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Working Paper

Silesian University in Opava
School of Business Administration in Karvina

Institute of Interdisciplinary Research

Working Papers in Interdisciplinary Economics and Business Research

European lending channel: differences in transmission mechanisms due to the global financial crisis

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January 2016

Working Papers in Interdisciplinary Economics and Business Research

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Citation

HERYÁN, T., TZEREMES, P.G. and R. MATOUSEK, 2016. European lending channel: differences in transmission mechanisms due to the global financial crisis. *Working Paper in Interdisciplinary Economics and Business Research no. 27.* Silesian University in Opava, School of Business Administration in Karviná.

Abstract

Tomáš Heryán, Panayiotis G. Tzeremes, Roman Matousek: **European lending channel: differences in transmission mechanisms due to the global financial crisis.**

This study focuses on the bank lending channels and transmission mechanisms of monetary policy in European Union (EU) countries. In accordance with previous empirical studies, we deploy the generalized method of moments (GMM) with pooled annual data. We examine the period from 1999 to 2012. We extend the current research on the transmission mechanisms of monetary policy in the following way: first, we compare the differences between the 'old' Economic Monetary Union (EMU) and 'new' EU countries. Second, we examine the interaction terms between bank characteristics and both monetary policy indicators. In particular, we examine the impact of short-term interest rates and monetary aggregate M2 on bank behaviour. Assuming a more obvious transmission mechanism, we argue that, in the group of 'old' EMU countries, the lending channel is affected by smaller banks that are less liquid or are strongly capitalized. For 'new' EU countries, we find similar results, i.e., the lending channel affects smaller banks. However, in terms of liquidity and capital adequacy and assuming a more obvious transmission mechanism, we find an opposing result. Those countries' lending channel is affected by smaller banks with higher levels of liquidity and lower bank capital. Third, we describe how transmission mechanisms changed during the crises period.

Key words

lending channel, transmission mechanism, crisis times, old EMU and new EU countries,

JEL: C58, G01, G21, G28

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Acknowledgement

This paper is supported by the Czech Science Foundation within the project GACR 13-03783S "Banking Sector and Monetary Policy: Lessons from New EU Countries after Ten Years of Membership".

Highlights:

- Transmission mechanisms are more obvious in the case of short-term interest rates among old EMU countries during the entire estimated period, whereas they are more obvious in the case of monetary aggregate M2 during the crisis period.
- Transmission mechanisms are more obvious in the case of monetary aggregate M2 among new EU countries during the entire estimated period, whereas they are more obvious in the case of short-term interest rates during the crisis period.
- Lending channel during the entire period: In old EMU countries, it is affected by smaller banks that are less liquid and strongly capitalized, whereas in new EU countries, it is affected by smaller banks with a higher level of liquidity and lower bank capital.
- Monetary policy during the entire period: In the old EMU, countries react more to its changes to large banks in the case of short-term interest rates, whereas in new EU countries, in the case of monetary aggregate M2, those more liquid and undercapitalized banks react more on monetary changes.
- Lending channel during the crisis period: In old EMU countries, it is affected by larger and stronger liquid banks, whereas in new EU countries, it is affected by smaller banks.
- Monetary policy during the crisis period: In the old EMU, countries react more to its changes of less liquid and strongly capitalized banks in the case of monetary aggregate M2, whereas in new EU countries, in the case of short-term interest rates, those more liquid and strong capitalized banks react more to its changes.

1. Introduction

The recent global financial crisis (GFC) has changed banks' behavior and affected the monetary policies of central banks in Europe, the USA and also in other regions. As a reaction to the GFC, the central banks have adopted unconventional monetary policy measures such as supplying an unlimited amount of capital to the market to support the liquidity of commercial banks and foreign exchange interventions through competitive devaluations of other currencies against the euro. These systemic changes have undoubtedly had an impact on banking systems and have affected bank lending channels of monetary transmission in 'old' Economic Monetary Union (EMU) and 'new' European Union (EU) countries.

In the existing literature on monetary transmission mechanisms, three major bank characteristics are found to affect the responses of bank loans to shifts in monetary policy—asset size, bank capitalization and bank liquidity—as discussed in seminal papers by Kashyap and Stein, 1995 and 2000; Kishan and Opiela, 2000 and further tested in different markets; see, for example, Ehrmann et al., 2003; Gambacorta, 2005; Matousek and Sarantis, 2009; Fungáčová et al., 2014; and Heryán et al., 2015 among others.

Only a handful of studies have focused on comparing the development of short-term interest rates and changes in monetary aggregates and their impacts on lending channels in the context of the distributional effects of monetary policies during the financial crisis period (see Heryán et al., 2015). However, there is no evidence of differences between old European economies that accept the euro as the common currency and new European Union (EU) economies in this field.

This paper attempts to contribute to the extensive research on monetary transmission mechanisms in general, and lending channels in particular. We extend the previous studies on the lending channel in the following ways: first, we use short-term interest rates as well as the monetary aggregate M2 to examine which variables most affected the lending channels. Second, the paper uses two periods within the entire period of 1999 to 2012, that is, the pre-crisis period and the crisis period from 2007 to 2012, to show the differences in how banks' behaviors changed. Finally, we compare the results for old EMU countries with the results for new EU countries that joined after 2004 (the UK, Sweden and Denmark are therefore excluded from the analysis).

The reported findings indicate that there is the differences between the old EMU lending channel, in which the transmission mechanism was more obvious in terms of short-term interest rates before the financial crisis, whereas during the crisis period, there were changes in the monetary aggregate M2 that affected the channel more. In contrast, in the new EU lending channel, it was found that the transmission mechanism worked more effectively with the M2 before the crisis, whereas during the crisis period, it was the changing interest rates that affected the channel more.

Throughout the paper, we also show the following: first, smaller banks react more to changes in the M2 than in interest rates, but only in old EMU countries; this is consistent with the recent monetary behavior of the ECB. Otherwise, the old EMU lending channel is affected more by larger banks, in contrast to the existing literature. Even among new EU countries, no evidence supports the idea that bank size affects the lending channel. Second, bank liquidity mattered among both the old EMU and new EU countries during the crisis, but only the old EMU lending channel was affected throughout the entire crisis period. Third, strongly capitalized banks reacted more to monetary policy changes in the old EMU countries, which is consistent with the existing literature. In the case of the new EU countries, only the strongly capitalized banks reacted for the entire period, but the reactions of the undercapitalized banks were much more evident during both periods. Finally, last year's development of loans granted was significant in all generalized method of moments (GMM) models. This result contrasts with the findings published by Fungáčová et al. (2014).

In addition, the study contributes to ongoing research by providing evidence for both the pre-crisis and the crisis periods using pooled data from 1999 to 2012 that were published by Bank Scope and using GMM panel regression. From the methodological point of view, there are four major studies within the area of monetary policy on the bank lending channel among European countries, all of which use methodologies similar to the GMM with pooled data: Gambacorta (2005) estimated relationships within the Italian credit market; Matousek and Sarantis (2009) investigated the lending channels of each country in the Visegrad group and compared them with the channels in the Baltic states; Akinci et al. (2013) estimated the credit market in Turkey; and Heryán et al. (2015) investigated differences between the EMU and EU countries with their own currencies.

This study is structured as follows: In next Section summarizes studies on bank lending channel, Section 3 describes the estimation methodology used in the papers from the previous paragraph and the data, Section 4 discusses the empirical results, and the last section summarizes the main conclusions.

2. Literature review

The importance of the bank lending channel (BLC) and its interaction with monetary policy was first investigated in the USA mainly in the 1990s. Initially, the lending view was interpreted by Bernanke and Blinder (1988); they interpreted it as a specific, special case of multi-asset models. Therefore, in particular, in the lending view, there were exactly three assets: money, bonds, and bank loans. The main idea was to check a basic premise of the theory, namely, that a tightening in monetary policy does in fact lead to a contraction in the deposits available to both large and small banks. This relation holds for the aggregate banking sector, which has already been established by Bernanke and Blinder (1992).

According to Kashyap and Stein (1995), the central bank must be able, simply by conducting open-market operations, to shift banks' loan supply schedules. According to these researchers, the differences between large and small bank equity emphasizes the fact that their use of bank size as a proxy for external market access is an imperfect one. The researchers find that small banks react more sensitively than large banks to changes in the stance of monetary policy for every one of our specifications. Moreover, one may expect that better capitalized banks would have an easier time raising external funds. For example, a better capitalized bank has less of a problem posed by asymmetric information when it attempts to raise funds using uninsured debt liabilities such as large CDs or subordinated debt. As we noted in the Introduction, and as we will discuss in more detail momentarily, monetary policy in the EU has changed due to changes caused by the GFC. Therefore, we focus on testing whether unconventional monetary policy measures have a larger impact on bank behavior in crisis times.

After the first two bank characteristics (bank size and its capital), the third characteristic investigated by Kashyap and Stein (2000) was bank liquidity. The researchers are interested in how US commercial banks react when the Fed drains reserves from the system. The researchers argue that changes in monetary policy matter more for the lending of those banks with the least liquid balance sheets. The studies above showed that the bank lending channel in the USA appears to be strengthened when small banks are either relatively illiquid or undercapitalized. The evidence provided by Kashyap and Stein (2000) and Ehrmann et al. (2003) shows that liquid banks can insulate their loan portfolios by reducing their liquid assets, whereas less liquid banks are unable to do so. Finally, bank capitalization is another characteristic used in certain BLC models. Peek and Rosengren (1995) and Kishan and Opiela (2000 and 2006) argue that poorly capitalized banks reduce their loan supply more than well capitalized banks after a monetary contraction, due to their limited ability to tap into uninsured sources of funds. Therefore, the size, liquidity and capitalization of banks are all expected to be positively correlated with bank loans.

There is several empirical literature sources regarding the monetary policy in the Eurozone as well. Arghyrou (2009) stated that, following the launch of the European Economic and Monetary Union (EMU) in 1999, focus on the empirical literature on monetary policy in Europe has gradually been shifting from modeling national monetary policies toward that of the European Central Bank (e.g., Gerlach and Schnabel, 2000; Mihov, 2001; Domenech et al., 2002; Surico, 2003 and 2007; Clausen and Hayo, 2005; Hayo and Hofmann, 2006; or Siklos et al., 2011). Certain authors compare monetary policy before and after a country joining the EMU. Arghyrou (2009) examined, e.g., monetary policy in the 1990s in Greece. He focused on monetary policy before and after the acceptance of the euro as the single European currency. Bleich and Fendel (2012) analyzed

monetary policy conditions in Spain before and after the change to the euro. The researchers found that the policy contributed to stabilizing the Spanish economy. The researchers also found that the monetary policy stance was that of the ECB since 1999, which was appropriate because the entire euro area was excessively expansionary for Spain's economy.

Moreover, it has been proven in Berger (2003) that the implementation of the EMU may also increase cross-border consolidation by improving trade, reducing the currency conversion costs, and lowering the costs to consumers and businesses of purchasing services from foreign institutions. The researcher also investigated the effects of the consolidation of financial institutions on the supply relation of lending services to informationally opaque small businesses. He argues that the consolidation of the banking industry into large, international banking organizations may result in disruptions in the supply of relationship credit to small businesses and the loss of relationship information that had developed over time. As is also argued in Fungáčová et al. (2014), monetary tightening may force certain banks to reduce their loan supply. However, these reductions will differ across banks. Banks with less access to alternative funding sources will probably be hit harder and thus cut their lending more than will the other banks. The access to alternative funding sources may depend not only on individual bank characteristics such as bank size, capitalization and liquidity but also on the structure of the banking sector and the market power of individual financial institutions (refer also to Kashyap and Stein, 1995 and 2000; Ehrmann et al., 2003; Gambacorta, 2005; Matousek and Sarantis, 2009; Akinci et al., 2013).

Akinci et al. (2013) argue that a new strand of research has recently emerged. According to these researchers, a number of empirical studies impose a new set of research questions that attempt to answer how the bank lending channel may be affected by bank consolidation and risk factors (refer to Gambacorta and Marques-Ibanez, 2011; Olivero et al., 2011; Brei et al., 2013; Shaw et al., 2013). We have studied a few papers connected to that issue as well. Altunbas et al. (2010) find initial evidence of a bank lending channel operating in the euro area via bank risk. The researchers show that bank risk conditions, as perceived by financial market investors, need to be considered, together with the other indicators (i.e., size, liquidity and capitalization), that are traditionally used in the bank lending channel literature to assess banks' ability and willingness to supply new loans. Using a large sample of European banks, the researchers find that banks characterized by a lower expected default frequency are able to offer a larger amount of credit and to better insulate their loan supply from monetary policy changes. The researchers argue the 2007–2008 credit crisis has shown very clearly that the market's perception of risk is crucial in determining how banks can access capital or issue new bonds. In their next study, the same authors, Altunbas et al. (2012), analyze whether bank characteristics affect the impact of monetary policy on bank risk. The researchers find that the insulation effects produced by capital and liquidity were lower for banks operating in countries with particularly low interest rates in Europe. Kishan and Opiela (2012) concluded that bank capital, liquidity, and other balance sheet variables that are used to price risk are endogenous to monetary policy shocks. This endogeneity has implications for financial stability.

Financial stability in the EU is currently discussed due to the unconventional monetary policy of the ECB. The policy has affected the monetary base and could affect the financial stability in all Europe. An impact of the development of short-term interest rates as well as monetary aggregate M2 on the EU lending channel is investigated by Heryán et al. (2015). However, in contrast to their paper, our focus will be on cross-sectional differences in these responses across banks of

different samples. The researchers differentiate EU banks according to the Eurozone and non-euro countries among whole EU. We believe that these two groups of countries are excessively heterogeneous. The sovereign debt crises in the EMU shows us there could be differences in economies among countries that accepted the euro before 2004 and those that accepted it later. Moreover, the researchers create the second panel from non-euro countries although there are huge differences among those economies (e.g., economy of the UK, Sweden or Denmark against the Czech Republic, Hungary and Poland). A more homogeneous sample can be formed from similar data according to the date when the countries accepted euro currency. However, we also focus on the most direct test of the theory, whether the lending volume of smaller banks is more sensitive to monetary policy (to conventional as well as unconventional) than to the lending volume of large banks.

Nonetheless, this study contributes to the investigation of the BLC and the effects of monetary policy in the EU because we attempt to determine the changes due to the GFC. In times affected by the GFC, many banks in the EU had not been classified as insolvent. Otherwise, these banks had been classified as illiquid to arrange their opportunity for possible lending from the ECB. Before the crisis, many European banks invested in Asset Back Securities (ABS), securities created by U.S. banks from unsecure and risky loans, which were considered as safe investments. However, the problem was that any bank in the EU did not know whether other banks were affected by that serious problem and by how much or, conversely, which bank had a problem with its short-term liquidity. The problem of suspicion arose in the interbank money market throughout all of the EU. Therefore, the money market that was used to bridge the liquidity shortage was illiquid. The first aid from the ECB was to supply liquidity to illiquid banks as well as to the illiquid market. Although the ECB previously limited money to the market, its behavior changed to the total opposite to supply an unlimited amount of money to banks through short-term loans. These loans were not secured by high quality securities, and their maturities were extended from three or six months to one year. Certain related studies are motivated by similar occasions. Although the previous literature investigates whether a tightening in monetary policy does in fact lead to the BLC, we investigate the effects of its easing in the EU during crises times.

3. Data and methodology

The data on banks were obtained from Bankscope, the main worldwide statistical database of bank data. The sample includes 25 countries from the European Union (except United Kingdom, Sweden and Denmark). The annual data of all commercial banks from these EU countries that are listed in Bankscope are included in our empirical investigation. The total number was 933 banks with its annual frequency data from the 1997 to 2012 period. Selected macroeconomic data were obtained from the World Bank statistical database. We use the nominal GDP in current prices, inflation, and monetary aggregate as percentages from GDP for all European countries. Three month short-term interest rates were obtained from Eurostat for each country. As the Eurostat describes, the 3-months interest rate is a representative short-term interest rate series for the domestic money market. From January 1999, the euro area rate is the 3-month "EURo InterBank Offered Rate" (EURIBOR). EURIBOR is the benchmark rate of the large euro money market that has emerged since 1999; it is the rate at which euro inter-bank term deposits are offered by one prime bank to another prime bank. The contributors to EURIBOR are the banks with the highest

volume of business in the euro area money markets. The panel of banks consists of banks from EU countries that participate in the euro from the outset, banks from EU countries that do not participate in the euro from the outset, and large international banks from non-EU countries but with important euro area operations. Finally, although EMU countries do not have their monetary aggregates because they do not have their own currencies, we can run the tests with M2 of each country according to data published by the World Bank. Although the use of short-terms interest rates is usual in previous studies, the use of M2 could expose certain strong attributes or weaknesses of using euro currency due to particular relations in the credit market. This study contributes with the comparison of results among both OLD and NEW EU countries.

Two approaches have been employed in the empirical literature for testing the bank lending channel. One is to divide banks by size, capitalization and liquidity (e.g., Kashyap and Stein, 1995 and 2000; Kishan and Opiela, 2000 and 2006; Altunbas et al., 2002). This approach requires a large number of banks, which is not a problem for the USA. The alternative approach is to use a panel data model that allows the reaction of bank loans to monetary policy to become dependent on the bank characteristics, as in Ehrmann et al. (2003). This approach avoids the above problem associated with the number of banks, and this is therefore used in our paper. The authors develop a model of the loans market that draws upon Bernanke and Blinder (1988). The solution of their model yields an equation for bank loans that relates the response of bank loans to monetary policy both directly (via the money channel) and to bank characteristics (through the bank lending channel).

In the empirical specification, in accordance with Kashyap and Stein (1995 and 2000), we also applied in Gambacorta (2005), Matousek and Sarantis (2009), Akinci et al. (2013), and Heryán et al. (2015). It is designed to test whether banks react differently to monetary policy shocks. This study contributes with using two types of variables among models to compare relations between development of credit market and the both, short term interest rates and monetary aggregate M2. Moreover, we split the analysis for OLD and NEW EU countries and estimate changes in crisis times. The model is given by the following equation (1), which includes interaction terms that are the product of the monetary policy indicator and a bank-specific characteristic:

$$\Delta \log(L_{it}) = \alpha_{it} + \sum_{j=0}^{1} \beta \Delta \log(L_{i(t-1)}) + \sum_{j=0}^{1} \vartheta \Delta C_{t-j} \sum_{j=0}^{1} \delta \Delta \log(GDP_{t-j}) + \sum_{j=0}^{1} \gamma \Delta CPI_{t-j} + \sum_{k=1}^{3} \varphi Z_{kit-1} + \sum_{k=1}^{3} \sum_{j=0}^{1} \omega Z_{kit-1} \Delta C_{t-j} + \sum_{k=1}^{2} \sum_{h=k+1}^{3} \sum_{j=0}^{1} \xi \, Z_{kit-1} Z_{hit-1} \, \Delta C_{t-j} + \varepsilon_{it}, \quad (1)$$

where $L_{it}$is the gross loans of *i ={1,…,N}* number of EU banks in time *t={1,…, T}*. The exogenous variable ΔC_{t-j} is either a growth of short-term interest rates in the first case or a growth of monetary aggregate M2. The next regressors are GDP_{t-j} and CPI_{t-j}, which means GDP and inflation in selected EU countries. The last three exogenous variables represent a combination of Z_k, which denotes *k=1,2,3* bank specific characteristic variables (refer to below) and ΔC_{t-j}. Constants and residuals are variables α_{it} and ε_{it}, respectively. We estimate two types of models, for OLD EMU as well as for NEW EU countries.

In accordance with Kashyap and Stein (1995 and 2000), the following bank characteristics, size S_{it}, liquidity Liq_{it} and capitalisation Cap_{it}, are applied to test the presence of the distributional effects of monetary policy among banks:

$$S_{it} = \log(A_{it}) - \frac{\sum \log(A_{it})}{N_t}, \quad (2)$$

$$Liq_{it} = \frac{LA_{it}}{A_{it}} - \frac{1}{T}\sum_t \left(\frac{1}{N_t}\sum_i \frac{LA_{it}}{A_{it}}\right), \quad (3)$$

$$Cap_{it} = \frac{EQ_{it}}{A_{it}} - \frac{1}{T}\sum_t \left(\frac{1}{N_t}\sum_i \frac{EQ_{it}}{A_{it}}\right), \quad (4)$$

where A_{it} means assets of all estimated N_t banks, LA_{it} means only its liquid assets (i.e., cash, interbank lending and securities), and EQ_{it} is bank capital and reserves (total equity).

Loan growth is regressed on changes of the interest rate controlled by the monetary authority and on its interaction with three bank-specific characteristics (size, liquidity and capitalization). The regression (1) also includes inflation and GDP growth to control for demand effects. The introduction of these two variables allows us to capture cyclical movements and serves to isolate the monetary policy component of interest rate changes. Gambacorta (2005) argues, this will allow us to gain further insight into the interbank lending channel by reporting the effects of changes in the interest rates on these other items of banks' balance sheets. Moreover, we employ the growth of monetary aggregate M2 to compare what will have a greater impact on the development of credit market, short-term interest rates or M2.

Akinci et al. (2013) argue that applying a pseudo general-to-specific model reduction method in the application of the GMM estimator avoids multicollinearity problems. The pseudo general model includes the current and first lagged value of variables C_{t-j}, GDP_{t-j}, CPI_{t-j} as well as the first lag of each bank characteristic, $S_{i(t-1)}$, $Liq_{i(t-1)}$ and $Cap_{i(t-1)}$. The researchers also argue that the two-step coefficient estimator is asymptotically efficient and robust to whatever heteroscedasticity, autocorrelation and cross-correlation is modeled by the new variance–covariance matrix. The rule of thumb is to maintain the number of instruments below the number of cross-sections to ensure valid inference. Therefore, we also use the dependent variable lagged two periods and deeper as "collapsed" GMM-style instruments to maintain a low number and avoid over fitting the endogenous variable (collapsing instruments in this manner does cause an efficiency loss). Therefore, we also restrict instruments to be the same for each model; these are the current value and first lag of each of our regressors.

Although we observed data from 1997, due to missing data and using previous year, the entire estimated period begins in 1999. Arellano and Bond tests show that the first order statistic is statistically significant, whereas the second order statistic is not, which is what we would expect if the model error terms are serial uncorrelated in levels. Therefore, we reject the presence of significant serial correlation in all countries, thus implying that GMM estimators are consistent. For bank characteristics, we estimated the model with each characteristic separately, then with all possible pairs of characteristics, and finally with all three characteristics together (refer to Matousek and Sarantis, 2009). The results of the models presented in Tables 1–8 were produced using EViews 9.0 (see Appendix). The model does not allow for random effects. Nevertheless, all the major studies which used GMM allowed for period effects in their estimations. We must always retain GMM weights to test the Arellano-Bond Serial Correlation and to conduct Sargan

tests. The lags of the bank characteristics were excluded from the IV-style instrument set to maintain the number of instruments below the number of cross-sectional units (refer to also Akinci et al., 2013).

4. Empirical results

This section provides a discussion of our findings. The main focus of our discussion is on the impact of short-term interest rates and monetary aggregate M2 on BLC. We also investigate specific bank behavior during the GFC and the sovereign debt crisis in the EMU.

4.1. Old EMU countries

From Table 1 and Table 2, it is obvious that the change of loans granted from the previous year has a larger impact in the case of interest rates when we include the bank size into the estimation. When we include the bank liquidity, it is very similar in both cases. Conversely, whereas we include the bank capitalization, there is a larger impact in the case of monetary aggregate M2. We observe that the change of M2 has much larger impact on the lending channel than the change of interest rates. Nonetheless, we observe that our lagged endogenous are statistically significant within independent regressors at 1% level in all panel GMM estimations (refer to all Tables 1–8). Fungáčová et al. (2014) argue, in their case, the results indicate that the lagged value of loan growth is not significant. Therefore, the researchers have serious doubts regarding the benefits of using the difference or system GMM. However, we find the lagged value of loan growth as significant in all estimations. It could be caused by a cyclicality of the development of loans granted. This is supported also with a significant positive impact of GDP development on the lending channel, which is often obvious in the estimations. Moreover, GMM models with annual data were deployed not only in this study but also in Ehrmann et al. (2003), Matousek and Sarantis (2009), Heryán et al. (2015).

We focus only on significant results in the text, naturally. Positive impacts of the lagged inflation's development on the lending channel are found only among OLD EMU countries. From the output of GMM models in Table 1, it is obvious that smaller banks on average affect the lending channel more during the entire estimation period (positive Size(1)). In OLD EMU economies, their lending channel is affected by smaller banks, which are simultaneously less liquid (negative Liq(1)) and strongly capitalized (positive Capital(1)) in Table 1 with short-term interest rates. In Table 2, with monetary aggregate M2, the lending channel is affected by those banks that are conversely more liquid and less capitalized. Significant coefficients are larger in the case of change of monetary aggregate M2 among OLD EMU countries.

To assess the distributional effects of monetary policy, we examine the coefficients of the interaction terms between the bank characteristics and the monetary policy indicator (refer to Matousek and Sarantis, 2009). In Table 1, with interest rates, large banks react more to its change in average among OLD EMU (positive Size*Rate). The reactions with and without one year's lag of the interest rate change have also been investigated. It is obvious that larger banks react with no lag among OLD EMU countries (positive Size(1)*Rate(1)).

We observe substantial differences among the OLD EMU lending channel in the period affected by the financial crises in Tables 3 and 4. We argue that the transmission mechanism of monetary policy works more in the cases with short-term interest rates over the analyzed period.

We observe that CPI(1) is significant in Table 1. However, the result is the opposite in the crisis period, when the mechanism is more obvious in the cases with monetary aggregate M2 in Table 4. Therefore, finally, we focus only on the output in which the transmission mechanism is more obvious within the crisis. In Table 4, we observe differences among the coefficients of the interaction terms between the bank characteristics and the monetary policy indicators. The lending channel is more affected by larger banks on average (positive Size(1)), but smaller banks react to the change of monetary aggregate M2 with no lags in the crisis (negative Size(1)*M2(1)). Lending channel is more affected by less liquid banks, which react to the change with no lags (negative Liq(1)*M2(1)). We argue in crisis times, those stronger capitalized banks react earlier to the M2 changes because significant coefficients Capital(1)*M2(1) are positive. Conversely, undercapitalized banks in average react on the M2 change with the one year's lag because the significant coefficient Capital(1)*M2 is negative in Table 4.

4.2. New EU countries

Among NEW EU lending channels, we prove the negative impact of changes in short-term interest rates in Table 5. However, we find a stronger positive impact of changes in monetary aggregate M2 in Table 6. From the output of GMM models with pooled data for NEW EU countries, it is also obvious that smaller banks, on average, affect the lending channel more in the whole estimation period in Table 5 (negative Size(1)). In NEW EU countries, their lending channels are affected by those smaller banks that are simultaneously more liquid on average (positive Liq(1)). Once more, we naturally focus only on significant results in the text.

Conversely, in NEW EU countries, their lending channels are affected by smaller banks (negative Size(1)), as well as by those with a higher level of liquidity (positive Liq(1)), only in the case of short-term interest rates in Table 5. The argument that smaller banks affect the lending channel supports the results of Matousek and Sarantis (2009), who found the same result among banking sectors in Hungary and Poland. The researchers argue that it is surprising to note that there is no significant responsiveness in the growth of bank loans to the monetary policy stance that is measured by the short-term interest rate (excluding Slovenia, in their case). However, the picture changes in our study when we consider the monetary aggregate M2 in Table 6. Then, we cannot argue the same result due to the insignificance of the coefficients.

Nevertheless, in the first case of interest rates in Table 5, larger banks react more to its change on average, although the coefficient is very close to zero. We observe the statistically significant lagged reaction of larger banks only (positive Size(1)*Rate). Matousek and Sarantis (2009) concluded that small banks that have started their activities almost from scratch have a higher dynamic of lending activities compared to large, established banks. Otherwise, among NEW EU countries, the result is not the same in our study.

Following Gambacorta (2005) and Matousek and Sarantis (2009), we also define capitalization as the amount of capital that banks hold in excess of the minimum required to meet the prudential regulation standards in their respective countries and then re-estimated all country equations using this alternative measure of capitalization. The overall pattern of results for NEW EU countries in terms of the sign and significance of the coefficients on the interaction of interest rate changes with capitalization remained similar to the reported results. Strongly capitalized as well as undercapitalized banks in Table 5 react to the change in the interest rate. However,

undercapitalized banks react with one year's lag (Capital(1)*Rate). Hence, the capitalization result appears to be related to the measure of capitalization that we employ.

In the second case, with monetary aggregate M2 in Table 6, banks that are strongly capitalized as well as banks with a lower level of capital, on average, react to its changes. Conversely, those undercapitalized banks react with no lag in that case (Capital(1)*M2(1)). We observe the interaction with one year's lag among banks with a higher level of capital in Table 6 (Capital(1)*M2). However, Gambacorta (2005) argues that the widely used capital to asset ratio may be a poor approximation for the capital constraint that banks confront under the Basle standards.

In the period affected by the financial crises, we observe large differences among NEW EU lending channels, as well. We argue over the whole period that mechanisms work more in the cases with M2 in Table 6. However, in the crisis period, it is more obvious in Table 7 with short-term interest rates. Therefore, we observe that the lending channel reacts to the change of CPI with no lag. This major change does not definitely cause minor changes. In NEW EU countries, their lending channel is more affected by smaller banks (negative Size(1)). However, we cannot clearly argue whether banks react to the change in short-term interest rates with or without lags due to insignificant results. We cannot argue whether the lending channel is affected by more or less liquid banks (insignificant Liq(1)).

Nonetheless, those more liquid banks react to the change in monetary policy with no lags in both cases in Table 7 and 8 (positive Liq(1)*Rate(1) as well as Liq(1)*M2(1)). The change of the interest rates is reacted to more strongly by capitalized banks with no lags in Table 7 (positive Capital(1)*Rate(1)). Conversely, in the case with M2, undercapitalized banks react with no lags in Table 8. Those stronger capitalized banks react with one year's lag (negative Capital(1)*M2).

4.3. Comparison

Finally, to compare the results of the crisis period and the entire period, we argue that the crisis period is differentiated from the whole by the presence of more obvious transmission mechanisms in our estimated relations. From the perspective of the lending channels: (i) In the case of OLD EMU countries, it is affected by smaller banks in the case of interest rates, whereas the size does not matter in the case of M2. In the case of NEW EU countries, the lending channel is affected by smaller banks in the case of interest rates over the entire period as well during the crisis period. (ii) In OLD EMU economies, the lending channel is affected by more liquid banks in the cases with M2, whereas with interest rates by less liquid banks. In NEW EU economies, the lending channel is affected by more liquid banks in both crises and whole period in the case of interest rates. For M2, those more liquid react only in crisis time. (iii) The OLD EMU lending channel is affected by strong capitalized banks in the case of interest rates; however, undercapitalized banks react more to the change of M2 only in the whole period. The NEW EU lending channel is affected in both periods by those banks that are undercapitalized in average.

The last paragraph describes the minor changes connected with the transmission mechanism. From the view of the transmission mechanism of monetary policy, the crisis period differs from the entire period in these relations. (iv) In the case of OLD EMU countries, larger banks react more to the change of short-term interest rates over the whole period, whereas smaller banks react more to the change of monetary aggregate M2 in the crisis. In the case of NEW EU countries, we observe that larger banks react more over the whole period. (v) In OLD EMU economies, more

liquid banks react to the change in interest rates, whereas less liquid banks react more to the change of M2. In NEW EU countries, more liquid as well as less liquid banks react on the change in interest rates, whereas in the crisis period, only those more liquid react to monetary changes in both cases. (vi) Among OLD EMU countries, those strong capitalized as well as less capitalized banks react to the change of M2 over the entire period and in the crisis. Among NEW EU countries, strong capitalized as well as less capitalized banks react to the change in interest rate as well as M2 over the whole period. Conversely, only those undercapitalized react more to changes of interest rates in the crisis period.

Conclusion

This paper provides new evidence of the bank lending channels in the EU member states during the GFC. Our study confirms that the lending channels are affected by changes in short-term interest rates as well as in the monetary aggregate M2. The results indicate that commercial banks react to monetary policy shocks differently in crisis periods. In fact, the bank lending channels in old EMU countries have become more sensitive to changes in M2 than in short-term interest rates during the GFC. In contrast, our results show that the bank lending channels in new EU countries are more sensitive to short-term market interest rates.

We argue that the monetary transmission mechanisms in the old EMU countries could have changed due to the unprecedented liquidity injection by the ECB (refer to also Drehmann and Nikolaou, 2013; Beaupain and Durré, 2013). Reichlin (2014) argues that the key non-standard monetary policy measures taken by the ECB were liquidity operations. Moreover, as Akinci et al. (2013) state, new empirical studies on the bank lending channels during the GFC indicate that bank behavior have also changed. Banks that encounter financial distress endure restructuring processes and operate in unstable economic environments. Mutual distrust between commercial banks[1] in the EU has resulted in the problem with market liquidity. Otherwise, due to changes in monetary policy, higher levels of liquidity are inevitable among EMU countries. Therefore, banks do react to the added liquidity in the crisis periods.

The transmission mechanisms among new EU countries are more obvious for the whole period of our analysis in the cases with M2. This finding could be caused by the fact that some of our selected new EU economies are not members of the EMU. Therefore, those countries' central banks still control the monetary base, which affects the entire lending channel. The ECB indirectly controls the monetary base. However, the ECB's interventions have affected the entire EMU. Regardless of whether there is no argument for these interventions in the entire market, the ECB leaves it to the interbank market and its demand and supply. Nonetheless, because of the Global Financial Crisis, banks in new EU countries are less liquid than banks in old EMU countries. The central banks out of the EMU do not add liquidity to the markets in the same way as the ECB. Therefore, the lending channels in new EU economies appears to be more sensitive to changes in interest rates during the crisis period and the monetary transmission mechanisms are more effective.

[1] Before the crisis many European banks invested to Asset Back Securities (ABS). The securities were created by U.S. banks from unsecure and risky loans, otherwise they were considered safe investments. However, the problem was that any of banks in the EU do not know whether other bank is affected with that serious problem or not, and which bank have just a problem with its short-term liquidity.

Furthermore, we analyze the interaction terms between the bank characteristics and the monetary policy indicators. Recent empirical studies, e.g., Matousek and Sarantis (2009), Fungáčová et al. (2014), and Heryán et al. (2015), among others, find that liquidity plays the prominent role in the EU lending channel as well (originally proved in Kashyap and Stein, 2000). Although, we find that bank size is an important factor that has affected the new EU lending channel. In contrast to the previous studies, we could not confirm that bank size did not have the same effect for the group of old EMU countries. Although in the whole period, new EU undercapitalized banks reacted more to monetary shocks in the case with M2, and more strongly capitalized banks in the new EU countries reacted more in the case with short-term interest rates.

This study could be useful in several ways. We argue that, although the unconventional monetary policy of the ECB obviously works within the lending channel, it must be well monitored. If central banks in other EU countries will also ease their monetary policy, it would make the situation on the market unfathomable. The ECB should slowly return its monetary policy to the conventional one to allow the lending channel to be affected in the more mature markets' manner. Future research should focus more on changes in the deposits of bank clients as well as whether the deposits have changed their behavior due to the GFC and the unconventional monetary policy of the ECB.

Acknowledgement

This paper is supported by the Czech Science Foundation within the project GACR 13-03783S "Banking Sector and Monetary Policy: Lessons from New EU Countries after Ten Years of Membership".

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Appendix:

Table 1: OLD EMU countries with short-term interest rates

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.5694 [a]	0.6240 [a]	0.3168 [a]	0.6081 [a]	0.5445 [a]	0.7049 [a]	0.6656 [a]
Rate	0.0407	0.0330	0.0690 [b]	-0.0423	0.0254	0.0238	-0.0141
Rate(1)	-0.1336	-0.0358	-0.0656 [c]	-0.0284	-0.0836	-0.0274	-0.0290
GDP	0.9866	0.4963	0.8090 [b]	0.1340	1.0246	0.2505	0.1964
GDP(1)	-2.2433 [a]	0.3997	0.0453	-1.5102 [b]	-2.0787 [b]	0.8655	-1.5700 [b]
CPI	-0.0119	0.0157	0.0009	0.0004	-0.0114	0.0197 [c]	0.0009
CPI(1)	0.0252 [a]	0.0190 [a]	0.0152 [a]	0.0263 [a]	0.0243 [a]	0.0195 [a]	0.0278 [a]
Size(1)	-0.8795 [a]			-1.1232 [a]	-0.7493 [a]		-1.0673 [a]
Size(1) * Rate	-0.0013			0.0171 [a]	-0.0105		0.0102
Size(1) * Rate(1)	0.0189 [a]			0.0124 [c]	0.0155 [b]		0.0083
Liq(1)		-2.6625 [a]		-3.0791 [a]		-3.3072 [a]	-3.2803 [a]
Liq(1) * Rate		0.0978 [a]		0.0535		0.1200 [a]	0.1198 [a]
Liq(1) * Rate(1)		0.0191		0.1022 [b]		0.0480	0.0485 [c]
Capital(1)			1.6004 [a]		0.7865 [b]	3.0620 [a]	1.1537 [a]
Capital(1) * Rate			-0.1041		0.0497	-0.1013	-0.0696
Capital(1) * Rate(1)			-0.1158 [c]		-0.1260	-0.1109	-0.0701
Size(1) * Liq(1) * Rate				0.0399 [c]			
Size(1) * Liq(1) * Rate(1)				-0.0335			
Size(1) * Capital(1) * Rate					-0.1492 [a]		
Size(1) * Capital(1) * Rate(1)					0.0954 [b]		
Liq(1) * Capital(1) * Rate						-0.0364	
Liq(1) * Capital(1) * Rate(1)						0.1761	
No. of observations	4628	4628	4628	4628	4628	4628	4628
Sargan test (p-values)	0.1539	0.2956	0.0814	0.1043	0.1455	0.3819	0.1139
Arellano Bond (p-AR1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arellano Bond (p-AR2)	0.0786	0.1854	0.2437	0.1436	0.0924	0.1366	0.1176

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 2: OLD EMU countries with monetary aggregate M2

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.4357 [a]	0.6348 [a]	0.5954 [a]	0.3218 [a]	0.5112 [a]	0.7616 [a]	0.6930 [a]
M2	-0.5943 [b]	-0.1555	-0.2196	-0.5463 [b]	-0.5914 [b]	-0.1010	-0.6632 [a]
M2(1)	0.7721 [a]	0.0908	0.3680 [c]	0.6743 [a]	0.6782 [b]	0.0792	0.5200 [c]
GDP	1.0024	-0.3395	0.9482	0.0130	1.3365	-0.9073	0.3671
GDP(1)	-1.4299	1.7947 [b]	0.2001	0.5386	-1.7686 [c]	2.2266 [b]	-1.2780
CPI	-0.0036	0.0178 [c]	0.0039	0.0090	-0.0117	0.0177	-0.0079
CPI(1)	0.0225 [a]	0.0105 [c]	0.0081	0.0210 [a]	0.0192 [a]	0.0100	0.0250 [a]
Size(1)	0.2515			0.5520	-0.5707		-1.4205 [b]
Size(1) * M2	0.0627			0.1046	0.0605		0.0847
Size(1) * M2(1)	-0.0986			-0.1440 [b]	-0.0659		-0.0733
Liq(1)		5.7052 [b]		4.1057		7.7597 [b]	9.3008 [a]
Liq(1) * M2		0.4784		1.6806 [a]		0.6968 [c]	0.1291
Liq(1) * M2(1)		-0.7662 [c]		-1.9040 [a]		-1.0854 [a]	-0.5655
Capital(1)			-10.8927 [c]		-12.2582 [b]	-4.8236	-11.2294 [b]
Capital(1) * M2			-0.9633		-0.6014	-1.8205 [b]	-1.7293 [c]
Capital(1) * M2(1)			1.4165		1.0631	2.0844 [b]	2.1650 [b]
Size(1) * Liq(1) * M2				-0.7094 [a]			
Size(1) * Liq(1) * M2(1)				0.7169 [a]			
Size(1) * Capital(1) * M2					0.0349		
Size(1) * Capital(1) * M2(1)					-0.0438		
Liq(1) * Capital(1) * M2						3.0613	
Liq(1) * Capital(1) * M2(1)						-3.0021	
No. of observations	4251	4251	4251	4251	4251	4251	4251
Sargan test (p-values)	**0.0242**	0.1608	0.1648	**0.0024**	0.0508	0.2501	**0.0166**
Arellano Bond (p-AR1)	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Arellano Bond (p-AR2)	0.0585	0.1281	0.0628	0.3950	0.0861	0.0744	0.0888

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 3: OLD EMU countries with short-term interest rates in the CRISIS

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.4998 [a]	0.5081 [a]	0.2355 [a]	0.5438 [a]	0.5027 [a]	0.6006 [a]	0.5746 [a]
Rate	-0.0336	-0.0518	-0.0005	-0.3455	-0.0065	-0.2042	-0.2909
Rate(1)	0.3578	0.1980	-0.1043	0.7544 [b]	0.3496	0.3846	0.6896 [b]
GDP	0.6711	1.5306 [c]	1.0602	0.9068	0.8413	0.9258	0.9402
GDP(1)	-0.2258	0.0197	0.1107	0.3534	-0.3207	0.1533	0.3498
CPI	-0.0052	0.0103	0.0003	0.0100	-0.0093	0.0174	0.0094
CPI(1)	0.0169 [b]	0.0100	0.0149 [c]	0.0129	0.0129	0.0147 [c]	0.0116
Size(1)	-1.0994 [a]			-1.4923 [a]	-1.1845 [a]		-1.5240 [a]
Size(1) * Rate	0.0162 [b]			0.0362 [a]	-0.0107		0.0223 [b]
Size(1) * Rate(1)	0.0105			0.0117	0.0321 [a]		0.0095
Liq(1)		-2.1040 [a]		-3.0445 [a]		-2.8777 [a]	-3.1951 [a]
Liq(1) * Rate		0.1475 [a]		0.1579 [b]		0.1828 [a]	0.2252 [a]
Liq(1) * Rate(1)		0.0159		0.0580		0.0482	0.0767 [b]
Capital(1)			1.9593 [a]		0.2940	3.0593 [a]	0.4188
Capital(1) * Rate			-0.2150 [a]		-0.2084 [b]	-0.1782 [b]	-0.2047 [b]
Capital(1) * Rate(1)			-0.0901		0.0435	-0.0721	-0.0242
Size(1) * Liq(1) * Rate				0.0436			
Size(1) * Liq(1) * Rate(1)				0.0131			
Size(1) * Capital(1) * Rate					-0.1509		
Size(1) * Capital(1) * Rate(1)					0.2127 [b]		
Liq(1) * Capital(1) * Rate						0.1844	
Liq(1) * Capital(1) * Rate(1)						0.0037	
No. of observations	2761	2761	2761	2761	2761	2761	2761
Sargan test (p-values)	0.1554	0.3345	0.3694	0.0970	0.1452	0.3408	0.0841
Arellano Bond (p-AR1)	0.0000	0.0000	0.0002	0.0018	0.0000	0.0001	0.0009
Arellano Bond (p-AR2)	0.2036	0.2386	0.5243	0.1551	0.1327	0.1355	0.1157

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 4: OLD EMU countries with monetary aggregate M2 in the CRISIS

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.2091 [a]	0.5454 [a]	0.5449 [a]	0.5663 [a]	0.4080 [a]	0.7214 [a]	0.6640 [a]
M2	-0.6586 [b]	-0.4744	-0.5428 [c]	-1.0666 [a]	-0.5122 [c]	-0.6043 [c]	-0.8603 [a]
M2(1)	1.0837 [a]	0.4482 [c]	0.6568 [b]	1.4279 [a]	0.8513 [a]	0.5720 [b]	1.2148 [a]
GDP	2.2289 [b]	2.0446 [c]	2.3148 [b]	3.2095 [a]	2.4245 [b]	2.0114 [c]	2.8399 [b]
GDP(1)	-1.2597	-0.3602	-1.9002	-2.5230 [c]	-1.5248	-1.0683	-1.6930
CPI	-0.0083	-0.0002	-0.0097	-0.0261 [c]	-0.0142	-0.0057	-0.0213
CPI(1)	0.0206 [b]	0.0095	0.0153 [c]	0.0169 [c]	0.0147	0.0136	0.0126
Size(1)	5.5433 [a]			3.7120 [b]	3.2773 [b]		3.0886 [c]
Size(1) * M2	0.0923			0.2325 [b]	-0.0240		0.1129
Size(1) * M2(1)	-0.3056 [a]			-0.4138 [a]	-0.1185		-0.2796 [b]
Liq(1)		11.6562 [a]		7.8456 [b]		16.8670 [a]	9.8209 [a]
Liq(1) * M2		1.0151 [b]		0.6308		0.8502	0.8824 [c]
Liq(1) * M2(1)		-1.4950 [a]		-0.9886		-1.5506 [a]	-1.3319 [a]
Capital(1)			-12.9145		-2.5257	-11.7796	-2.8486
Capital(1) * M2			-2.2493 [c]		-2.4170 [b]	-2.4345 [b]	-2.8202 [b]
Capital(1) * M2(1)			2.7821 [b]		2.5159 [b]	2.9435 [b]	2.9309 [b]
Size(1) * Liq(1) * M2				-0.0930			
Size(1) * Liq(1) * M2(1)				0.0880			
Size(1) * Capital(1) * M2					-0.2603		
Size(1) * Capital(1) * M2(1)					0.2441		
Liq(1) * Capital(1) * M2						6.0665	
Liq(1) * Capital(1) * M2(1)						-5.9825	
No. of observations	2761	2761	2761	2761	2761	2761	2761
Sargan test (p-values)	0.1002	0.4097	0.5954	0.1013	0.2240	0.5839	0.0906
Arellano Bond (p-AR1)	0.0004	0.0000	0.0000	0.0015	0.0001	0.0001	0.0011
Arellano Bond (p-AR2)	0.6481	0.2342	0.1405	0.2506	0.2549	0.1394	0.1652

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 5: NEW EU countries with short-term interest rates

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.5412 [a]	0.6842 [a]	0.6680 [a]	0.5168 [a]	0.4894 [a]	0.6930 [a]	0.4489 [a]
Rate	-0.0394 [a]	-0.0053 [b]	-0.0067 [a]	-0.0376 [a]	-0.0347 [a]	0.0005	-0.0434 [a]
Rate(1)	0.0080 [c]	-0.0059 [a]	0.0011	0.0008	0.0027	-0.0107 [a]	-0.0058
GDP	0.5639 [a]	0.5190 [a]	0.4325 [a]	0.5234 [a]	0.5259 [a]	0.5032 [a]	0.6286 [a]
GDP(1)	0.2609 [a]	0.0966	0.1540 [c]	0.3416 [a]	0.3423 [a]	0.1309 [c]	0.3481 [a]
CPI	-0.0002	0.0018	0.0015	0.0004	0.0001	0.0006	-0.0010
CPI(1)	0.0002	-0.0028 [b]	-0.0019	-0.0014	-0.0007	-0.0020	-0.0002
Size(1)	-0.2349 [a]			-0.1969 [a]	-0.1893 [a]		-0.1378 [b]
Size(1) * Rate	0.0084 [a]			0.0100 [a]	0.0088 [a]		0.0124 [a]
Size(1) * Rate(1)	-0.0017			-0.0014	-0.0011		-0.0028 [c]
Liq(1)		0.6330 [a]		0.3984 [a]		0.6898 [a]	0.3525 [a]
Liq(1) * Rate		-0.1136 [a]		-0.1151 [a]		-0.0670 [a]	-0.0978 [a]
Liq(1) * Rate(1)		0.1058 [a]		0.1985 [a]		0.0627 [a]	0.0978 [a]
Capital(1)			0.3216		-0.4311 [b]	0.1482	-0.5893 [a]
Capital(1) * Rate			-0.1353 [a]		-0.1113 [b]	-0.0646 [a]	-0.0798 [a]
Capital(1) * Rate(1)			0.1089 [a]		0.1457 [a]	0.0987 [a]	0.1250 [a]
Size(1) * Liq(1) * Rate				0.0055			
Size(1) * Liq(1) * Rate(1)				-0.0380 [a]			
Size(1) * Capital(1) * Rate					-0.0080		
Size(1) * Capital(1) * Rate(1)					-0.0124		
Liq(1) * Capital(1) * Rate						-0.9199 [a]	
Liq(1) * Capital(1) * Rate(1)						0.8143 [a]	
No. of panel observations	1542	1542	1542	1542	1542	1542	1542
Sargan test (p-values)	0.3275	0.3775	0.3945	0.5031	0.4624	0.3220	0.4077
Arellano Bond (p-AR1)	0.0040	0.0007	0.0023	0.0021	0.0050	0.0025	0.0051
Arellano Bond (p-AR2)	0.0872	**0.0187**	0.0780	0.0801	0.1702	**0.0182**	0.1318

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 6: NEW EU countries with monetary aggregate M2

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.5195 [a]	0.6163 [a]	0.5504 [a]	0.6189 [a]	0.5052 [a]	0.6037 [a]	0.5981 [a]
M2	0.3100 [a]	0.1987 [a]	0.2953 [a]	0.1136	0.2281 [b]	0.2151 [a]	0.1354
M2(1)	0.3132 [a]	0.3917 [a]	0.3084 [a]	0.4303 [a]	0.4060 [a]	0.3698 [a]	0.4054 [a]
GDP	0.4071 [a]	0.4291 [a]	0.3390 [a]	0.3667 [a]	0.3617 [a]	0.4192 [a]	0.3993 [a]
GDP(1)	-0.2612 [b]	-0.4518 [a]	-0.1955 [c]	-0.3803 [a]	-0.2067 [c]	-0.3544 [a]	-0.3393 [a]
CPI	-0.0072 [a]	-0.0115 [a]	-0.0073 [a]	-0.0101 [a]	-0.0071 [a]	-0.0113 [a]	-0.0097 [a]
CPI(1)	0.0000	-0.0001	0.0001	0.0002	0.0001	0.0001	0.0000
Size(1)	0.3668			0.1773	0.3393		0.0918
Size(1) * M2	-0.0163			0.0232	0.0188		0.0183
Size(1) * M2(1)	-0.0069			-0.0438	-0.0400		-0.0356
Liq(1)		-2.7112 [c]		-0.0424		-3.0814 [c]	-1.4731
Liq(1) * M2		0.0429		-1.7090 [a]		-0.0407	-0.0269
Liq(1) * M2(1)		0.0993		1.7822 [a]		0.1974	0.1174
Capital(1)			-7.1429 [b]		-4.1931	-6.1875 [c]	-8.5022 [b]
Capital(1) * M2			1.6306 [a]		1.2073	1.3916 [a]	1.8543 [a]
Capital(1) * M2(1)			-1.3248 [a]		-1.0188	-1.1224 [a]	-1.5007 [a]
Size(1) * Liq(1) * M2				0.8384 [a]			
Size(1) * Liq(1) * M2(1)				-0.8564 [a]			
Size(1) * Capital(1) * M2					0.1073		
Size(1) * Capital(1) * M2(1)					-0.1157		
Liq(1) * Capital(1) * M2						0.1379	
Liq(1) * Capital(1) * M2(1)						-0.0508	
No. of panel observations	1596	1596	1596	1596	1596	1596	1596
Sargan test (p-values)	0.0821	0.0997	0.2177	0.0961	0.1484	0.1626	0.1790
Arellano Bond (p-AR1)	0.0041	0.0027	0.0026	0.0032	0.0040	0.0032	0.0037
Arellano Bond (p-AR2)	0.0842	**0.0355**	**0.0470**	0.0551	0.0690	**0.0342**	**0.0484**

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 7: NEW EU countries with short-term interest rates in the CRISIS

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.5373 [a]	0.6020 [a]	0.5454 [a]	0.5876 [a]	0.5114 [a]	0.6359 [a]	0.4883 [a]
Rate	-0.0148 [a]	-0.0175 [a]	-0.0192 [a]	-0.0049	-0.0176 [a]	-0.0213 [a]	-0.0189 [a]
Rate(1)	-0.0108 [c]	-0.0109 [a]	-0.0149 [a]	0.0012	-0.0194 [a]	-0.0132 [a]	-0.0194 [a]
GDP	0.4008 [a]	0.2256 [b]	0.2909 [a]	0.2411 [c]	0.3864 [a]	0.1786	0.4064 [a]
GDP(1)	0.3756 [a]	0.3723 [a]	0.3698 [a]	0.3239 [a]	0.3999 [a]	0.4521 [a]	0.4650 [a]
CPI	0.0044 [b]	0.0037 [c]	0.0038 [b]	0.0057 [a]	0.0045 [b]	0.0046 [b]	0.0045 [b]
CPI(1)	0.0030	0.0010	0.0022	0.0025	0.0032 [c]	0.0008	0.0011
Size(1)	-0.4540 [a]			-0.5263 [a]	-0.4274 [a]		-0.4052 [a]
Size(1) * Rate	0.0002			-0.0027	-0.0001		0.0011
Size(1) * Rate(1)	-0.0015			-0.0038 [c]	0.0017		0.0014
Liq(1)		0.1864		0.3818 [a]		0.3261 [a]	0.3812 [a]
Liq(1) * Rate		-0.0215		-0.0010		-0.0396 [a]	-0.0374 [a]
Liq(1) * Rate(1)		0.0871 [a]		0.1410 [a]		0.0699 [a]	0.0507 [a]
Capital(1)			-0.0543		-0.6334 [a]	0.2956	-0.2887
Capital(1) * Rate			-0.0451		0.0201	-0.0768 [b]	-0.0572
Capital(1) * Rate(1)			0.1340 [a]		0.1359 [a]	0.1803 [a]	0.1276 [a]
Size(1) * Liq(1) * Rate				-0.0192			
Size(1) * Liq(1) * Rate(1)				-0.0414 [a]			
Size(1) * Capital(1) * Rate					-0.0388		
Size(1) * Capital(1) * Rate(1)					-0.0030		
Liq(1) * Capital(1) * Rate						0.0211	
Liq(1) * Capital(1) * Rate(1)						0.3609 [c]	
No. of observations	1007	1007	1007	1007	1007	1007	1007
Sargan test (p-values)	0.5921	0.3676	0.4300	0.7832	0.5955	0.6745	0.7339
Arellano Bond (p-AR1)	0.0229	0.0132	0.0205	0.0068	0.0253	0.0168	0.0206
Arellano Bond (p-AR2)	0.4578	0.1260	0.4139	0.2576	0.6566	0.2721	0.3620

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.

Table 8: NEW EU countries with monetary aggregate M2 in the CRISIS

	Size	Liq	Capital	Size Liq	Size Capital	Liq Capital	Size Liq Capital
Loans(1)	0.4402 [a]	0.5032 [a]	0.4824 [a]	0.4896 [a]	0.4385 [a]	0.5493 [a]	0.5646 [a]
M2	0.2824 [a]	0.1758	0.3638 [a]	-0.0453	0.3488 [a]	0.2218 [b]	0.1365
M2(1)	0.0300	0.2587 [a]	0.1705 [b]	0.2009	0.0049	0.2610 [a]	0.0060
GDP	0.3418 [a]	0.1180	0.1625	0.3138 [b]	0.2794 [b]	0.0489	0.1973
GDP(1)	0.5147 [a]	0.2967 [b]	0.4060 [a]	0.5194 [a]	0.5210 [a]	0.3957 [a]	0.5274 [a]
CPI	0.0039 [c]	0.0018	0.0031	0.0016	0.0043 [c]	0.0022	0.0036
CPI(1)	-0.0020	-0.0006	-0.0035 [b]	-0.0019	-0.0027 [c]	-0.0020	-0.0016
Size(1)	-0.4029			-0.8953 [a]	-0.4884 [c]		-0.9956 [a]
Size(1) * M2	-0.0316			0.0731	-0.0328		-0.0563
Size(1) * M2(1)	0.0354			-0.0545	0.0413		0.0771 [a]
Liq(1)		-0.4773		2.3642		0.6499	1.5426
Liq(1) * M2		-0.7194 [a]		-2.0006 [a]		-0.9909 [a]	-0.7452 [a]
Liq(1) * M2(1)		0.7661 [a]		1.9523 [a]		0.9921 [b]	0.7127 [a]
Capital(1)			-13.3392 [a]		-13.2238 [a]	-7.7950 [b]	-14.1613 [a]
Capital(1) * M2			1.3200 [a]		0.4524	-0.9901	0.5044
Capital(1) * M2(1)			-0.7486		0.0969	1.3670	0.1004
Size(1) * Liq(1) * M2				0.8470 [b]			
Size(1) * Liq(1) * M2(1)				-0.8597 [b]			
Size(1) * Capital(1) * M2					0.3030		
Size(1) * Capital(1) * M2(1)					-0.3033		
Liq(1) * Capital(1) * M2						-17.9364 [a]	
Liq(1) * Capital(1) * M2(1)						18.1296 [a]	
Total No. of observations	987	987	987	987	987	987	987
Sargan test (p-values)	0.3376	0.1137	0.1472	0.2810	0.4228	0.1757	0.7137
Arellano Bond (p-AR1)	0.0379	0.0245	0.0331	0.0268	0.0389	0.0281	0.0330
Arellano Bond (p-AR2)	0.5172	0.2103	0.5308	0.3657	0.6214	0.3572	0.3899

Source: Authors' calculation. Note: Symbol [a]. [b] or [c] indicates significance at 1%. 5% or 10%.