Monetary Policy Transmission in Transition Economies: the Bank Lending Channel

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- Preliminary version -

Abstract

In this paper we analyze the bank lending channel in ten Central and Eastern European countries. We provide a brief overview of the theory and the empirical approaches used to investigate the existence of bank lending channel. From the existing methods, we use the generally applied approach suggested by Kashyap and Stein (1995), which relies on discovering asymmetries in changes in the amount of loans due to monetary actions, in order to isolate supply and demand effects. We estimate the model by the Generalized Method of Moment approach, the asymmetric effects being captured by interaction-terms. We find significant asymmetric ajustement of loan quantities along certain bank characteristics. The existing of bank lending channel can explain these asymmetries. Based on our results, we can not, however, conclude for the existence of a bank lending channel in all the analyzed countries.

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1 Introduction

Understanding monetary policy is crucial. It allows answering to several policy questions: What is the appropriate monetary policy in different business cycle episodes? What should be the appropriate rule for monetary policy?

In the present paper we analyze the bank lending channel in the case of transition countries. By using disaggregated data on bank balance sheets, we provide a test of the lending view of monetary policy transmission. As in the study of Kashyap and Stein (1995), we argue that if the lending view is correct, the loan and security portfolios of large and small banks respond differentially to a contraction in monetary policy.

The theory of the bank lending channel suggest that the state of financial sector may have a strong influence on the transmission of monetary policy. The implications on the euro zone is that a common monetary shock in the euro zone may induce asymmetric reactions in countries with different conditions on the financial market.

We consider very important the analysis of differences in the monetary transmission of CEE countries both in the context of the forthcoming full euro-area participation of the countries that have entered the EU in May 2004, and in that of the existing gap in financial sector development relative to the euro area.

Over the last decade, the banking sectors of CEECs have undergone massive transformation processes, marked by numerous bank failures and the accumulation of huge amounts of non-performing loans (in the early phase of economic transition). In the same time, we have assisted at the privatization of a large number of public banks, contributing at the increasing efficiency of the banking sectors. In our analysis, we intent to capture the time-varying characteristics, if any, of banks' lending behavior.

The main contribution of the present paper is empirical. It consists in analyzing the effect of monetary policy changes on bank lending, at microeconomic level, in ten CEECs[1] during the period 1999-2005. Based on the results, we make inferences on the effectiveness on the bank lending channel of monetary policy transmission. As far as we know this has not been done so far in this topic. The

[1]Bulgaria, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

vast majority of studies on bank lending channel applying the disaggregated approach are realized on a case-by-case basis; these are separate panel data analysis at each country level. The methodology we apply proceeds with many countries together and it allows to get a comparative view on the effectiveness of the bank level channel in ten different economies.

The remainder of the paper is organized as follows. In the next section we present a theoretical overview of the monetary policy transmission channels. Next, we present a brief overview of the debate on the lending view, first generally and then in the context of transition economies; we will use this in order to motivate our focus on the behavior of different types of banks. The following section describes the econometric model and the data used in the empirical work, and the one after presents our empirical results. The final section concludes.

2 Channels of monetary policy transmission

In this section we present the mechanisms of monetary policy transmission. Our aim is to give an idea of what these mechanisms imply. This will help to show the motivation for the particular channel we analyze in this paper.

The transmission mechanisms include interest rate effects, exchange rate effects, other asset price effects and the so-called credit channel.

1. The transmission of the monetary policy through interest rate mechanisms is a key component of how monetary policy effects are transmitted to the economy[2]. A contractionary monetary policy leads to a rise in real interest rates; this will lead to a decline in investment spending, thereby declining the aggregate demand and determining a fall in output.

$$M \downarrow \Rightarrow i \uparrow \Rightarrow I \downarrow \Rightarrow Y \downarrow .$$

2. The monetary transmission operating through exchange rate effects on net exports has received more attention with the US economy internationalization and the advent of flexible exchange rates. When domestic real interest rates rise, domestic deposits become more attractive relative to deposits denominated in foreign currencies; this leads to a rise in the value of domestic deposits relative to other currency deposits, so that there is an appreciation of the local money (denoted by E). Domestic goods become more expensive

[2]This is the traditional Keynesian view.

than foreign goods, causing a fall in net exports (NX) and, consequently, in aggregate output.

$$M \downarrow \Rightarrow i \uparrow \Rightarrow E \uparrow \Rightarrow NX \downarrow \Rightarrow Y \downarrow .$$

3. The `monetarists` criticize these views, considering that it is vital to look at how monetary policy affects the relative asset prices and the real wealth. Monetarist' studies emphasize two channels of monetary transmission: the Tobin's q theory of investment and the wealth effects on consumption.
a). Tobin (1969) defines the market value of firms divided by the replacement cost of capital, denoted by q.

   - if q is high, the market price of firms is high relative to the replacement cost of capital and new plant and equipment is cheap relative to the market value of business firms. Firms can issue equity and get a high price for it relative to the cost of plant and equipment that they are buying. Thereby, the investment spending will rise, as firms can buy a lot of new investment goods with a small issue of equity.
   - if q is low, firms will not purchase new investment goods because of the low market value of firms relative to the cost of capital. Investment spending is low; when q is low, the firms can buy another firm cheaply and acquire old capital instead.

   In the monetarist view, when the money supply falls, the public has less money than it wants and tries to acquire it by decreasing its spending. Public can spend less in the stock market, decreasing the demand for equities; this will lower their prices. Lower equity prices will lead to a lower q and, this way, to a lower investment spending.

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow q \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow .$$

   b). The channel of monetary transmission through wealth effects on consumption was strongly recommended by Modigliani. In his life-cycle model, lifetime resources of consumers determine consumption spending; these lifetime resources are made up of human capital, real capital and financial wealth. Common stocks are a major component of the financial wealth. When stock prices fall, the value of financial wealth decreases, so that lifetime resources of consumers decrease and, thus, consumption fall.

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow wealth \downarrow \Rightarrow consumption \downarrow \Rightarrow Y \downarrow .$$

4. Two basic channels of monetary transmission occur as a consequence of

agency problems in credit markets: the bank lending channel and the balance-sheet channel.

- The bank lending channel - banks play a special role in the financial system, being well suited to deal with certain types of borrowers (especially small firms, where asymmetric information can be pronounced). Large firms can directly access the credit markets through stock and bond markets, without going through banks. Contractionary monetary policy that decreases bank reserves and bank deposits, will have an impact through its effect on these borrowers.

$$M \downarrow \Rightarrow bank\,deposits \downarrow \Rightarrow bank\,loans \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow .$$

- The balance-sheet channel operates through the net worth of business firms. Lower net worth signifies that lenders have less collateral for their loans, so that losses from adverse selection are higher. A decline in the net worth leads to a decrease in lending for the investment spending financing. Lower net worth of business firms increases the moral hazard problem, as owners have a lower equity stake in their firms; they consequently engage in risky investment project. This determine a decrease in lending and, in this way, in investment spending.
  The monetary policy can affect firms' balance sheets in several ways. First, contractionary monetary policy, which causes a decline in equity prices, lowers the net worth of firms and leads to lower investment spending and aggregate demand because of the increase in adverse selection and moral hazard problems.

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow adverse\,selection\&moral\,hazard \uparrow \Rightarrow lending \downarrow$$

$$\Rightarrow I \downarrow \Rightarrow Y \downarrow .$$

  Second, contractionary monetary policy that raises interest rates, causes a deterioration in firm's balance sheets by the reduction of the cash flow.

$$M \downarrow \Rightarrow i \uparrow \Rightarrow adverse\,selection\&moral\,hazard \uparrow \Rightarrow lending \downarrow$$

$$\Rightarrow I \downarrow \Rightarrow Y \downarrow .$$

  The balance-sheet channel operates as well through liquidity effects on consumer expenditures on durable goods and housing. In the liquidity effects view, balance-sheet effects work through their impact on consumers' desire to spend. If consumers expect a high likelihood of financial distress, they would rather hold few illiquid assets (like consumer

durables or housing) and more liquid financial assets. If they need to sell their consumer durables or housing to raise money, they would suffer large losses, as they can not get their full value in a distress sale. In contrast, liquid financial assets like money in banks, stocks or bonds can be more easily be realized at full market value. This leads to another transmission mechanism for monetary policy operating through the link between money and equity prices. The monetary contraction raises interest rates and thereby reduces cash flow to consumers; this leads to a decline in spending on consumer durables and housing, because of their illiquid character. A decline in consumer cash flow increases the likelihood of financial distress, which reduces the desire of holding durable goods or housing, reducing in this way the spending on them and, consequently, the aggregate output.

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow financial\,assets \downarrow \Rightarrow likelihood\,of\,financial\,distress \uparrow$$

$$\Rightarrow consumer\,durables\,and\,housing\,expenditure \downarrow \Rightarrow Y \downarrow .$$

The large majority of studies in this area focus on the analysis of the interest and exchange rate channels and little attention is paid to bank lending channel. The main explanation is that financial innovation of the last decades makes the importance of the bank lending channel doubtful, as banks play a less important role in credit markets. This affirmation stands true in the context of developed economies, but it does not apply for transition countries, where financial systems are mainly bank-based and borrowers do not have viable alternatives to bank loans as sources of financing. Consequently, as mentioned in the title, the actual study examines the bank lending channel of the monetary policy transmission.

The following section presents a brief overview of the debate on the lending view.

3 Debate on the lending view

In this section we first present an overview of the general debate on the lending view. Then, it follows an overview of the existing studies in the context of transition economies. The aim of this section is to show what sort of empirical methods have been adopted so far and to put in light our motivation for the approach applied in this paper.

3.1 The lending view - a definition

The hypothesis of "bank lending channel" postulates the existence of a channel of monetary policy transmission through bank credit. This channel is independent of the traditional "money channel", which considers the effects of changes in the real interest rate on economic activity.

The bank lending channel theory ascribes a special role to banks in the monetary transmission mechanisms. It stipulates that a monetary policy tightening can affect not only the demand for loans (through the interest rate channel), but also the supply of loans. In other words, monetary policy affects not only borrowers, but also the banks. The theoretical underlying mechanism is the following: a monetary policy tightening shrinks banks' reserves and, this way, banks' deposits. Deposits are an important source of financing the lending. The theory stipulates that, in the aftermath of a monetary policy tightening, the responses of banks might not be the same across banks, in term of lending.

Two hypothesis are crucial for the theory of bank lending channel:

- the imperfect substitutability between credits and other assets in the banks' balance sheet; and
- the imperfect substitutability between bank credits and other forms of financing on firms' balance sheet.

These two forms of imperfect substitutability cause monetary policy to impact on economic activity on two stages.

First, the imperfect substitutability in bank assets determines a contraction in banks' credit supply when there is a tightening of monetary policy (`first stage`). When facing a decrease in liquidity, banks decrease their supply of credit instead of selling bonds that they posses in their portfolios. Alternatively, rather than decreasing credit, banks could issue bonds or collect deposits from households or from corporate sector. Financial market imperfections, such as adverse selection and moral hazard (imperfect substitutability between credits and bonds on the asset side and bonds and deposits on the liability side), limit the ability of some banks to borrow from financial markets.

Once credit supply has decreased, because of the imperfect substitutability between bank credit and other forms of external funding on firm's balance sheet, the investment spending fall down (`second stage`).

3.2 Tests using aggregate data

An important empirical paper in this area of research is that of Bernanke and Blinder (1992). They analyze the response of aggregate bank balance sheet variables to changes in the stance of monetary policy (proxied by changes in the Fed funds rate), finding that a monetary tightening is followed by a drop in bank deposits. Bank holdings of securities also fall. Bank loans respond with a lag, but they also present a decline. The measures of aggregate output respond to monetary impulses with a similar lag, declining contemporaneously with bank loans.

A fluctuation in the growth rate of loans might equally be caused by the demand for, or supply of, loans, so that there is an identification problem which occurs.

Kashyap, Stein and Wilcox (1993) bring new evidence for a clear econometric identification of the lending channel of monetary-policy transmission, by using the relative fluctuations in bank loans and in commercial papers - an important substitute for bank finance. They find that a tighter monetary policy determines a sharp rise in the issuance of commercial papers, while the bank loans fall. Thus, a contractionary policy reduce loan supply.

The results of the study of Kashyap, Stein and Wilcox (1993) are not accepted as being decisive. Oliner and Rudebusch (1995) show that, in an economy with heterogenous agents, aggregate results must be treated with caution. A natural next step is to use disaggregated data to explore the cross-section implications of the lending view.

3.3 Tests using disaggregated data

According to the lending view, a tight monetary policy should pose more problems for small firms (who rely mainly on banks) than for large firms (who have a greater access to nonbank sources of external finance). Evidence in this sens is provided by some recent studies, such as that of Oliner and Rudebusch (1995); they show that, with a tightening of monetary policy, liquidity constraints become more pronounced for small firms.

The question is whether changes in banks' deposit liabilities affect their lending. In order to answer this question, it is necessary to analyze the way in which banking firms respond to changes in the stance of monetary policy.

Kashyap and Stein (1995) develop a disaggregated version of that in Bernanke and Blinder (1992), analyzing the way bank deposits, securities holdings and loans respond to shocks in monetary policy. They focus on cross-sectional differences in these responses across banks of different sizes. The overall message that can be taken away from their model is that loan and securities portfolios of large and small banks respond differentially to a contraction in monetary policy: the lending volume of small banks declines more rapidly in response to a given contraction in deposits, than does the lending volume of large banks; while the securities holdings of small banks decline more slowly in response to a given contraction in deposits than do the securities holdings of large banks.

The model specification of Kashyap and Stein (1995) is further adopted in a large number of recent studies. We mention those of De Bondt (1998), Cecchetti (1999), Kashyap and Stein (2000), Kishan and Opiela (2000), Altunbas, Fazylov and Molyneux (2002), Driscoll (2003), Adam and Amel (2005) and Gombacorta (2005).

According to Kashyap and Stein (1995) and De Bondt (1998), the disaggregate approach has both a benefit and a cost. The benefit is that it is the most precise way to test for the existence of credit channels. The cost is that these data are not appropriate to evaluate the aggregate importance of credit channels.

3.4 The lending view in transition economies

The study of the monetary transmission mechanism in the transition economies of Central and Eastern Europe is very important. It allows a precise understanding of the way in which a change in the central bank's interest instrument affects inflation, being in the center of interest of the inflation targeting[3]. It is also very important to analyze the differences in the monetary transmission of the CEE countries, in the context of the forthcoming full euro-area participation of the countries that have entered the EU in May 2004 and in that of the existing gap in financial sector development relative to the euro area.

Corricelli, Egert and MacDonald (2006) survey recent advances in empirical studies of the monetary transmission mechanism in the Central and Eastern Europe, presenting the functioning of the separate channels and the possible interrelations between different channels and their impact on prices and real economy. They classify the empirical evidence for the CEECs in two categories: evidence

[3]A large number of transition countries use the inflation targeting as an instrument of monetary policy.

from VAR and evidence from bank-level data.

In our analysis we proceed with the same classification of the evidence on the bank lending channel, as it follows.

3.4.1 VAR evidence

The VAR modeling methodology is the main tool used in the area of research of the monetary transmission mechanisms. For this category of studies we mention, in the case of transition economies, some references: Klos and Wrobel (2001), Creel and Levasseur (2005), Darvas (2005), Elbourne and de Haan (2006) and Hericourt (2006).

Klos and Wrobel (2001) use the VAR approach, with a relatively modest set of variables: the consumer price index, credit to non-financial sector and the intervention rate of the National Bank of Poland, as a policy instrument. The credit growth is used as an indicator of domestic demand pressure. The authors show that a shock in short-term interest rates causes real credit to drop in the short run and to stabilize at a lower level afterward.

Creel and Levasseur (2005) update the evidence on the monetary policy transmission mechanisms for three large new EU members: the Czech Republic, Hungary and Poland, using a structural VAR. Incorporating either credit or money as an endogenous variable in the VAR makes insignificant the price' rise. The responses of credit and money to a monetary policy shock in Hungary are counterintuitive, as credit and money increase with a positive innovation in the nominal interest rate. The usually explanation is that of a permanent excess in the liquidity of the banking sector.

Darvas(2005) study the transmission of monetary policy in three new member state of the EU: Poland, the Czech Republic and Hungary with structural time-varying coefficient VARs and makes a comparison with the transmission of the monetary policy in the euro area. Among the three countries studied, monetary policy is more powerful in Poland and comparable in strength with that in the euro area, but it is less powerful in Hungary; the strength of monetary policy in the Czech Republic lies in between. The author explains these differences by the credibility of the monetary policy and the openness.

Elbourne and de Haan (2006) examine the relationship between monetary policy transmission and the financial structure in ten accession countries, using the SVAR methodology. The authors find substantial differences in monetary trans-

mission among the ten countries regarding both inflation and output. Based on the lending view, the indicators of financial structure are grouped in three categories: indicators of size, of banking system' health and of alternative sources of external finance' importance. Rank correlation coefficients are computed for the estimated impact of monetary policy decisions on each financial structure indicator. Elbourne and de Haan (2006) do not find convincing evidence that financial sector indicators are associated with monetary policy shocks in the ten acceding countries.

By using different VAR estimations for each of the eight CEECs recently integrated to EU, Hericourt (2006) show the existence of similarities with the euro area and an ongoing homogenization process, concluding on the relevance of a close integration of these countries into the euro area. His estimations include money and domestic credit aggregates, on the one hand, and industrial production and rebuilt series of GDP, on the other hand.

3.4.2 Bank-level data evidence

The literature on micro data-based evidence apply the generally used approach of Kashyap and Stein (1995, 2000), which relies on discovering asymmetric movements of loans quantities with respect to certain bank characteristics. The references cited in this case are: Juks (2004), Pruteanu (2004) and Horvath, Kreko and Naszodi (2006).

Juks (2004) analyzes the significance of the bank-lending channel in Estonia. The results of the study are the following: first, the well-capitalized banks seem to experience a smaller outflow of deposits after a monetary contraction; second, the liquidity position of banks seems to be an important determinant of loans supply, more liquid banks are able to maintain their loan portfolios, while less liquid banks must reduce their loan supply, after a monetary policy contraction.

Pruteanu (2004) examine the overall effect of monetary policy changes on the growth rate of loans and the characteristics of the supply of loans for the Czech commercial banks. For the period 1996-1998, cross-sectional differences in the lending reactions to monetary policy shocks are due to the degree of capitalization and liquidity. For the subsequent period 1999-2001, the distributive effects of monetary policy are due to bank size and a bank's proportion of classified loans.

Horvath, Kreko and Naszodi (2006) consider the foreign ownership besides the usual bank specific variables (size, liquidity and capitalization) in a study on Hungary. They find empirical evidence that demand for loans can be considered

reasonably homogenous across banks with respect to the share of foreign ownership and the size of banks.

Our analysis belongs to this category of bank-level evidence. In the following section we describe the model applied, as well as the data used.

4 Model and data

4.1 The econometric model

As in the majority of studies using bank-level data, our empirical specification is based on Kashyap and Stein (1995). This specification was designed to test whether banks react differently to monetary policy shocks. The model is given by the following equation:

$$\Delta \ln x_{it} = \sum_{j=1}^{t} \alpha_j \Delta \ln x_{i(t-j)} + \sum_{j=1}^{t} \beta_j \Delta MP_{t-j} + \gamma z_{i(t-1)} + \sum_{j=1}^{t} \delta_j \left[\Delta MP_{t-j} z_{i(t-1)}\right] +$$

$$+ \sum_{j=1}^{t} \varphi_j \pi_{t-j} + \sum_{j=1}^{t} \eta_j \Delta \ln y_{t-j} + \sum_{q=1}^{2} \theta_q dum_q + \mu_i + \varepsilon_{it} \quad (1)$$

where: **i** denotes bank i ($i = \overline{1, N}$) and **t** denotes year t ($t = \overline{1, T}$)

x_{it}	total loans to clients
MP_t	monetary policy indicator
y_{it}	real GDP
π_{it}	inflation rate
z	bank characteristics: size, capitalization and liquidity
μ_i	individual bank effects
ε_{it}	error term
$\alpha, \beta, \delta, \gamma, \varphi, \eta, \theta$	parameteres to be estimated.

We use the growth rate of GDP and inflation to control for demand shocks. The introduction of these two variables allows us to capture cyclical movements and serves to isolate the monetary policy component of interest rate changes.

To test for the existence of distributional effects of monetary policy among banks, we use the following indicators for the bank characteristics (z): bank size, capitalization and liquidity. There is another relevant characteristic that we add

in our analysis: the type of ownership.

$$Size_{it} = \log A_{it} - \frac{\sum_{i=1}^{N} \log A_{it}}{N_t}$$

$$Liquidity_{it} = \frac{L_{it}}{A_{it}} - \left(\sum_{t=1}^{T} \frac{\sum_{i=1}^{N} L_{it}/A_{it}}{N_t} \right) \Big/ T$$

$$Capitalization_{it} = \frac{E_{it}}{A_{it}} - \left(\sum_{t=1}^{T} \frac{\sum_{i=1}^{N} E_{it}/A_{it}}{N_t} \right) \Big/ T$$

Size is measured by the log of total assets, A_{it}. Liquidity is defined as the ratio of liquid assets L_{it} (cash, interbank lending and securities) to total assets, and capitalization is given by the ratio of equity, E_{it}, to total assets[4]. These characteristics are normalized with respect to their average across all banks in the sample, in order to get indicators that sum to zero over all observations. This means that for the regression model (1), the average of the interaction terms ($\Delta MP_{t-j} z_{i(t-1)}$) are also zero, and the parameters β_j are directly interpretable as the average effect of monetary policy on loans.

The indicator 'size' is a variable that captures possible bank-specific asymmetries as deviations from their cross-sectional means. This removes a general trend characterizing the financial sector.

For the indicators 'liquidity' and 'capitalization' we remove the overall average (across banks and over time) from each observation. Actually, the definition of a large bank may differ with changing market conditions, as banks which are considered to be small on a market with deeper financial sector, might be regarded as medium or large in a smaller market. Contrary to size, liquidity and capitalization are less relative measures. We make use of the variability of these characteristics not only across banks, but also over time. This way, we obtain the interpretability of parameters β_j, but we do not remove the trend from a possibly changing financial market. This approach is used for the two indicators, as we assume that the above mentioned general trends of decreasing liquidity and capitalization might be

[4]Capitalization is usually defined as the ratio of capital and reserves to total assets. We make use of an alternative measure of capital ratio - *the equity to total assets ratio* - as data on capital and reserves are poorly informed for more than a half of the sample.

relevant from the point of view of the transmission.

Bank ownership is represented by dummy variables for each ownership group (banks with mostly national participation and banks with mostly foreign participation).

The model allows for bank-specific effects (μ_i). The parameters of interest are those in front of the monetary policy indicator (β_j), which capture the direct overall impact of monetary policy changes on the growth of bank lending, and the coefficients in front of interaction terms (δ_j); the latter serve to asses whether the considered bank characteristic makes any difference in the way banks react to monetary policy changes. A positive and significant parameter δ_j is equivalent with the assumption that smaller / less capitalized / less liquid banks react more strongly to monetary policy changes. The coefficient in front of the bank characteristic (γ) has an illustrative role, it describes whether there is a linear relationship between the growth rate of loans and the bank characteristic.

We will first estimate a "benchmark model", which does not include the bank characteristic (z) and the interaction between the bank characteristic and the monetary policy indicator ($\Delta MP_{t-j} z_{i(t-1)}$). This will give us a preliminary insight into whether the growth rate of clients loans respond to monetary policy shocks and macroeconomic conditions. The full model, given by the equation (1) will be referred to as the "extended model".

4.2 Data

We use the BankScope data set for banks' balance sheet and the International Financial Statistics (IMF) data for real GDP, inflation and interest rate. The sample covers the period 1999-2005 and contains annual data. The analysis does not go before 1999 because of the unavailability of data on banks' balance sheets.

Our analysis covers the commercial banks from ten Central and Eastern Europe Countries: Bulgaria, with 26 banks; Czech Republic,with 26 banks; Estonia, with 7 banks; Hungary, with 30 banks; Latvia, with 26 commercial banks; Lithuania, with 10 banks; Poland, with 53 banks; Romania, with 28 banks; Slovak Republic, with 17 banks; and Slovenia, with 19 banks. The analysis is performed separately for each country.

In the following section we present the estimation method and the results obtained.

5 Estimation Method and Results

5.1 Estimation Method

We employ a specification in growth rates for at least two reasons. First, we are interested in capturing the differences in the reactions of banks to monetary shocks across different time periods, so the focus is on short-run relationships and not on long-run one. Second, a specification in growth rates is supposed to circumvent the unit root problem.

Both the "benchmark model" and the "extended" one are estimated by the Generalized Method of Moments as designed by Arellano and Bond (1991). The use of this method is due to the inclusion of lagged dependent variable as an explanatory variable[5]. The methodology accounts also for the possible endogeneity of some variables, as is probably the case with the bank characteristics. The Arellano and Bond' methodology first differences the autoregressive model to eliminate the individual effect and "optimally exploits" the moment conditions using the lagged values dated t-2 and earlier of the dependent variable and lagged values of the predetermined variables as instruments. This ensures efficiency and consistency and provides that the model is not subject to serial correlation in ε_{it} and that the instrument variables are valid (the Sargan and Hansen tests). The Arellano and Bond design both a 1-step estimation and a 2-step estimation. The difference between them consists in the specification of an individual specific weighting matrix. The 2-step estimation uses the 1-step's residuals, so it is more efficient. Therefore, we will further proceed with this estimation in two steps.

Our sample follows commercial banks over 7 years (1999-2005). The estimation of both "benchmark" and "extended" model is realized separately, for each country; this will help us the observe the existing differences in the banks' behavior in the aftermath of a monetary policy tightening.

5.2 Estimation Results

In order to justify the use of the model in growth rates, we test whether variables in levels are integrated of order one. This approach was used by Kashyap and Stein (1995) for avoiding the problem of spurious correlations. We perform two

[5]The presence of a lagged dependent variable among the regressors in a specification which considers the individual effect as well, brings about the correlation between the error term and a right-hand regressor. In such a case, the OLS estimation would be inconsistent and biased.

unit root tests for panel data: the Im-Pesaran-Shin test and the Levin-Lin-Chu test. The results are presented in the Appendix, tables (5) and (6). As the results obtained are inconclusive, we will follow the approach proposed by Kashyap and Stein (1995) and applied by the majority of analysis in this area - the use of the model in growth rates.

Tables (1), (2), (3) and (4) summarize the results of estimating the "benchmark model" and "extended model" respectively, for total loans to clients. The reported figures represent the long-run elasticities of the models[6]. These have been estimated using the GMM estimator suggested by Arellano and Bond (1991), which ensures efficiency and consistency provided that the models are not subject to serial correlation of order two and that the instruments are valid (which is tested by the Hansen test)[7].

Table 1: "Benchmark model" GMM estimation results (long term coefficients)(1)

Dependent variable:	**Growth rate of total loans to clients**				
Specifications :	(1)	(2)	(3)	(4)	(5)
	Bulgaria	**Czech Rep.**	**Estonia**	**Hungary**	**Latvia**
Monetary Policy	-0.164***	0.142	-0.021	0.012*	-0.026
	(0.032)	(0.094)	(0.020)	(0.006)	(0.017)
within BMNP	-0.166***	0.119	–	–	-0.020
	(0.036)	(0.305)			(0.038)
within BMFP	-0.176**	0.075**	-0.095***	0.010	-0.025
	(0.065)	(0.026)	(0.010)	(0.009)	(0.021)
GDP growth	46.333***	-43.902	-0.307	3.303***	-5.593*
	(14.539)	(37.019)	(1.060)	(1.084)	(2.769)
Inflation	-3.282***	3.243	-0.231*	0.027	0.980
	(1.106)	(3.357)	(0.106)	(0.140)	(0.578)
p-value Hansen	0.087	0.503	0.784	0.240	0.477
p-value AR1/AR2	0.345/0.638	0.091/0.55	0.281/0.384	0.243/0.308	0.333/0.376
No. of banks	26	26	7	30	26

Note: Standard errors in parentheses. *,**,*** denotes significance at 10%, 5%, 1% level.
BMNP means "banks with mostly national participation".
BMFP means "banks with mosly foreign participation".
(3) and (4): the regression could not be estimated within BMNP, due to insufficient observations.

[6]The long-term coefficient of a variable is computed as the sum of its coefficients (of its lags and current values, where applicable) divided by one minus the sum of the coefficients of the lags of the dependent variable. For instance, the long-run elasticity of the dependent variable with respect to monetary policy for the average bank is given by $\sum \beta_j/(1-\sum \alpha_j)$.

[7]In the present study, in the GMM estimation instruments are the second and further lags of the dependent variable and of the bank specific characteristics included in each equation. Inflation, GDP growth rate and the monetary policy indicator are considered as exogenous variables.

Table 2: "Benchmark model" GMM estimation results (long term coefficients)(2)

Dependent variable :	**Growth rate of total loans to clients**				
Specifications :	(6)	(7)	(8)	(9)	(10)
	Lithuania	**Poland**	**Romania**	**Slovakia**	**Slovenia**
Monetary Policy	-0.141*	0.014	0.008	0.376	-0.271
	(0.069)	(0.230)	(0.016)	(0.561)	(5.609)
within BMNP	1.152	-0.122	0.329*	-0.004	0.057
	(2.353)	(0.130)	(0.130)	(0.120)	(0.035)
within BMFP	-0.135	0.215	0.008	0.760	0.041***
	(0.342)	(0.298)	(0.017)	(2.402)	(0.005)
GDP growth	14.352	15.803	-2.305	61.87	-646.392
	(10.997)	(22.968)	(2.512)	(81.46)	(10812)
Inflation	-0.336	-0.182	0.300	-1.200	51,608
	(0.692)	(2.216)	(0.340)	(1.722)	(873.59)
p-value Hansen	0.772	0.132	0.216	0.108	0.221
p-value AR1/AR2	0.160/0.421	0.090/0.148	0.095/0.855	0.748/0.846	0.049/0.129
No. of banks	10	53	28	17	19

Note: Standard errors in parentheses. *,**,*** denotes significance at 10%, 5%, 1% level.
BMNP means "banks with mostly national participation".
BMFP means "banks with mosly foreign participation".

5.2.1 "Benchmark Model" Estimation Results

The estimation of the "benchmark model" reveals major differences between the results for the ten countries, both in terms of magnitude and significance.

Concerning the effects of monetary policy on the growth rate of total loans to clients, the changes in the policy-induced interest rate have a negative and significative impact in Bulgaria and Lithuania. This confirms the theory on the bank lending channel: loans fall after a monetary tightening. Nevertheless, the impact is positive and significative in Hungary; as in Creel and Levasseur (2005), we explain this positive effect by the excess of liquidity which exists in the Hungarian banking sector. For the rest of the countries this impact is not significative. These results represent the average impact of monetary policy across all banks, where the banks are considered as having the same weight and not a ponder given by their market share or characteristics. Consequently, these estimates can not be used to quantify the effect of a certain change in monetary policy.

As regards the difference in the impact of the macroeconomic conditions, the influence of GDP growth is positive and significative in Bulgaria and Hungary, while it is negative in Latvia. Inflation, which is meant to account for demand factors, impacts negatively only in the case of Bulgarian and Estonian banks.

We distinguish between banks belonging to different ownership groups, i.e., banks with mostly national participation and banks with mostly foreign participation. Tables (1) and (2) also report the effects of the monetary conditions on the growth of total loans to clients within each of the two ownership groups. It appears that the reactions of the growth rate of loans to monetary policy changes are similar among the banks in the two groups in Bulgaria, with a weaker reaction of the banks with mostly foreign participation: the total loans to clients fall after a monetary tightening. The negative and significative reaction of the growth rate of loans to monetary policy changes is obtained in the case of banks with mostly foreign participation in Estonia; this means that foreign banks were more affected by a change in the policy-induced interest rate than the national ones. In Romania, the reaction of the growth rate of loans to monetary policy changes is positive and significative in the case of banks with mostly national participation. The excess of liquidity of Romanian national banks can be the explanation. The same positive reaction is encountered in Czech Republic and Slovenia, but, for the banks with mostly foreign participation. This may be due to weaker reactions of the demand faced by banks with mostly national participation in the context of privatization of the biggest national banks.

5.2.2 "Extended Model" Estimation Results

The features of the supply of loans are revealed by the estimation of the "extended model". We focus on the significance of the linear relationship between the growth rate of the total loans to clients and the bank characteristics - the coefficient γ in equation (1) - and of the distributive effects of monetary policy on the growth rate of loans due to these bank characteristics - the interaction coefficients δ_j in equation (1). We realize this for the whole banking sector of each country, and also within each ownership group (see tables (3) and (4)).

Size as the bank characteristic: the estimations reveal a significant linear negative relationship between bank size and the growth rate of total loans to clients in Bulgaria, Czech Republic, Lithuania and Romania. However, in the case of Estonia, this linear relationship is positive ans significative. When distinguishing between the different ownership groups, the negative linear relationship is maintained only within banks with mostly foreign participation from Czech Republic and Romania. Still, in Slovenia, within banks with mostly foreign participation, the linear relationship is positive.

The distributive effect of the monetary policy changes due to bank size is shown

Table 3: "Extended model" GMM estimation results (long term coefficients)(1)

Dependent variable :	**Growth rate of total loans to clients**				
Specifications :	(1)	(2)	(3)	(4)	(5)
	Bulgaria	**Czech Rep.**	**Estonia**	**Hungary**	**Latvia**
Monetary Policy	-0.912**	0.015	-0.228	0.062**	-0.063
	(0.042)	(0.108)	(0.213)	(0.336)	(0.051)
GDP growth	10.939	-19.394**	-1.731	4.716**	-2.674
	(17.977)	(8.425)	(1.141)	(2.170)	(3.581)
Inflation	-0.647	1.205*	-0.031	-0.285	0.421
	(1.263)	(0.664)	(0.224)	(0.226)	(0.769)
Bank characteristics:					
Size	-0.327*	-0.794*	0.964*	0.163	-0.596
	(0.165)	(0.394)	(0.377)	(0.216)	(0.513)
within BMNP	17.042	45.618	–	–	0.405
	(11.691)	(261.682)			(3.801)
within BMFP	-0.218	-0.615***	–	0.143	-0.636
	(0.378)	(0.207)		(0.253)	(0.416)
Liquidity	0.013	0.051*	0.021	-0.004	0.0002
	(0.035)	(0.026)	(0.012)	(0.060)	(0.023)
within BMNP	0.515	–	–	-0.609**	0.041
	(0.632)			(0.089)	(0.058)
within BMFP	0.067	0.020	0.021	-0.116	0.018
	(0.103)	(0.016)	(0.023)	(0.124)	(0.016)
Capitalization	0.019	0.023	-0.104***	-0.082**	0.257*
	(0.022)	(0.019)	(0.021)	(0.033)	(0.150)
within BMNP	1.659	-0.484	–	-0.407	0.235***
	(15.657)	(0.546)		(0.540)	(0.041)
within BMFP	-0.019	0.015	-0.396*	-0.095**	0.056
	(0.035)	(0.022)	(0.061)	(0.038)	(0.102)
Bank char.*MP:					
Size	-0.006	0.012	0.046	-0.011**	0.019
	(0.016)	(0.024)	(0.073)	(0.004)	(0.020)
within BMNP	-0.055	0.380	–	-0.094	0.002
	(0.147)	(1.962)		(0.734)	(0.016)
within BMFP	0.001	0.005	0.069**	-0.002	0.028
	(0.016)	(0.015)	(0.019)	(0.017)	(0.035)
Liquidity	-0.002	-0.001	0.0008	-0.002	-0.003*
	(0.001)	(0.001)	(0.0005)	(0.002)	(0.001)
within BMNP	0.00001	–	–	-0.0001	0.0007
	(0.016)			(0.011)	(0.002)
within BMFP	0.001	0.0005	-0.0002	-0.005	-0.005***
	(0.005)	(0.0008)	(0.0017)	(0.003)	(0.001)
Capitalization	-0.001	-0.00002	-0.006***	-0.0004	-0.0005
	(0.001)	(0.001)	(0.001)	(0.0006)	(0.003)
within BMNP	-0.058	-0.003	–	-0.018	0.0008
	(0.623)	(0.004)		(0.008)	(0.0012)
within BMFP	-0.0006	0.002	-0.020**	0.00002	-0.004
	(0.001)	(0.002)	(0.003)	(0.0009)	(0.006)
p-value Hansen	0.782	0.964	0.981	0.942	0.980
p-value AR1/AR2	0.109/0.0766	0.072/0.245	0.38/-	0.184/0.622	0.317/0.345
No. of banks	26	26	7	30	26

Note: Standard errors in parentheses. *,**,*** denotes significance at 10%, 5%, 1% level.
BMNP means "banks with mostly national participation".
BMFP means "banks with mosly foreign participation".
(2), (3) and (4): the regression could not be estimated within BMNP and BMFP (for 'size'), due to insufficient observations.

Table 4: "Extended model" GMM estimation results (long term coefficients) (2)

Dependent variable :	**Growth rate of total loans to clients**				
Specifications :	(6)	(7)	(8)	(9)	(10)
	Lithuania	**Poland**	**Romania**	**Slovakia**	**Slovenia**
Monetary Policy	-0.064**	0.043	0.041	0.515***	-4.187
	(0.026)	(0.103)	(0.026)	(0.134)	(42.706)
GDP growth	8.900**	7.354	-0.189	81.707**	378.764
	(3.788)	(8.442)	(2.061)	(37.068)	(3683.12)
Inflation	-0.391**	0.002	-0.115	-1.756**	-31.421
	(0.133)	(0.435)	(0.169)	(0.781)	(300.198)
Bank characteristics:					
Size	-0.429**	-0.070	-1.593**	0.033	14.842
	(0.155)	(0.301)	(0.632)	(0.957)	(149.336)
within BMNP	–	2.538	4.527	–	2.139
		(1.447)	(8.299)		(3.102)
within BMFP	-0.286	-0.003	-1.674**	0.736	1.097**
	(0.214)	(0.502)	(0.598)	(1.448)	(0.316)
Liquidity	0.020	-0.015	0.015	0.008	-0.206
	(0.050)	(0.023)	(0.117)	(0.102)	(0.520)
within BMNP	-0.362	–	-1.132	–	0.078
	(0.174)		(7.454)		(0.123)
within BMFP	-0.051*	-0.006	0.065	–	0.037
	(0.023)	(0.030)	(0.109)		(0.243)
Capitalization	-0.085	0.055	0.166	-0.273	0.161
	(0.196)	(0.051)	(0.139)	(0.746)	(0.116)
within BMNP	–	0.742*	-0.150	–	0.008
		(0.413)	(0.413)		(0.020)
within BMFP	-0.636*	0.062	0.137	-0.762	18.372
	(0.297)	(0.063)	(0.142)	(0.830)	(156.191)
Bank char.*MP:					
Size	0.008	-0.013	-0.012	-0.014	1.373
	(0.007)	(0.011)	(0.008)	(0.055)	(13.928)
within BMNP	0.051	0.105*	-0.022	–	0.164
	(0.057)	(0.057)	(0.058)		(0.281)
within BMFP	-0.0004	-0.013	-0.008	0.004	-0.089**
	(0.010)	(0.017)	(0.008)	(0.501)	(0.029)
Liquidity	0.002	0.0006	0.0013	0.0013	-0.033
	(0.003)	(0.001)	(0.0014)	(0.003)	(0.086)
within BMNP	0.018*	–	0.002	–	-0.008
	(0.005)		(0.027)		(0.008)
within BMFP	0.0028***	0.0006	-0.0007	–	-0.0005
	(0.0005)	(0.001)	(0.0013)		(0.006)
Capitalization	-0.005	0.001	-0.0028	-0.0007	0.009
	(0.006)	(0.003)	(0.0029)	(0.023)	(0.006)
within BMNP	0.031	0.014	-0.014	0.012	0.0014
	(0.105)	(0.009)	(0.015)	(0.047)	(0.0014)
within BMFP	-0.176	0.0006	-0.003	-0.018	0.941
	(0.127)	(0.0021)	(0.003)	(0.028)	(7.911)
p-value Hansen	0.998	0.331	0.925	0.998	0.998
p-value AR1/AR2	0.177/0.961	0.088/0.176	0.422/0.456	0.259/0.791	0.038/0.412
No. of banks	10	53	28	17	19

Note: Standard errors in parentheses. *,**,*** denotes significance at 10%, 5%, 1% level.
BMNP means "banks with mostly national participation".
BMFP means "banks with mosly foreign participation".
(6), (7) and (9): the regression could not be estimated within BMNP and BMFP (for 'liquidity'), due to insufficient observations.

by the interaction term between the monetary policy and the bank size. Its coefficient is negative and significative in Hungary, meaning that the big banks' growth rate of loans decreases more than that of the small banks, after a monetary tightening. As regards the ownership groups, the distributional effects of monetary policy within the group of banks with mostly national participation is positive and significative in Poland, confirming the theory - the smaller the national bank, the stronger its lending reacts to the monetary policy conditions. Within banks with mostly foreign participation, the interaction term is significant and negative in Slovenia; this means that the lending of bigger foreign banks is more affected by the monetary policy conditions. Still, within the same categories of banks with mostly foreign participation, the interaction term is positive and significative in Estonia - the lending of the small foreign banks is more affected by the monetary policy conditions, compared to that of the national banks.

Liquidity as the bank characteristic: the estimations show evidence of an overall positive and significant linear effect of liquidity on the growth rate of loans in Czech Republic. Concerning the linear relationship, liquidity has an explanatory power only within banks with mostly national participation from Hungary and within banks with mostly foreign participation from Lithuania. In these two cases the linear relationship between bank liquidity and the growth rate of total loans to clients is negative and significative.

As regards the distributive effects of monetary policy, the overall analysis reveals a negative and significative coefficient of the interaction term in Latvia - meaning that the more liquid banks in Latvia, are more affected by the monetary policy conditions. When distinguishing between the ownership groups, the same negative and significant coefficient is encountered in Latvia within banks with mostly foreign participation, while for banks with mostly national participation the coefficient is positive but not significant. We see some evidence of the lending channel due to liquidity in Lithuania, both within banks with mostly national participation and banks with mostly foreign participation; the coefficient of the interaction term is positive and significative, confirming the theory: less liquid banks are strongly affected by the monetary policy conditions.

Capitalization as the bank characteristic: based on our results, capitalization presents an overall negative and significative linear effect on the growth rate of total loans to clients in Estonia and Hungary. In Latvia, the overall linear effect is positive and significative. With regards to the ownership groups, within banks with mostly national participation the linear effect is positive and significative in Latvia and Poland, while in the case of banks with mostly foreign participation,

the linear effect is negative and significative in Hungary and Lithuania.

As for the distributive effects of monetary policy, the overall analysis reveals a negative and significative coefficient for the interaction term between capitalization and the monetary policy in Estonia - meaning that the more capitalized banks from Estonia are more affected by the monetary policy conditions. The result obtained for Estonian banks is contrary to that of Juks (2004). The same result -a negative and significative coefficient for the interaction term- is obtained within banks with mostly foreign participation from Estonia. This is most probably due to the fact that there is a significant negative correlation between size and degree of capitalization (the correlation coefficient between size and degree of capitalization is -0.60) and, as we can see in table (3), when accounting for size as the bank characteristic we obtain a positive interaction term.

6 Conclusions

In this paper we investigate the working of bank lending channel in the case of ten CEECs, for the period 1999-2005. Using a panel of annual time series for the commercial banks of each of the ten CEECs, we analyze: (1) whether monetary conditions impact on bank lending; (2) whether there are linear relationships between certain bank characteristics (size, liquidity, ownership and capitalization) and the growth rate of total loans to clients; and (3) we characterize the effectiveness of the credit channel, whether there are distributional effects due to bank characteristics in the impact of monetary policy on bank lending. The existence of distributional effects of monetary policy is thought to reveal the effectiveness of the bank lending channel.

Our analysis focus on fluctuations in total loans to clients over the period 1999-2005. We find significant differences between the results characterizing each country as well as between the results characterizing banks belonging to different ownership groups.

The results of the estimations show that total loans to clients react to monetary policy impulses with stronger intensity in Bulgaria and Lithuania. The coefficient of the monetary policy indicator is, for both countries, negative and significant. The development of the banking sector and the recovery of the demand after the 1998 crisis could explain the stronger impact of the monetary policy on the growth rate of total loans to clients. Meanwhile, the impact of the monetary policy on the growth rate of loans is positive in Hungary, as the banking sector of this country has faced an excess of liquidity. Concerning the different ownership groups, we find

a strong negative and significative reaction of growth rate of loans to the monetary policy conditions within banks with mostly national participation from Bulgaria, while in Romania, the reaction within the same group of banks is positive and significative. As for banks with mostly foreign participation, the reaction of their lending is negative and significative in Bulgaria and Estonia, but positive in Czech Rep. and Slovenia. This may be due to weaker reactions of the demand faced by banks with mostly national participation in the context of privatization of the biggest national banks.

We find significant linear effects of all bank characteristics on the growth rate of loans to clients. Bank size impinges negatively on the growth rate of total loans to clients in Hungary. The impact on the bank size is also negative within banks with mostly foreign participation in Slovenia. Still, the impact of bank size in positive within banks with mostly foreign participation from Estonia and banks with mostly national participation from Poland. The negative sign of the coefficient for foreign banks in Slovenia complete the "opposed" result obtained by estimating the "benchmark" model; it seems that in Slovenia, banks with mostly foreign participation are increasing their lending in the aftermath of a monetary tightening, as the demand addressed to national banks decrease. In the same time, the big banks with mostly foreign participation are more affected by the monetary policy conditions. The degree of liquidity impinges negatively on the growth rate of total loans to clients in Latvia, the highest magnitude being within banks with mostly foreign participation from this country. The expected positive and significative impact is obtained for both ownership groups in Lithuania, as the lending of less liquid banks is more affected by a monetary tightening. Capitalization seems to influence negatively the lending of banks from Estonia, especially within banks with mostly foreign participation.

According to these findings we cannot assert the existence of the bank lending channel in all the analyzed countries. This may be due to the short time span of analysis. We do not expect that bank dependence of borrowers would decline as the analyzed economies integrate more into and become more similar to the European economy. The continuously diminishing of excess liquidity in the banking systems and the decreasing capitalization due to the increasing efficiency outlines the possibility of strengthening of the bank-lending channel in the future, in CEECs.

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7 Appendix

7.1 Variable Definition

Loans: total loans to clients (th. USD); source: BankScope (Bureau Van Dijk).
Monetary Policy: money market rate (annual data); source: IFS (IMF).
GDP: the growth rate of real GDP (annual data), own calculation; source: IFS (IMF).
Inflation: CPI % changes (annual data); source: IFS (IMF).
Size: the total assets (th. USD); source: BankScope (Bureau Van Dijk).
Liquidity: the ratio of liquid assets to total assets (%), own calculation; source: BankScope (Bureau Van Dijk).
Capitalization: the ratio of equity to total assets (%); source: BankScope (Bureau Van Dijk).
Ownership: dummy variables for banks with mostly foreign participation and banks with mostly national participation; source: BankScope (Bureau Van Dijk).

7.2 Panel Unit Root Test

We first present the theoretical aspects of the panel unit root tests performed, followed by the results.

Levin, Lin and Chu (LLC, 2002) have developed a panel unit root test, which assumes that each individual unit in the panel shares the same AR(1) coefficient, but allows for individual effects, time effects and possibly a time trend. The test may be viewed as a pooled Dickey-Fuller test, or an Augmented Dickey-Fuller (ADF) test when lags are included, with the null hypothesis that of non-stationarity (I(1) behavior).

Im, Pesaran and Shin (IPS, 2003) developed a test for unit roots in heterogeneous panels developed, which allows for individual effects, time trends, and common time effects. Based on the mean of the individual Dickey-Fuller t-statistics of each unit in the panel, the IPS test assumes that all series are non-stationary under the null hypothesis. Unlike the Levin-Lin-Chu test, which assumes that all series are stationary under the alternative, IPS is consistent under the alternative that only a fraction of the series are stationary.

We have performed each of the two panel unit root tests for individual intercept and individual trend and intercept. We note that the Levin-Lin-Chu test shows that the variable "total loans to clients" in the ten countries is I(0); loans to clients appears to be a stationary process. The Im-Pasaran-Shin test shows the presence

of the non-stationarity for the majority of countries. In the case of the test with individual intercept, total loans to clients appears as a stationary process only in the case of Bulgaria and Slovenia, while the variable is an I(1) for Czech Republic, Hungary, Latvia, Poland, Romania and Slovakia and an I(2) for Estonia and Lithuania.

Table 5: Total loans to clients: Panel Unit Root tests results (1)

Tested variable :	Total loans to clients (ln)					
	Level/ lag	First difference/lag	Order of integration	Level/ lag	First difference/lag	Order of integration
version of the test		Im-Pesaran-Shin test	*individual intercept*		Levin-Lin-Chu test	
Bulgaria	-42.39/0	-5.42/0	0	-162.90/0	-44.03/0	0
	(0.00)	(0.00)		(0.00)	(0.00)	
Czech Rep.	-0.83/0-1	-3.31/0	1	-9.39/0-1	-13.96/0	0
	(0.20)	(0.00)		(0.000)	(0.00)	
Estonia	-0.10/0-1	-0.50/0	2	-4.95/0-1	-3.78/0	0
	(0.46)	(0.31)**		(0.00)	(0.00)	
Hungary	-0.59/0	-2.05/0	1	-12.19/0	-9.40/0	0
	(0.27)	(0.02)		(0.00)	(0.00)	
Latvia	0.15/0-1	-5.75/0	1	-4.24/0-1	-18.86/0	0
	(0.56)	(0.00)		(0.00)	(0.00)	
Lithuania	2.10/0-1	-1.25/0	2	-2.05/0-1	-6.74/0	0
	(0.98)	(0.10)**		(0.00)	(0.00)	
Poland	0.74/0-1	-2.39/0	1	-6.42/0-1	-21.28/0	0
	(0.77)	(0.00)		(0.00)	(0.00)	
Romania	2.15/0-1	-7.79/0	1	-2.48/0-1	-7.12/0	0
	(0.98)	(0.00)		(0.00)	(0.00)	
Slovakia	0.02/0-1	-2.18/0	1	-8.68/0-1	-6.74/0	0
	(0.50)	(0.01)		(0.00)	(0.00)	
Slovenia	-2.11/0-1	-0.11/0	0	-11.83/0-1	-3.25/0	0
	(0.01)	(0.00)		(0.00)	(0.00)	

Note: ** denotes that the test was also performed for the second difference.
Probabilities in parentheses.
Source: Author' calculations.

Table 6: Total loans to clients: Panel Unit Root tests results (2)

Tested variable :	Total loans to clients (ln)					
	Level/ lag	First difference/lag	Order of integration	Level/ lag	First difference/lag	Order of integration
version of	*individual trend and intercept*					
the test	Im-Pesaran-Shin test			Levin-Lin-Chu test		
Bulgaria	-1.75/0	*	0	-59.10/0	-11.51/0	0
	(0.03)			(0.00)	(0.00)	
Czech Rep.	-0.04/0	-0.64/0	2	-10.88/0	-18.29/0	0
	(0.48)	(0.26)**		(0.00)	(0.00)	
Estonia	0.03/0	0.78/0	2	-6.24/0	-1.99/0	0
	(0.51)	(0.79)**		(0.00)	(0.00)	
Hungary	0.36/0	0.04/0	2	-8.22/0	-11.68/0	0
	(0.64)	(0.52)**		(0.00)	(0.00)	
Latvia	-0.60/0	-0.16/0	2	-15.36/0	-15.93/0	0
	(0.27)	(0.43)**		(0.00)	(0.00)	
Lithuania	0.19/0	-0.07/0	2	-6.43/0	-15.57/0	0
	(0.57)	(0.47)**		(0.00)	(0.00)	
Poland	0.43/0	-1.11/0	2	-27.47/0	-19.34/0	0
	(0.67)	(0.13)**		(0.00)	(0.00)	
Romania	-1.70/0	-2.97/0	0	-14.24/0	-29.51/0	0
	(0.04)	(0.00)		(0.00)	(0.00)	
Slovakia	-0.07/0	-0.40/0	2	-5.12/0	-10.98/0	0
	(0.47)	(0.34)**		(0.00)	(0.00)	
Slovenia	0.59/0	1.72/0	2	-4.62/0	-6.25/0	0
	(0.72)	(0.95)**		(0.00)	(0.00)	

Note: ** denotes that the test was also performed for the second difference.
* denotes that the test is not informed.
Probabilities in parentheses.
Source: Author' calculations.
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