*	*0.004*	*0.003*	*0.005*
GDP Growth(-1)	**0.0101** **	**0.0137** ***	**0.0135** **	**0.0113** **	**0.0117** **	**0.0113** **	**0.0117** **
	0.046	*0.002*	*0.014*	*0.049*	*0.041*	*0.048*	*0.041*
Inflation	**-0.0052** ***	**-0.0066** ***	**-0.0073** ***	**-0.0075** ***	**-0.0073** ***	**-0.0075** ***	**-0.0074** ***
	0.007	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*
REER growth	**0.0028**	**0.0052** **	**0.0062** **	**0.0059** **	**0.0065** ***	**0.0068** ***	**0.0069** ***
	0.211	*0.028*	*0.013*	*0.022*	*0.010*	*0.008*	*0.007*
Size	**-0.5425** **	**-0.4448** **	**-0.5184** *	**-0.6542** **	**-0.5879** **	**-0.5741** **	**-0.6082** **
	0.041	*0.046*	*0.051*	*0.015*	*0.028*	*0.034*	*0.023*
Liquidity	**0.6577** ***	**0.6437** ***	**0.6562** ***	**0.6363** ***	**0.6173** ***	**0.6136** ***	**0.6202** ***
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
Capitalization	**0.0076** **	**0.0113** ***	**0.0070** **	**0.0056** *	**0.0048**	**0.0050**	**0.0046**
	0.019	*0.000*	*0.029*	*0.095*	*0.145*	*0.133*	*0.167*
O-Dummy*MPI Domestic				**-0.0044**			
				0.342			
O-Dummy*MPI(-1) Domestic				**0.0002**			
				0.963			
O-Dummy*MPI Euro Area					**-0.0251**	**-0.0256**	**-0.0272**
					0.218	*0.210*	*0.182*
O-Dummy*MPI(-1)Euro Area					**-0.0500** ***	**-0.0540** ***	**-0.0527** ***
					0.009	*0.005*	*0.006*
Size*MPI Domstic						**0.0202**	
						0.165	
Size*MPI(-1) Domestic						**0.0022**	
						0.809	
Liquidity*MPI Domestic							**-0.0235** *
							0.077
Liquidity*MPI(-1) Domestic							**0.0114**
							0.212
R^2(within)	0.1761	0.2113	0.1898	0.1902	0.1994	0.2024	0.2057
obs.	821	867	821	740	740	740	740

Note: P-values are reported below the estimated coefficients.

***, **, * indicate significance at 1%, 5%, 10% level respectively.

Comparing the results of specifications 4 and 5, two interesting results emerge. First the interaction term of the ownership dummy and the domestic monetary policy indicator is not significantly different from zero. That means that foreign-owned banks do not react differently to a domestic interest rate increase than their domestic competitors.

The hypothesis that a foreign-owned bank suffers less from informational frictions in the credit market since it is considered to be less risky because of its foreign investors or has better access to the foreign capital market is not supported by the empirical results. So I conclude that there is no evidence for a bank lending channel working through the ownership structure.

But as can be seen in specifications 5-7 the ownership structure of a bank matters substantially for the response towards the euro area monetary policy. The regression results of the specifications 1-4 show so far that credit growth at the average bank decreases by 3.5 % for every percentage point increase in the euro area monetary policy indicator. The specifications 5-7 prove that this effect results from the reaction of the foreign-owned banks to euro area monetary policy. The coefficient of the euro area monetary policy indicator, which represents the response of the average bank, is still negative but not longer significant while the coefficient of the interaction term including the ownership dummy and the euro monetary policy indicator is negative and highly significant. The group of foreign-owned banks reduces loan growth by 5% the year after an increase in the euro area short term interest rates.

Correcting for the strong negative effect of euro area monetary policy affecting mainly foreign-owned banks, the domestic monetary policy has a significant effect on bank lending as well. A one percentage point increase in the domestic interest rate leads to a small but significant decrease in loan growth of the average bank in the current year and a small positive increase in loan growth the following year.

Although the opposite signs of the coefficients do not allow to draw a final conclusion on how domestic monetary policy affects bank lending, I test also in this setting if the sensitivity of loan growth to the two monetary policy indicators varies systematically across bigger, more liquid and higher capitalized banks. None of the interaction terms with the euro area interest rate as monetary policy indicator turns out to be significant, which indicates that either these characteristics do not play a role in determining the response to a monetary policy change or that the size, liquidity position or capitalization of a bank relative to its domestic competitors is not the relevant measure describing the asymmetries a bank faces in the euro market. If bank characteristics defined relative to the euro area counterparts could play a role, remains to be tested in further research.

With respect to domestic monetary policy the bank's size and liquidity position seem to play a role in determining the loan growth of an individual bank. In specification 6 the coefficient of the

interaction term with size turns out to be positive but only slightly significant. That could point to a weaker loan growth reduction after an increase in the domestic monetary policy rate for bigger than average banks. Banks with a higher liquidity position reduce, as can be seen in specification 7, contrary to the expectation, more strongly the loan growth after a restrictive change in domestic monetary policy.[24] Summarizing the findings with respect to a potential bank lending channel of monetary transmission, there is at best a weak case for a lending channel working through size, but neither through the liquidity position nor the capitalization of a bank. The coefficients of the other variables remain stable.

Third, the empirical results so far obtained are tested for robustness with respect to time and borrower effects. To address the issue of instability of the banking sectors in the early 1990s I replicate the main regressions with a shorter sample running from 1995-2001 in specifications 1-5 in Table 4. The results consolidate the impression that domestic monetary policy is not an important determinant for individual banks' loan growth. The coefficients of the current and the lagged interest rate changes have opposite signs, are small and not significant. Instead the banks respond strongly to the monetary policy in the euro area. A one percentage point increase in the euro area monetary policy indicator reduces bank lending around 2% in the current and 3% in the consecutive year.

The coefficient of the interaction term of the ownership dummy and the euro area monetary policy indicator remains negative but is only weakly significant, but the coefficient of the euro area monetary policy indicator, which represents the response of the average bank, is negative and remains significant. The average bank reaction to an increase in the euro area monetary policy is negative and stable around 3 % and the special group effect of the foreign-owned banks is weaker than in the longer sample period. My interpretation is that due to the strong increase in foreign participation in the EU new member countries banking markets the foreign-owned bank becomes more and more the average bank, consequently reducing the particular group effect.

The coefficients for the interaction terms with size and liquidity are not significant, so I conclude that there is no evidence for a bank lending channel in EU new member countries for the short sample period. One further minor change is that the capitalization of a bank does not seem to play a role in the determination of loan growth; all respective coefficients are not significantly different from zero in the short sample.

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[24] The interaction term with capitalization never turns out to be significant.

Table 4: Estimation Results for Short Sample (1995-2001) and the Inclusion of Borrower Effect

Dependent Variable: Loan Growth								
Variables	1	2	3	4	5	6	7	8
MPI Domestic	-0.0050	-0.0046	-0.0050	-0.0050	-0.0050	-0.0025	-0.0052 *	-0.0044
	0.104	0.230	0.115	0.120	0.115	0.355	0.065	0.114
MPI(-1) Domestic	0.0024	0.0026	0.0023	0.0024	0.0022	0.0025	0.0033	0.0034 *
	0.267	0.326	0.283	0.264	0.324	0.176	0.100	0.083
MPI Euro Area	-0.0235 *	-0.0248 *	-0.0208	-0.0214	-0.0175	-0.0189 *	-0.0058	-0.0029
	0.066	0.061	0.249	0.236	0.336	0.073	0.687	0.850
MPI (-1) Euro Area	-0.0466 ***	-0.0481 ***	-0.0326 **	-0.0324 *	-0.0328 **	-0.0375 ***	-0.0156	-0.0122
	0.000	0.000	0.050	0.052	0.050	0.003	0.300	0.448
GDP Growth	0.0166 ***	0.0157 **	0.0165 ***	0.0166 ***	0.0158 ***	0.0165 ***	0.0169 ***	0.0170 ***
	0.006	0.012	0.007	0.007	0.011	0.005	0.005	0.005
GDP Growth(-1)	0.0173 **	0.0176 **	0.0183 **	0.0181 **	0.0188 ***	0.0134 **	0.0112 **	0.0112 **
	0.013	0.013	0.010	0.012	0.009	0.015	0.049	0.052
Inflation	-0.0053 **	-0.0059 **	-0.0059 ***	-0.0059 ***	-0.0056 **	-0.0073 ***	-0.0074 ***	-0.0075 ***
	0.015	0.011	0.008	0.009	0.019	0.000	0.000	0.000
REER growth	0.0032	0.0028	0.0034	0.0034	0.0036	0.0062 **	0.0068 ***	0.0066 ***
	0.197	0.280	0.181	0.189	0.174	0.012	0.007	0.010
Size	-0.9722 ***	-1.0180 ***	-0.9231 ***	-0.9387 ***	-0.9292 ***	-0.5541 *	-0.6145 **	-0.7306 **
	0.001	0.001	0.003	0.003	0.003	0.065	0.043	0.024
Liquidity	0.6639 ***	0.6591 ***	0.6497 ***	0.6464 ***	0.6177 ***	0.6537 ***	0.6109 ***	0.6137 ***
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Capitalization	0.0040	0.0029	0.0031	0.0028	0.0032	0.0070 **	0.0050	0.0050
	0.261	0.439	0.402	0.454	0.380	0.029	0.133	0.133
O-Dummy*MPI Domestic		-0.0004						
		0.931						
O-Dummy*MPI(-1) Domestic		-0.0007						
		0.865						
O-Dummy*MPI Euro Area			-0.0083	-0.0076	-0.0110		-0.0255	-0.0281
			0.727	0.749	0.644		0.211	0.178
O-Dummy*MPI(-1)Euro Area			-0.0333	-0.0333	-0.0358 *		-0.0542 ***	-0.0542 ***
			0.130	0.131	0.104		0.005	0.006
Size*MPI Domstic				0.0037			0.0196	
				0.815			0.184	
Size*MPI(-1) Domestic				-0.0054			0.0026	
				0.624			0.776	
Liquidity*MPI Domestic					-0.0206			
					0.184			
Liquidity*MPI(-1) Domestic					0.0023			
					0.836			
Size*MPI Euro Area								-0.0384
								0.535
Size*MPI(-1) Euro Area								-0.0528
								0.411
Size*GDP						0.0069	0.0079	0.0052
						0.798	0.772	0.858
R^2(within)	0.1873	0.1874	0.1913	0.1918	0.1943	0.1899	0.2026	0.2008
obs.	734	679	679	679	679	821	740	740

Note: P-values are reported below the estimated coefficients.

***, **, * indicate significance at 1%, 5%, 10% level respectively.

Estimations 1-5: Short Sample 1995-2001; Estimations 6-8: Test for Borrower Effect

Furthermore there is a so-called "borrower effect" as described by Ashcraft and Campello (2002) and Berger et al. (2002) which is tested for in the specifications 6-8 in Table 4. These studies show that borrowers of small banks may deviate from those of large banks.

Small banks could concentrate their lending with small local business resulting in a size effect which would have nothing to do with the bank lending channel of monetary transmission. De Bondt (1999) suggest including an interaction term between bank size and GDP. Following this proposition, I repeat the regressions with size including an additional interaction term. The estimation results are robust when taking into account potential borrower effect. The coefficient of the interaction term of size and GDP growth is not significantly different from zero in all three specifications. In addition the inclusion does not change any of the results.

5. Conclusions

The EU new member countries are committed to join in the single currency after fulfilling the convergence criteria laid down in the EU Treaty. This can take place the earliest in 2006, since they have to fulfill an obligatory two-year membership in the ERM II. So rather soon after the accession of the new members of the European Union in 2004, the European Central Bank could face the challenge of pursuing monetary policy in an enlarged euro zone. Therefore, the ECB will need to have an accurate assessment of the monetary transmission mechanism in these countries. So far, the financial markets of the EU new member countries are strongly bank dominated such that the knowledge about the role of banks in monetary transmission is crucial in order to pursue a successful monetary policy. Banks are of major importance for the financing of firms, which implies that the way they adjust lending in response to monetary policy actions can potentially constitute an important channel though which monetary policy affects the real economy.

This paper performs a panel analysis to answer three questions: What is the role of banks in monetary transmission in the EU new member countries? Do the effects of monetary policy depend on the type of bank? Are current and future EMU members different in this respect? The approach chosen uses annual balance sheet data of 261 banks for the period 1990-2001, operating in the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia.

The objective is to investigate how banks adjust their lending behavior in response to monetary policy actions. This is implemented by analyzing, how credit growth of banks reacts to changes in the monetary policy indicator and credit demand and supply factors. The estimation approach

allows furthermore examining, whether banks that differ in the characteristics such as relative size, level of liquidity, capitalization and ownership structure show various reactions in response to monetary policy. The usual assumptions taken in the literature are that a small, less liquid or less capitalized bank reacts more strongly to the monetary policy change than a bank with a high value of the respective bank characteristic. Furthermore affiliated banks or foreign-owned banks should show a weaker reaction to restrictive monetary policy since they can access internal or foreign capital markets.

The estimation results show that banks contract their lending in response to an increase of the euro area short term interest rate, but show only a weak reaction after changes of the domestic monetary policy indicator. Inflation and GDP growth are important determinants of bank lending and the coefficients have the expected signs. The real effective exchange rate is introduced as a further important macroeconomic variable and shows the expected positive sign.

Controlling for the banks' ownership structure is crucial for understanding how banks react to monetary policy. The banking sector in the EU new member countries can be subdivided into two groups along the ownership structure. In particular the group of foreign-owned banks adjusts more strongly their lending after an increase in euro area interest rates than their domestic-owned competitors. By correcting for this effect, there is only weak evidence for a bank lending channel working through the size of a bank vis-à-vis the domestic monetary policy. Bigger banks show a weaker response to monetary policy. The liquidity or the capitalization of a bank do not play a role for the loan supply response after a monetary policy change. In the response to the euro area monetary policy indicator, a differential loan supply response cannot be found

Comparing my results to the findings of the literature allows me to answer the question whether the role of banks in monetary policy transmission is different between current and future EMU members. It has been shown that bank lending in the EU new member countries contracts significantly after a monetary tightening which is similar to the results found by Ehrmann et al. (2003) for the euro area. Banks in the EU new member countries respond to the same interest rate as the euro area banks since they react strongly to the euro area monetary policy indicator and show only a very weak reaction to the respective domestic interest rates. This effect can be explained by the reaction of the large group of foreign-owned banks in the EU new member countries. The subdivision into the foreign- and domestic-owned banks is essential for the understanding of banks' behavior towards monetary policy; this is very different to the euro area situation, where foreign-

owned banks constitute a negligible small group. Since acceding country banking systems are increasingly and even predominantly foreign owned, an even stronger effect of euro area monetary policy on EU new member countries bank lending should be expected in the years to come. Regarding the evidence of a bank lending channel there is at best weak evidence for the importance of a bank's size to characterize a bank's reaction to monetary policy in the EU new member countries. Bigger banks react less strongly to domestic monetary policy than smaller banks. Factors like liquidity and capitalization of a bank are not important for the way a bank adjusts its lending to interest rate changes. This is opposed to the findings of Ehrmann et al. (2003) for the euro area, where less liquid banks show a disproportionately strong response to monetary policy.

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