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FOREIGN BANKS AND THE BANK LENDING CHANNEL

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We provide new evidence on bank ownership and transmission of monetary policy using bank-level data on 453 banks in Central and Eastern European economies between 1998 and 2012. Only domestic banks adjust loans to changes in monetary policy, while foreign banks do not. Conventional wisdom says that this is because foreign banks can rely on parent banks' funding to insulate against monetary policy shocks. In this paper we document an alternative explanation. Deposits in foreign banks do not react to monetary policy, hence the bank lending channel is only triggered in domestic banks. (*JEL* E50, F36, G21)

I. INTRODUCTION

Financial liberalization has led to an increased integration of financial markets over the last 30 years. The emerging and developing countries, however, entered this process with undercapitalized banks. In result of this, large shares of the financial sector in these countries are controlled by subsidiaries of foreign banks. In this paper we investigate the implications of foreign ownership for the monetary policy transmission through bank loans.

The traditional bank lending channel postulates that after a monetary policy contraction, both banks' reserves and deposits decrease. If there is imperfect substitutability between different types of bank funding (e.g., due to frictions that impede trade between banks), or a bank is liquidity constrained, then the supply of loans falls, as an indirect consequence of a monetary policy tightening. This is a separate, supply side mechanism from the direct "interest rate channel" which reduces aggregate demand.

In this paper, we look at foreign ownership as a credit supply-side determinant of monetary transmission. Whether the transmission works analogously in foreign and domestic banks is an important policy question, especially so in countries with significant presence of foreign-owned banks. We explore the consequences of asymmetric financial integration in the particular area of Central and Eastern Europe (CEE). Banks dominate the financial structure of the CEE economies and many of them are majority foreign-owned, following a period of rapid increase in foreign penetration of the banking sector in the early and mid-1990s. In CEE, firms rely on bank financing much more than on capital markets compared with the United States. For this study, we have collected data on credit, deposits, ownership and other bank-level characteristics for 453 banks in ten CEE countries in the years 1998–2012.

We make two contributions to the empirical literature on the monetary policy transmission via banks. First, we find that the supply of credit in foreign banks does not respond to monetary policy, while in the domestic banks it does. Previous contributions (reviewed later) document a less

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ABBREVIATIONS

CEE: Central and Eastern Europe
OLS: Ordinary Least Squares

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stark result, that the response of credit to monetary policy is only weaker, in foreign than in the domestic banks. This finding is robust to a battery of checks, including accounting for banks heterogeneity other than ownership, differences in issuance of foreign currency loans, and the special role of the global financial crisis.

Second, we document a novel explanation for the difference in the transmission mechanism: the response of consumer deposits to monetary policy is absent in foreign banks while it is strong in private domestic banks. Thus, the bank lending channel in foreign banks is simply not triggered after monetary policy changes. On top of that, ownership is an important stand-alone determinant of the structure of funding: foreign banks enjoy lower cost of financing and rely less on consumer deposits.

A. *Related Literature*

This paper is related to the two strands of literature: one studying the role of bank ownership and one studying monetary policy transmission via banks.

The relationship between foreign ownership and the growth of credit at the bank level has been receiving an increased interest in the literature since Peek and Rosengren (1997), who show that in a response to the stock market slump in Japan the Japanese-owned banks contracted their lending in the United States. The CEE transition economies are a natural field for empirical studies on foreign banks as they exhibit variation in foreign banks penetration both in cross-section and over time.[1] For the earlier period of 1990s, De Haas and van Lelyveld (2006) find that interest rate did not affect the pace of growth of credit. We find that this picture changed and the bank lending channel was active in domestic, but not in foreign banks in the CEE region.

The theoretical foundation of the bank lending channel was laid out in Stein (1998). Following Kashyap and Stein (2000), identification of effects of monetary policy on the supply of (and not on the demand for) loans relies on panel bank-level data. In the sample of U.S. banks, Cetorelli and Goldberg (2012) show that having global operations insulates banks from changes in local monetary policy. Cetorelli and Goldberg (2016) show that branches of conglomerates in more complex families have a markedly lower lending sensitivity to funding shocks. Temesvary (2018) finds that in response to home country monetary tightening, foreign banks with less access to liquid funds reduce their business lending substantially more than foreign banks with more funding access. In our sample foreign banks are less liquid and less capitalized which, however, does not constrain their response to monetary policy shocks. This is because their deposit base is immune to monetary policy.

Our paper is closely related to Gambacorta (2005) and Wu, Luca, and Jeon (2011). In Gambacorta (2005) the strength of the lending response to monetary policy is related to a bank's holding of liquid assets and capitalization. The bank lending channel is triggered when insured deposits fall after a monetary contraction. We complement this work by looking at foreignness, which proves to be relevant for the trigger of the bank lending channel transmission. Wu, Luca, and Jeon (2011) provide evidence of a weaker response of lending to monetary policy in foreign banks and conclude that it is due to their access to an internal capital market which was particularly important during local crises episodes. We find that lending by foreign banks does not respond to monetary policy which is due to the absence of the trigger of the bank lending channel. Consumer deposits in foreign banks do not react to monetary policy.

In the literature investigating the role of foreign banks during crises it is found (Allen et al. 2017; De Haas and van Lelyveld 2006; Popov and Udell 2012) that they stabilize credit in times of a domestic crisis. Ongena, Peydro, and van Horen (2015) use matched bank-firm data in CEE and Turkey to explore the consequences of the Lehman failure. Adams-Kane, Caballero, and Lim (2017) use global sample with matched owner-subsidiary data to study responses of foreign banks to home country crises. We find that monetary policy only impacts bank lending in tranquil times and not during the global financial crisis.

Last, but not least, Drechsler, Savov, and Schnabl (2017) documents the importance of dynamics of deposits for the transmission of monetary policy, uncovering a novel *deposits channel*. We complement their finding by documenting a quantitatively and qualitatively important heterogeneity in how deposits respond to monetary policy in banks of different ownership.

1. As of 2009 the share of foreign banks in the total assets of the banking sectors in the CEE economies was greater than 80%. In other European Union member states this number stood at 25% (own calculations based on Claessens and Van Horen (2014)).

The remainder of the paper is organized as follows. Section 2 lays out the data sources and the empirical procedure. We present benchmark results and robustness checks in Section 3. Section 4 studies the reasons of the observed difference in credit behavior. The last section concludes.

II. DATA DESCRIPTION

We construct an unbalanced panel that consists of bank-level and macroeconomic data. Our primary source of data is Bankscope, a commercial database provided by Bureau van Dijk. Bankscope comprises a large number of standardized, comparable indicators at annual frequency and has been used extensively in the related literature. Ownership data are not easily accessible, as only the most recent owner is reported in Bankscope. Thus, we complement Bankscope with data sourced from individual banks' websites and financial statements. We source macroeconomic data from the Eurostat and national statistical offices.

The outcome of the data collection process is a panel of 3,357 bank-year observations for 453 banks active for at least one year between 1998 and 2012 (out of the total of 514 banks registered in Bankscope) in ten CEE countries. Our ownership data cover 92% of the bank-year observations with non-missing total assets and is balanced both across time and countries.[2] The descriptive statistics of bank level and macroeconomic variables are presented in Tables 1 and 2.

We distinguish three ownership categories: foreign, private domestic and state-owned domestic banks. A foreign ownership dummy *Foreign* takes value 1 if at least 50% of bank capital is owned by foreign entities. A state ownership dummy *State* is defined analogously based on the share of domestic state-related entities. These variables capture potentially different management practices, business objectives, know-how and ease in accessing sources of capital and are, by construction, mutually exclusive.

The importance of foreign banks in the CEE region increased from 38% share of total assets on average in 1998 to 74% in 2006 and remained at the similar level ever since. The share of total assets owned by state banks went down from 47% on average in 1998 to 12% in 2012. There is also substantial heterogeneity across countries. For example, Czechia, Lithuania, and Slovakia had more than 90% of their banking sectors foreign-owned in 2012, while Slovenia had only 23%, followed by Hungary (52%) and Latvia (59%). Slovenia and Poland had more than 20% of their banking assets in state hands in 2012, while Bulgaria, Czech Republic, Hungary, Lithuania, Latvia, and Slovakia all had below 5%.[3]

Following related literature (Allen et al. 2017; De Haas and van Lelyveld 2006; Micco and Panizza 2006) we define five core bank-level variables. Our dependent variable Δ*NetLoans* is the real percentage growth of net loans. *Size* measures bank's prominence in the host country banking sector as a share of bank's total assets in all banks' assets in a given country in a given year. *Profitability* is defined as a ratio of operating profit over total assets, *Capitalization* as a ratio of total equity over total assets and *Liquidity* as a ratio of liquid assets over total assets. All original variables are denominated in local currencies. The growth of loans was the slowest, but also the most volatile, in state owned banks. Foreign banks are less liquid and less capitalized than other banks while state banks rely on liquid assets the most and have the highest capitalization. Foreign banks are larger than domestic private banks but smaller than the state-owned banks. Profitability is highest in foreign banks and lowest for state-owned banks.

We extend core bank-level controls with additional variables. Δ*C-Dep* and Δ*B-Dep* are the real rate of growth of deposits from consumers and banks. Correspondingly, *C-Funding* and *B-Funding* are the ratios of consumer and bank deposits over total bank assets. *Interest Expenditure* is calculated as a ratio of total interest expenses over total assets. State-owned and foreign-owned banks rely less on consumer deposit and more on deposits from banks than the private domestic banks. Foreign banks have the lowest and state banks have the highest interest expenditure. *FXshare* is calculated as a share of a sum of foreign-currency denominated or

2. The countries in our sample are: Bulgaria, Croatia, Czechia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. We present detailed data coverage by country, by year and by ownership in Tables 10 and 11 in Appendix S1 to this paper. Schmitz (2004) compares Bankscope data with the IMF data in the International Financial Statistics for the asset side of the banking sector and finds that approximately 70–90% of total banking assets is covered by Bankscope for the CEE countries. Mathieson and Roldos (2001) estimate data coverage to be about 90%.

3. Additional information on the ownership split across countries and over time is provided in Tables 8 and 9 in Appendix S1 to this paper.

Table 1
Descriptive Statistics: Bank Level Variables

	Foreign			Private Domestic			State Domestic		
	Mean	**Median**	***SD***	**Mean**	**Median**	***SD***	**Mean**	**Median**	***SD***
Δ*NetLoans*	11.17	7.66	25.61	13.31	10.09	26.23	9.16	6.02	27.04
Size	4.63	1.97	6.45	3.08	1.05	5.78	5.31	2.18	7.18
Liquidity	26.31	22.56	19.58	28.87	26.17	18.54	37.46	34.71	24.51
Capitalization	11.83	10.05	7.95	13.50	10.52	10.01	14.86	9.97	13.15
Profitability	0.90	1.05	2.19	0.78	0.94	2.59	0.70	0.73	2.75
Δ*C-Dep*	9.15	4.99	24.60	15.02	10.84	24.53	7.77	5.26	26.91
Δ*B-Dep*	26.30	6.76	76.12	31.18	7.41	90.57	26.03	5.39	81.11
C-Funding	54.15	57.74	22.70	64.49	69.19	20.23	48.47	63.54	31.40
B-Funding	33.88	30.18	22.42	21.94	16.15	19.59	35.61	23.84	27.04
Interest Expenditure	3.34	2.72	2.77	3.47	3.09	2.63	4.05	3.00	4.11
FXshare	49.38	52.86	29.06	44.66	49.00	29.22	34.79	26.34	26.47

Notes: The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All variables are expressed in percentage points.

Table 2
Descriptive Statistics: Macroeconomic Variables

	Mean	**Median**	***SD***
Δ*MP*	−0.80	−0.31	2.24
Δ*GDP*	3.09	3.90	3.71
Inflation	5.10	3.90	4.31
Δ*CHF*	3.55	2.26	9.74
Δ*EUR*	1.46	0.00	9.10

Notes: The sample is 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All variables are expressed in percentage points.

foreign-currency linked loans in the total value of loans. Foreign-owned banks have the highest, while state-owned banks have the lowest share of foreign-currency loans. The results of *t*-tests of between group differences, conditional on bank ownership and pairwise correlations between bank level controls are reported in Tables 2 and 3 in Appendix S1 to this paper.

We calculate Δ*MP* as the yearly difference of the nominal average central bank repo rate in a host country, similar to Gambacorta (2005). Repo rates directly impact on a broad array of the short term money market rates and their changes are considered in the literature (Bernanke and Blinder 1992) to be standard proxies for monetary policy shocks in the short term. Accordingly, a positive value of Δ*MP* indicates monetary policy tightening and a negative value, loosening. Our sample covers rich variation in the stance of monetary policy: between 1998 and 2012 loosening stood for about 60% of all covered cases.

Next, we introduce Δ*GDP*, the real GDP growth rate to control for cyclical variation in bank balance sheets and proxy for sector-wide demand effects, and *Inflation* measured by the percentage growth of the consumer price index. High inflation in the CEE region was correlated with overall macroeconomic instability of the posttransition period. We account for nonstandard circumstances of the global financial crisis by introducing a dummy Crisis that equals 1 for the years 2008–2010. Δ*EUR* and Δ*CHF* are rate of change in the value of the local currency against the euro and the Swiss franc. A positive value indicates local currency depreciation. Pairwise correlations between macroeconomic variables are reported in Table 7 in Appendix S1 to this paper.

III. MONETARY POLICY, OWNERSHIP, AND BANK LOANS

In this section we estimate different versions of the following regression using data on bank i in country j in year t:

$$\begin{aligned}(1)\quad \Delta\text{NetLoans}_{i,j,t} &= \beta_{\Delta MP} \times \Delta MP + \beta_O \\ &\times \text{Owner}_{i,t} + \beta_{\Delta MP\times\text{Owner}} \times \Delta\text{MP}_{j,t} \times \text{Owner}_{i,t} \\ &+ \beta_{\text{NetLoans}} \times \Delta\text{NetLoans}_{i,j,t-1} + \beta_B \times \text{Bank}_{i,t} \\ &+ \beta_E \times \text{Economy}_{j,t} + \beta_{E\times O}\text{Economy}_{j,t} \\ &\times \text{Owner}_{i,t} + \beta_{j,t} + \varepsilon_{i,t},\end{aligned}$$

where Δ*MP* is a change in the monetary policy rate, *Owner* includes the ownership dummies

and *Bank* includes core bank-level controls: *Liquidity*, *Capitalization*, *Profitability*, and *Size*. To control for possible demand-side effects on the growth of credit we employ two versions of macro controls set in the *Economy* vector. In the first set, we include ΔGDP and *Inflation*, and country and time fixed effects: $\beta_{j,t} = \beta_j + \beta_t$. In the second set, we use only country × time fixed effects $\beta_{j,t} = \beta_{j,t}$. This allows us to perfectly control for all non-systematic factors that affect banks' credit growth in any given country in any given year. However, since monetary policy is also country-time specific, this specification does not permit studying the effects of the key variable ΔMP. We report which set is used in each regression. To study whether credit responses to monetary policy changes are heterogenous in ownership we introduce interactions of ΔMP with *Owner* variables.

If the regression coefficient $\beta_{\Delta \mathrm{MP}}$ is significant and negative we can expect the bank lending channel to be at work while differences in its working among banks of different ownership will be picked up by the interaction coefficients $\beta_{\Delta \mathrm{MP} \times \mathrm{Owner}}$. Thus, we focus on the supply-side effects of monetary policy by identifying ownership as a credit-supply side driver. We also allow for interactions between ΔGDP and *Inflation* and ownership dummies to capture potentially different responses to demand shifts across ownership types.

We explicitly allow for autoregressive dynamics in the growth rate of our bank credit variable. It is well recognized (Adams-Kane, Caballero, and Lim 2017; Claessens and Van Horen 2014; Gambacorta 2005; Wu, Luca, and Jeon 2011) that the presence of bank-specific controls and lagged dependent variable induces an endogeneity problem. Thus, our method of choice is the system-GMM approach based on Arellano and Bond (1991) and Blundell and Bond (1998) with robust standard errors. In this estimation we allow the dependent variable to be potentially autocorrelated and contemporary bank controls to be endogenous. We assume that macro controls, monetary policy and ownership are exogenous to the growth of credit at the bank level (we relax some of these assumptions in Section 2 in Appendix S1 to this paper). As the system-GMM approach often suffers from the instruments proliferation problem, for each regression we report the p value of Hansen J-test of overidentifying restrictions. We also report the value of F-test of overall model fit and p values of Arellano-Bond autocorrelation tests of dependent variable of orders one and two.[4]

A. Benchmark Results

Table 3 presents results of the benchmark estimations of Equation (1). We reject the null hypothesis that the AR(1) coefficient is equal to zero, but we fail to reject the null hypothesis that the AR(2) coefficient is equal to zero. This validates our specification with one lag of the dependent variable.

In columns 1 and 2 we estimate Equation (1) without the monetary policy indicator. This allows us to build intuition about "pure" ownership effects and compare the predictions on *Bank* and *Economy* controls with earlier work that focused on CEE countries but did not consider monetary policy. We find that credit growth is slower in larger, more liquid, more capitalized, and less profitable banks. Credit growth accelerates in booms and slows down in recessions with one percentage increase in GDP growth rate leading to approximately 0.5–0.8 percentage point increase in credit growth rate. Higher inflation hampers the growth of credit: an increase in the consumer price index by one percentage point implies a reduction in the credit growth rate by approximately 1.2–1.4 percentage points. All of the effects of *Bank* and *Economy* controls are in line with previous studies. Finally, as ownership dummies are insignificantly different from zero, we conclude credit growth does not depend on bank ownership *per se* (as is does in e.g., Allen et al. (2017))

The estimation in column 3 does not include the ownership dummies but it includes the monetary policy indicator. We find evidence that monetary policy tightening reduces the growth of credit at the bank level in all banks: a one percentage point increase in the monetary policy rate decreases bank credit growth by 0.6 percentage points on average. However, this number masks a substantial variation in the impact of monetary policy on credit dynamics in banks

4. Due to instruments proliferation problem we put less trust in results obtained using bank-fixed effects, which are available upon request. In using country, time and country × time fixed effects instead of bank fixed effects we follow the literature including Adams-Kane, Caballero, and Lim (2017), Bonin, Hasan, and Wachtel (2005), Brown and De Haas (2012), Kalemli-Ozcan, Papaioannou, and Perri (2013), Temesvary and Banai (2017). Bank fixed effects are usually used in static panels like in Aydin (2008), Micco and Panizza (2006), Temesvary (2018).

Table 3
Benchmark Results

	(1) ΔNetLoans	(2) ΔNetLoans	(3) ΔNetLoans	(4) ΔNetLoans	(5) ΔNetLoans	(6) ΔNetLoans	(7) ΔNetLoans
Foreign	−1.529	−1.868		−1.165	−0.931	0.245	0.666
	(1.628)	(1.571)		(1.978)	(1.961)	(2.139)	(2.112)
State	3.508	3.146				5.710	6.430
	(3.132)	(3.308)				(4.324)	(4.550)
Δ*MP*			−0.626*	−1.583***		−1.821***	
			(0.348)	(0.546)		(0.615)	
Δ*MP* × *Foreign*				1.317**	1.725**	1.555**	2.133***
				(0.634)	(0.687)	(0.686)	(0.718)
Δ*GDP* × *Foreign*				0.087	−0.034	−0.155	−0.294
				(0.246)	(0.248)	(0.234)	(0.223)
Inflation × *Foreign*				−0.255	−0.210	−0.200	−0.186
				(0.311)	(0.327)	(0.335)	(0.340)
Δ*MP* × *State*						0.864	1.282
						(1.136)	(1.157)
Δ*GDP* × *State*						−1.185**	−1.218**
						(0.558)	(0.556)
Inflation×*State*						0.259	0.118
						(0.607)	(0.620)
*Lagged*Δ*NetLoans*	0.221***	0.238***	0.234***	0.222***	0.237***	0.219***	0.232***
	(0.037)	(0.043)	(0.039)	(0.039)	(0.045)	(0.038)	(0.044)
Size	−0.692***	−0.529**	−0.789***	−0.694***	−0.538**	−0.702***	−0.554**
	(0.249)	(0.229)	(0.252)	(0.245)	(0.228)	(0.249)	(0.234)
Liquidity	−0.356***	−0.398***	−0.359***	−0.355***	−0.399***	−0.359***	−0.400***
	(0.092)	(0.100)	(0.095)	(0.095)	(0.102)	(0.091)	(0.097)
Capitalization	−0.568**	−0.548**	−0.620**	−0.580**	−0.538**	−0.578***	−0.536**
	(0.224)	(0.248)	(0.242)	(0.239)	(0.260)	(0.221)	(0.243)
Profitability	1.472***	1.438***	1.450***	1.504***	1.321***	1.482***	1.309***
	(0.423)	(0.427)	(0.424)	(0.408)	(0.400)	(0.412)	(0.402)
Δ*GDP*	0.556**		0.583**	0.576*		0.797***	
	(0.238)		(0.240)	(0.310)		(0.295)	
Inflation	−1.346***		−1.362***	−1.193***		−1.240***	
	(0.205)		(0.208)	(0.322)		(0.344)	
Observations	2017	2022	2075	2008	2008	2008	2008
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economy controls	Yes	No	Yes	Yes	No	Yes	No
Year FE	Yes	No	Yes	Yes	No	Yes	No
Country FE	Yes	No	Yes	Yes	No	Yes	No
Country × Year FE	No	Yes	No	No	Yes	No	Yes
Economy × Owner	No	No	No	Yes	Yes	Yes	Yes
Number of banks	332	332	343	331	331	331	331
F	30.11	84.93	31.44	29.51	80.21	28.31	82.41
AB AR(1) test	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AB AR(2) test	0.82	0.90	0.89	0.79	0.74	0.76	0.76
Hansen J	0.37	0.57	0.29	0.40	0.59	0.37	0.59
Δ*MP*+Δ*MP* × *Foreign* = *0*				0.53		0.52	
Δ*MP*+Δ*MP* × *State* = *0*						0.33	

Notes: Standard errors in parentheses. The dependent variable is the real rate of growth of net loans at the bank level. The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report system-GMM estimates. Models (1) and (2) abstract from monetary policy indicator and focus on ownership, model (3) abstracts from ownership variables, models (4)–(7) include ownership and monetary policy. Regressions (1), (3), (4) and (6) include country and time fixed effects and economy-controls. Regressions (2), (5) and (7) include country × time fixed effects instead. In models (1), (2), (6) and (7) private domestic banks are the reference group. In models (4) and (5) private and state domestic banks are the reference group. Bottom rows show *p* values of the Wald test of the null that a sum of respective coefficients is equal to zero. The numbers in parentheses are robust standard errors.

*$p < .10$, **$p < .05$, ***$p < .01$.

of different ownership, as subsequent columns of Table 3 reveal.

The estimations in columns 4 and 5 include the foreign ownership dummy and its interactions with ΔMP, ΔGDP and *Inflation*. The coefficient on monetary policy indicator, $\beta_{\Delta \text{MP}}$, is statistically significant and economically important. A one percentage point tightening leads to an average decrease of 1.6 percentage point in credit growth *in domestic banks*. The loans issued by foreign banks react less to monetary policy, as $\beta_{\Delta \text{MP} \times \text{Foreign}}$ is positive and statistically significant. In fact, loans issued by foreign banks are *immune to monetary policy*. Formally, we apply the Wald test on the null hypothesis that the sum $\beta_{\Delta \text{MP}} + \beta_{\Delta \text{MP} \times \text{Foreign}}$ is zero. There is no evidence to reject the null which is confirmed in the one but last row of Table 3 in column 4 where we report the p value of this test (low value indicating low probability of the null). Last, there is no significant difference in how inflation and GDP growth affect bank lending between foreign and domestic banks.

The estimations in columns 6 and 7 include both ownership dummies and their interactions. A one percentage point tightening leads to an average decrease of 1.8 percentage point in credit growth in domestic banks. Again, there is no evidence to reject the null hypothesis that $\beta_{\Delta \text{MP}} + \beta_{\Delta \text{MP} \times \text{Foreign}} = 0$. We find no evidence of different response of credit growth to monetary policy between private domestic and state owned domestic banks, but as there are few state owned banks in the sample, the precision of the estimate of $\beta_{\Delta \text{MP}} + \beta_{\Delta \text{MP} \times \text{State}}$ is low. Interestingly, lending of state banks is counter-cyclical: the coefficient on $\Delta GDP \times State$ interaction is significant and negative. This can be rationalized by those banks submitting to political pressures and extending credit in recessions (Micco and Panizza 2006).

There is some variation in the size of estimated coefficients for bank-level, and macroeconomic controls. The same holds for the interactions of ownership and macroeconomic controls. However, their signs and significance levels are remarkably stable. This holds in all subsequent estimations and hence, for the sake of brevity, in the remainder of the paper we do not report the estimates for *Bank*, *Economy* and *Economy* $\times$ *Owner* controls. Next, we verify the robustness of the result on lending by foreign banks being immune to local monetary policy.

B. Inside the Bank Lending Channel

The basic premise of the first robustness exercise is to check if foreign ownership is not simply a stand-in for heterogeneity in other bank characteristics. The traditional view of the bank lending channel (Kashyap and Stein 2000) is that the impact of monetary policy on lending behavior, due to a drop in nonsecured deposits, is stronger for banks with less liquid balance sheets. Gambacorta (2005) argues that less capitalized banks, due to higher degree of informational frictions in financial markets, face larger costs in raising non-secured deposits and are forced to reduce their lending by more. Thus, we introduce interactions of ΔMP with *Capitalization* and *Liquidity* in Equation (1). If the coefficient $\beta_{\Delta \text{MP} \times \text{Foreign}}$ is not significantly different from zero in this richer regression, we will conclude that foreign ownership is a proxy for a superior access to funding and liquidity.

The results are reported in Table 4. Columns 1 and 2 present the estimates of a regression with added interactions of ΔMP with *Liquidity* and *Capitalization* with all domestic banks as the reference group. In columns 3 and 4 private domestic banks are the reference group. The estimates of $\Delta MP \times Foreign$ are positive and statistically significant across all specifications. Thus, the different response of credit related to ownership is not explained by the cross-sectional differences in liquidity and funding access.

The coefficients on the added interactions are negative but are not significantly different from zero. Altunbas, Gambacorta, and Marques-Ibanez (2010) argue that financial innovation and access to new ways of transferring credit risk have diminished the informational content of standard bank balance sheet indicators, like *Capitalization* or *Liquidity*. The results in this section support the financial innovation view: banks that are more liquid and better capitalized actually *do worse* in mitigating the effects of monetary policy changes on their lending. In our sample, as demonstrated in Table 1, state-owned banks rely on liquid assets the most and have, on average, highest *Capitalization*. All this is consistent with Bonin, Hasan, and Wachtel (2005b) who argue that in the CEE region only the least efficient state-owned banks have not been privatized.

C. Foreign-Currency Loans

In recent years there has been an increase in bank lending in foreign currencies in the CEE countries. Ongena, Schindele, and Vonnák (2017)

Table 4
Robustness: Inside the Bank Lending Channel

	(1) *ΔNetLoans*	(2) *ΔNetLoans*	(3) *ΔNetLoans*	(4) *ΔNetLoans*
Foreign	−1.303	−1.036	0.378	0.739
	(2.015)	(1.983)	(2.123)	(2.117)
State			6.770	7.206
			(4.492)	(4.670)
Δ*MP*	−0.050		−0.303	
	(1.064)		(1.050)	
Δ*MP* × *Foreign*	1.137*	1.513**	1.648**	2.151***
	(0.686)	(0.725)	(0.699)	(0.747)
Δ*MP* × *State*			1.822	2.127*
			(1.306)	(1.285)
Δ*MP* × *Capitalization*	−0.017	−0.022	−0.024	−0.031
	(0.036)	(0.040)	(0.031)	(0.035)
Δ*MP* × *Liquidity*	−0.034	−0.025	−0.039*	−0.032
	(0.023)	(0.026)	(0.021)	(0.024)
Observations	2008	2008	2008	2008
Bank controls	Yes	Yes	Yes	Yes
Economy controls	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Country FE	Yes	No	Yes	No
Country × Year FE	No	Yes	No	Yes
Economy × Owner	Yes	Yes	Yes	Yes
Number of banks	331	331	331	331
F	28.92	81.56	27.71	84.14
AB AR(1) test	0.00	0.00	0.00	0.00
AB AR(2) test	0.75	0.74	0.70	0.80
Hansen J	0.39	0.71	0.37	0.64
Δ*MP*+Δ*MP* × *Foreign* = *0*	0.28		0.11	
Δ*MP*+Δ*MP* × *State* = *0*			0.26	

Notes: Standard errors in parentheses. The dependent variable is the real rate of growth of net loans at the bank level. The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report system-GMM estimates. All models include interactions of monetary policy indicator with bank controls. Estimates for other macro and bank controls are suppressed. Regressions in odd-numbered columns include country and time fixed effects and macrocontrols. Regressions in even-numbered columns include country × time fixed effects instead. In models (1) and (2) private and state domestic banks are the reference group. In models (3) and (4) private domestic banks are the reference group. Bottom rows show *p* values of the Wald test of the null that a sum of respective coefficients is equal to zero. The numbers in parentheses are robust standard errors.

*$p < .10$, **$p < .05$, ***$p < .01$.

provide compelling evidence that supply of bank credit in a foreign currency is less sensitive to changes in domestic monetary conditions than the equivalent supply in the domestic currency. Therefore, if loan currency composition differs between foreign and domestic banks, one should observe different reactions to monetary policy between foreign and domestic banks. Interestingly, Table 2 in Appendix S1 to this paper reveals that unconditionally there is no significant difference between foreign and private domestic banks in currency composition of their loan portfolios. Only the differences between state owned banks and other groups are significant.

We conduct two exercises. First, we replace the *Foreign* ownership dummy with *FXshare*. Second, we estimate a regression with both variables and their interactions with Δ*MP*. The results of these exercises are reported in Table 5. In columns 1 and 2, the estimated coefficient on *FXShare* is positive, but statistically not significant. The same holds for the coefficient on the interaction term Δ*MP* × *FXShare*. In further estimations we include the monetary policy indicator Δ*MP* and its interactions with foreign ownership dummy in columns 3 and 4 and with both ownership dummies in columns 5 and 6. The benchmark result: a negative estimate of Δ*MP* and a positive estimate of Δ*MP* × *Foreign* is robust to controlling for the share of foreign currency loans. The positive and significant estimate on *FXShare* in columns 4 and 6 implies that banks more inclined to issue loans in foreign currencies enjoyed larger demand and hence, larger growth of loans.

However, due to data limitations, we must take these results with a grain of salt. There is a systematic time variation in the quality of reporting

Table 5
Robustness: Foreign-Currency Loans

	(1) ΔNetLoans	(2) ΔNetLoans	(3) ΔNetLoans	(4) ΔNetLoans	(5) ΔNetLoans	(6) ΔNetLoans
Foreign			−1.227	5.924	−1.291	5.939*
			(3.110)	(3.592)	(3.202)	(3.567)
State					2.469	1.859
					(4.139)	(4.630)
Δ*MP*	−1.813		−2.583**		−2.593**	
	(1.172)		(1.127)		(1.129)	
Δ*MP* × *Foreign*			2.425**	3.003***	3.048***	3.002***
			(0.993)	(1.021)	(1.101)	(0.966)
Δ*MP* × *State*					1.363	1.000
					(1.196)	(0.875)
FXshare	0.033	0.051	0.041	0.060*	0.037	0.056*
	(0.033)	(0.036)	(0.033)	(0.035)	(0.033)	(0.033)
Δ*MP* × *FXshare*	0.017	0.024	0.006	0.006	−0.004	0.004
	(0.016)	(0.024)	(0.016)	(0.020)	(0.015)	(0.019)
Observations	472	472	472	472	472	472
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Economy controls	Yes	No	Yes	No	Yes	No
Year FE	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No
Country × Year FE	No	Yes	No	Yes	No	Yes
Economy × Owner	No	No	Yes	Yes	Yes	Yes
No. banks	102	102	102	102	102	102
F	300.52	58.89	322.66	33.15	298.73	91.68
AB AR(1) test	0.00	0.00	0.00	0.00	0.00	0.00
AB AR(2) test	1.00	0.89	0.78	0.52	0.94	0.67
Hansen J	0.86	1.00	0.79	1.00	0.78	1.00
Δ*MP*+Δ*MP* × *Foreign* = 0			0.90		0.74	
Δ*MP*+Δ*MP* × *State* = 0					0.33	

Notes: Standard errors in parentheses. The dependent variable is the real rate of growth of net loans at the bank level. The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report system-GMM estimates. Estimates for other macro and bank controls are suppressed. Regressions in odd-numbered columns include country and time fixed effects and macrocontrols. Regressions in even-numbered columns include country × time fixed effects instead. Models (1) and (2) do not control for the ownership. In models (3) and (4) private and state domestic banks are the reference group. In models (5) and (6) private domestic banks are the reference group. Bottom rows show *p* values of the Wald test of the null that a sum of respective coefficients is equal to zero. The numbers in parentheses are robust standard errors.

*$p < .10$, **$p < .05$, ***$p < .01$.

standards in our sample.[5] Before 2004, that is before the countries in CEE started joining the European Union, financial statements are significantly less detailed and currency composition of loans is almost never reported which is the reason for a significant drop in the number of observations in Table 5.

To circumvent these data availability issues, a natural extension is to study the role of currency fluctuations for dynamics of bank loans. If differences in *FXShare* go beyond the reported data, then fluctuations in the value of local currency can impact on the coefficient on Δ*MP* × *Foreign*. This effect would then be detected by including fluctuations in the local currency in the estimation. We use changes in the exchange rate of the local currency against the euro Δ*EUR* and the Swiss franc Δ*CHF* together with their interactions with the ownership dummies.[6]

The correlation between the Δ*MP* variable and fluctuations in the exchange rates (see Table 7 in Appendix S1 to this paper) are small and equal to −0.21 for Δ*EUR* and − 0.18 for Δ*CHF*: when monetary policy tightens, the local currency appreciates slightly. Hence, following a monetary policy tightening, the value of loans in

5. Approximately 60% of observations come from the last 4 years of our sample. Also, smaller banks tend to present less detailed financial statements hence the incidence of *FXshare* variable is tilted towards larger banks and banks with foreign ownership. Only 10% of all observations come from the state-owned banks.

6. We implicitly assume that the variation in Δ*MP* does not prompt demand shifts between local and foreign currency loans.

Table 6
Robustness: Currency Fluctuations

	(1) Δ *NetLoans*	(2) Δ *NetLoans*	(3) Δ *NetLoans*	(4) Δ *NetLoans*	(5) Δ *NetLoans*	(6) Δ *NetLoans*	(7) Δ *NetLoans*	(8) Δ *NetLoans*
Foreign	−0.708	−0.252	0.518	1.241	−0.775	−1.186	0.954	0.298
	(2.039)	(2.039)	(2.236)	(2.284)	(2.314)	(2.373)	(2.386)	(2.418)
State			5.303	6.325			6.622	6.473
			(4.419)	(4.633)			(4.730)	(5.161)
Δ*MP*	−1.583***		−1.811***		−1.784***		−2.188***	
	(0.546)		(0.616)		(0.615)		(0.637)	
Δ*MP* × *Foreign*	1.302**	1.699**	1.528**	2.092***	1.371**	1.781**	1.771**	2.398***
	(0.635)	(0.688)	(0.687)	(0.719)	(0.694)	(0.745)	(0.707)	(0.765)
Δ*MP* × *State*			0.837	1.251			1.255	1.782
			(1.131)	(1.140)			(1.236)	(1.245)
Δ*CHF*	−0.056		−0.115					
	(0.163)		(0.202)					
Δ*CHF* × *Foreign*	−0.148	−0.222	−0.083	−0.170				
	(0.162)	(0.171)	(0.192)	(0.198)				
Δ*CHF* × *State*			0.161	0.102				
			(0.328)	(0.345)				
Δ*EUR*					−0.216		−0.392	
					(0.232)		(0.339)	
Δ*EUR* × *Foreign*					0.054	−0.006	0.229	0.058
					(0.251)	(0.250)	(0.350)	(0.327)
Δ*EUR* × *State*							0.424	0.117
							(0.440)	(0.440)
Observations	2008	2008	2008	2008	1,610	1,610	1,610	1,610
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economy controls	Yes	No	Yes	No	Yes	No	Yes	No
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No	Yes	No
Country × Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Economy × Owner	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. banks	331	331	331	331	294	294	294	294
F	29	81	27	87	20	18	18	18
AB AR(1) test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AB AR(2) test	0.73	0.75	0.73	0.75	0.30	0.55	0.30	0.49
Hansen *J*	0.47	0.65	0.36	0.65	0.87	0.87	0.92	0.90
Δ*MP*+Δ*MP* × *Foreign* = 0	0.50		0.50		0.34		0.33	
Δ*MP*+Δ*MP* × *State* = 0			0.32				0.40	

Notes: Standard errors in parentheses. The dependent variable is the real rate of growth of net loans at the bank level. The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report system-GMM estimates. Estimates for other macro and bank controls are suppressed. Regressions in odd-numbered columns include country and time fixed effects and macrocontrols. Regressions in even-numbered columns include country×time fixed effects instead. In models (1) and (2) and (4) and (5) private and state domestic banks are the reference group. In models (3) and (4) and (7) and (8) private domestic banks are the reference group. Models (1)–(4) control for fluctuations in the local currency against Swiss frank, models (5)–(8) control fluctuations in local currency against the euro. The number of observations in columns 5–8 drops because several countries in the sample had either pegged their currency to the euro or adopted it. Bottom rows show *p* values of the Wald test of the null that a sum of respective coefficients is equal to zero. The numbers in parentheses are robust standard errors.

foreign currency decreases, mechanically leading to a negative correlation between monetary policy rate and growth of loans for banks with a higher share of foreign currency loans. This mechanism goes against our benchmark result. However, there are other factors that can affect exchange rate (e.g., foreign country monetary policy, trade flows), weakening the link between Δ*MP* and Δ*NetLoans*. Hence, we let the data speak.

Table 6 reports the results of this robustness exercise. The benchmark result that the supply of loans in foreign banks is immune to local monetary policy is firmly robust. The coefficients on Δ*CHF* and Δ*EUR* are negative, albeit not significantly different from zero.

Coefficients on the interactions with the ownership dummies are not significantly different from zero as well. Intuitively, this is consistent with the fact that the difference in *FXShare*

between domestic and foreign banks is small and that there is only weak relationship between ΔMP and exchange rates. This yields the currency fluctuations to be quantitatively insignificant for the bank lending channel in the sample. Another possibility is that currency fluctuations have short-term effects which cannot be detected in the annual data.

D. Global Financial Crisis

Could it be that the results reported in Table 3 are driven by the global financial crisis? One could argue that a positive coefficient on $\Delta MP \times Foreign$ results from a differential response of foreign bank lending during a global turmoil. Monetary policy interest rates were slashed to mitigate liquidity dry-up in the financial markets. If lending in foreign banks decreased by more than it did in domestic banks in that time (as Allen et al. (2017) have found) this could manifest itself as the significant, positive interaction term.

Hence, we extend model (1) to include interactions with the *Crisis* dummy.[7] The results of this exercise are reported in Table 7. In column 1 we interact the monetary policy indicator with the *Crisis* dummy. Accounting for the crisis, the estimated coefficient on ΔMP is significant and implies an effect of monetary policy on bank loans stronger by approximately one third than the benchmark estimate ($\beta_{\Delta \text{MP}}$ decreases from -0.626 in Table 3 to -0.8 in Table 7). The coefficient on $\Delta MP \times Crisis$ is positive. This is because during the global financial crisis lending and interest rates were going down at the same time, opposite to what the bank lending channel theory predicts. Importantly, the Wald test does not reject the null hypothesis that the sum $\beta_{\Delta \text{MP}} + \beta_{\Delta \text{MP} \times \text{Crisis}}$ is equal to zero. Thus, changes in the monetary policy rate had no effects on the credit growth at the bank level during the global financial crisis.

In columns 2 and 3 we introduce the foreign ownership dummy and its interactions, and in columns 4 and 5 we introduce both ownership dummies and their interactions. Qualitatively, we confirm our first result: credit in foreign banks does not respond to monetary policy in tranquil times while in domestic banks it does. The effect of monetary policy on domestic banks' credit growth in tranquil times is stronger than the benchmark estimates. Interestingly, we do not find evidence that lending by foreign banks decreased by more or less during the crisis compared to domestic banks: the coefficient on $Crisis \times Foreign$ is not significantly different from zero across all specifications.

In column 4 the effect of monetary policy on private domestic banks in tranquil times is strong and significant. A one percentage point tightening of monetary policy leads to a reduction of 2.2 percentage points in credit growth. Again, we cannot reject the null hypothesis that credit growth in foreign banks does not react to monetary policy in tranquil times. Similarly, we cannot reject the null hypothesis that credit growth in state-owned banks does not react to monetary policy in tranquil times.

The coefficient on $Crisis \times State$ is positive, albeit insignificant. This is different than Allen et al. (2017) who find that state-owned banks played stabilizing role by increasing their lending during the global financial crisis. This difference derives from the fact that our specification includes the interaction of *State* and ΔGDP.[8]

To sum up, the lack of response of foreign banks' credit to monetary policy is not driven by the global financial crisis. The bank lending channel was simply not active during that time. We find that monetary policy affects bank loans only in tranquil times and that foreign bank loans remain immune to monetary policy. This is different than results in Wu, Luca, and Jeon (2011). In their sample, different response of credit to monetary policy in foreign banks is predominant during crisis episodes. Their study has a broader geographical coverage (CEE, Latin America and South-East Asia countries), and the countries in those regions had different monetary policy instruments, targets and implementation. Also, their time-frame of 1996–2003, unlike our sample, includes many episodes of local banking crises and no global financial crises. The exceptional magnitude of the global financial crisis (and a different definition of "crisis times") is another plausible cause for the different results.

IV. WHAT DRIVES THE DIFFERENCE?

Having established the robustness of bank ownership as a driver of different responses of credit to monetary policy rate, we now turn to

7. We do not introduce the dummy itself as it is a linear combination of year fixed effects and country-year fixed effects.

8. In a regression without $Economy \times Owner$ interactions, the $Crisis \times State$ coefficient is positive and significant. The estimation results are available upon request.

Table 7
Robustness: Global Financial Crisis

	(1) *ΔNetLoans*	(2) *ΔNetLoans*	(3) *ΔNetLoans*	(4) *ΔNetLoans*	(5) *ΔNetLoans*
Foreign		−1.303	−1.114	−0.163	0.095
		(2.195)	(2.237)	(2.315)	(2.279)
State				5.061	5.529
				(4.637)	(4.988)
Δ*MP*	−0.808**	−1.886***		−2.246***	
	(0.408)	(0.696)		(0.771)	
Δ*MP* × *Foreign*		1.415*	1.965**	1.784**	2.540***
		(0.844)	(0.911)	(0.904)	(0.948)
Δ*MP* × *State*				1.052	1.519
				(1.454)	(1.441)
Crisis × *Foreign*		−0.443	−1.126	0.184	−0.428
		(2.474)	(2.531)	(2.543)	(2.337)
Crisis × *State*				2.404	2.636
				(4.879)	(5.101)
Δ*MP* × *Crisis*	1.006	1.419		1.810	
	(0.661)	(1.070)		(1.151)	
Foreign×Δ*MP* × *Crisis*		−0.246	−0.913	−0.643	−1.484
		(1.277)	(1.272)	(1.403)	(1.357)
State×Δ*MP* × *Crisis*				−0.362	−0.745
				(2.273)	(2.318)
Observations	2075	2008	2008	2008	2008
Bank controls	Yes	Yes	Yes	Yes	Yes
Economy controls	Yes	Yes	No	Yes	No
Year FE	Yes	Yes	No	Yes	No
Country FE	Yes	Yes	No	Yes	No
Country × *Year FE*	No	No	Yes	No	Yes
Economy × *Owner*	No	Yes	Yes	Yes	Yes
No. banks	343	331	331	331	331
F	31.31	28.80	80.33	26.52	87.27
AB AR(1) test	0.00	0.00	0.00	0.00	0.00
AB AR(2) test	0.83	0.73	0.72	0.69	0.75
Hansen J	0.30	0.39	0.67	0.38	0.60
ΔMP+ΔMP × Crisis = 0	0.71	0.55		0.60	
ΔMP+ΔMP × Foreign = 0		0.36		0.37	
ΔMP+ΔMP × State = 0				0.34	
ΔMP in Foreign in Crisis = 0		0.24		0.24	
ΔMP in State in Crisis = 0				0.85	

Notes: Standard errors in parentheses. The dependent variable is the real rate of growth of net loans at the bank level. The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report system-GMM estimates. Estimates for other macro and bank controls are suppressed. Model (1) abstracts from ownership variables and focuses on monetary policy effects in tranquil and crisis times. Models (2)–(5) include monetary policy and ownership variables. Regressions (1), (2) and (4) include country and time fixed effects and economy-controls. Regressions (3) and (5) include country × time fixed effects instead. In models (1)–(3) private and state domestic banks are the reference group. In models (4) and (5) private domestic banks are the reference group. Bottom rows show *p* values of the Wald test of the null that a sum of respective coefficients is equal to zero. The numbers in parentheses are robust standard errors.
*$p < .10$, **$p < .05$, ***$p < .01$.

determining the causes of this fact. The supply driven bank lending channel originates from a fall in deposits as a response to a monetary contraction. Therefore, we turn our attention to the trigger of the bank lending channel, namely, how deposits respond to monetary policy. Analogously to Section 3, we estimate the following dynamic panel equation for deposits:

(2)
$$\Delta\text{Deposits}_{i,j,t} = \beta_{\Delta MP} \times \Delta\text{MP}_{j,t} + \beta_O \times \text{Owner}_{i,t} + \beta_{\Delta MP \times \text{Owner}} \times \Delta MP \times \text{Owner}_{i,t} + \beta_{\text{Dep}_{t-1}} \times \Delta\text{Deposits}_{i,j,t-1} + \beta_{\text{Dep}_{t-2}} \times \Delta\text{Deposits}_{i,j,t-2} + \beta_B \times \text{Bank}_{i,t} + \beta_E \times \text{Economy}_{j,t} + \beta_{E,O}\text{Economy}_{j,t} \times \text{Owner}_{i,t} + \beta_{j,t} + \varepsilon_{i,t}.$$

The dependent variable is either *C-Dep*, a real percentage growth of net consumer consumer deposits or *B-Dep*, a real percentage growth of deposits from banks. We include two lags of the dependent variable in case of *C-Dep* and one lag

Table 8
Deposits

	(1) Δ*C-Dep*	(2) Δ*C-Dep*	(3) Δ*C-Dep*	(4) Δ*B-Dep*	(5) Δ*B-Dep*	(6) Δ*B-Dep*
Foreign		−3.388	−4.413*		−3.226	−3.171
		(2.336)	(2.417)		(10.492)	(10.650)
State		−8.829**	−7.849*		2.505	−0.063
		(4.421)	(4.619)		(16.746)	(16.699)
Δ*MP*	0.371	−1.746***		−1.699	−7.348	
	(0.724)	(0.514)		(1.726)	(5.108)	
Δ*MP* × *Foreign*		1.723***	1.621**		5.700	6.218
		(0.608)	(0.629)		(5.372)	(5.316)
Δ*MP* × *State*		1.775*	1.553		8.682	9.567*
		(1.014)	(1.176)		(5.347)	(5.684)
Observations	1,695	1,648	1,648	1,697	1,634	1,634
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Economy controls	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
Country FE	Yes	Yes	No	Yes	Yes	No
Country × Year FE	No	No	Yes	No	No	Yes
Economy × Owner	No	Yes	Yes	No	Yes	Yes
No. banks	298	289	289	307	295	295
F	15.50	13.97	68.44	4.68	5.64	21.85
AB AR(1) test	0.00	0.00	0.00	0.00	0.00	0.00
AB AR(2) test	0.86	0.33	0.35	0.60	0.39	0.35
Hansen *J*	0.21	0.34	0.34	0.28	0.31	0.65
ΔMP+ΔMP × Foreign = 0		0.96			0.39	
ΔMP+ΔMP × State = 0		0.97			0.49	

Notes: Standard errors in parentheses. The dependent variable is: the real rate of growth of consumer deposits at the bank level in models (1)–(3) and deposits from banks and financial entities at the bank level in models (4)–(6). The sample is 453 banks in 10 CEE countries in years 1998–2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report system-GMM estimates. Estimates for other macro and bank controls are suppressed. Regressions in columns 1 and 2 and 4 and 5 include country and time fixed effects and macrocontrols. Regressions in columns 3 and 6 include country × time fixed effects instead. In models (2) and (3) and (5) and (6) private domestic banks are the reference group. Bottom rows show *p* values of the Wald test of the null that a sum of respective coefficients is equal to zero. The numbers in parentheses are robust standard errors.

*$p < .10$, **$p < .05$, ***$p < .01$.

for *B-Dep* because of evidence of autoregression in residuals when only one lag was used in the former case. The selection of controls together with model fit and specification tests is the same as in estimation of Equation (1).

The results of estimations of Equation (2) are reported in Table 8. In columns 1–3 consumer deposits are the dependent variable while in columns 4–6 deposits from banks are the dependent variable. In columns 1 and 4, without accounting for ownership, we do not find the monetary policy to have any impact on bank deposits. The subsequent estimations reveal that this result masks substantial heterogeneity in consumer deposits reaction between ownership types.

We find that after a monetary contraction private domestic banks have difficulties to raise deposits: a 1 percentage point increase in the policy rate reduces the rate of growth of deposits by 1.2 percentage point. Foreign banks do not face this issue. The rate of growth of deposits in foreign banks does not react to changes in the monetary rate. This is an important result. The bank lending channel is not only weaker in foreign banks, as previous studies have found, but it is entirely absent. Since deposits do not fall in the wake of a monetary contraction, there is no trigger to initiate a response in credit. This is consistent with the benchmark result on lending in foreign banks being immune to monetary policy.

Regarding deposits from banks, we see that there is essentially no evidence that bank ownership matters for how those deposits respond to monetary policy. The coefficient $\beta_{\Delta MP}$ in columns 4 and 5 is negative, but not statistically significant. We conclude that monetary policy does not matter for the dynamics of deposits from other banks.

Beck and Brown (2015) argue that foreign banks cherry-pick their clients. Foreign banks may attract deposits from households who weakly respond to monetary policy shocks. This can be due to earnings, wealth and how

financially constrained a household is. Similarly, the Wald test does not reject the null hypothesis of no response of deposits in state owned banks to changes in ΔMP. State-owned banks usually service public sector entities that do not engage in active management of their liquidity position in response to monetary policy changes.[9]

Thus, we find a novel fact, that there is no response of consumer deposits to monetary policy in foreign and state-owned banks. The composition of funding matters as well, as deposits from banks do not respond to monetary policy in all banks. These two facts alone can fully explain the benchmark result that foreign bank lending is immune to local monetary policy. The trigger of the bank lending channel, the adjustment of deposits following a change in the monetary policy rate, is not activated in those banks.[10]

However, one question still remains, namely, why loans issued by private domestic banks respond to monetary policy in the first place? Clearly, a part of this is that their consumer deposits do drop following a monetary policy tightening. However, one could imagine a counterfactual scenario in which private domestic banks relied more on deposits from banks, possibly to the extent that would render local monetary policy irrelevant for their lending as well. Therefore, it is important to understand the determinants and consequences of bank funding structure.

V. FUNDING STRUCTURE

We expect that foreign banks rely more on wholesale funding (deposits from banks), while domestic banks rely more on retail funding (consumer deposits), as suggested by unconditional means in Table 1. To find if ownership is a standalone factor for funding structure and costs, we estimate the following regression with ordinary least squares (OLS), including lagged bank-level controls to avoid endogeneity:

$$\text{Funding}_{i,j,t} = \beta_O \times \text{Owner}_{i,t} + \beta_B \times \text{Bank}_{i,t-1} + \beta_j + \varepsilon_{i,j,t}. \tag{3}$$

The dependent variable is deposits from banks, consumer deposits and interest expenses to total assets (funding costs). By doing this, we verify whether ownership impacts on the funding structure and funding costs in the long run separately from other bank characteristics.[11]

Table 9 reports the results. There are significant differences in the structure of funding and its costs between foreign and domestic banks. The share of deposits from banks in foreign banks' funding is on average 10 percentage points higher than that in private domestic banks. Interestingly, state banks rely more on deposits from banks and less on consumer deposits than both private domestic banks and foreign banks. We view this as additional evidence of importance of information frictions in the interbank market. State owned banks enjoy implicit government backing which makes them a more trustworthy trading partner to other banks.

Interest expenses to total assets are approximately 0.5 percentage point lower for foreign banks which corresponds to a one-sixth reduction in those costs (as the average interest expense to total assets in the sample is 3%). We find that the coefficient on the *State* dummy in column 6 of Table 9 is positive, albeit insignificantly different from zero. State-owned banks do not manage their liabilities as efficiently as foreign banks do. State banks are less innovative and less efficient, hence they incur larger costs. We conclude that foreign ownership is a significant determinant of the funding structure. This, together with results reported in Table 8 explains why loans in domestic banks respond to monetary policy while those in foreign banks do not.

VI. CONCLUSIONS

In this study we provide new evidence on the effects of monetary policy on bank loans dynamics. We find that only domestic banks adjust their

9. Another possible explanation involves deposit dollarization, or, more precisely, euroization. This is highly heterogeneous across CEE economies, as shown in Brown and Stix (2015). In 2012, more than 75% of bank deposits in Croatia and more than 40% of deposits in Bulgaria were denominated in foreign currency, predominantly the euro. By contrast, the share of foreign currency deposits in Central Europe (e.g., Poland, Hungary and Czech Republic) in 2012 was below 15%. If foreign banks have more deposits euroization and if changes in local monetary policy rate are uncorrelated with changes in the euro exchange rate, then local monetary policy changes are less binding for the depositors of foreign banks. However, we can not credibly pursue this line of inquiry, as the data on currency composition of deposits are of even lower quality than that on loans.

10. We address the relevance of the linkages to parent banks in our sample in Section 2.3 in Appendix S1 to this paper.

11. We have also estimated this equation including time fixed effects and macro controls, result remain robust to this extension.

Table 9
Funding Structure and Costs

	(1) *B-Funding*	(2) *B-Funding*	(3) *C-Funding*	(4) *C-Funding*	(5) *Interest Expenditure*	(6) *Interest Expenditure*
Foreign	*5.535****	10.520***	−5.748***	−10.812***	−0.511***	−0.475***
	(1.038)	(1.092)	(1.049)	(1.105)	(0.111)	(0.111)
State		18.164***		−18.700***		0.126
		(1.910)		(1.976)		(0.218)
Lagged Size	−0.345***	−0.456***	0.369***	0.485***	−0.009	−0.010
	(0.050)	(0.053)	(0.050)	(0.053)	(0.007)	(0.007)
Lagged Liquidity	−0.180***	−0.202***	0.198***	0.221***	0.008**	0.007**
	(0.027)	(0.025)	(0.028)	(0.026)	(0.004)	(0.004)
Lagged Capitalization	−0.008	−0.054	−0.668***	−0.628***	−0.029***	−0.030***
	(0.053)	(0.051)	(0.058)	(0.053)	(0.005)	(0.005)
Lagged Profitability	−0.034	0.094	−0.061	−0.196	0.005	0.005
	(0.214)	(0.206)	(0.221)	(0.210)	(0.029)	(0.029)
Observations	2,380	2,380	2,368	2,368	2,555	2,555
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
F	33	40	39	45	28	27

Notes: Standard errors in parentheses. The dependent variable is: deposits from banks and financial entities to total assets (*B-Funding*) in columns (1) and (2), total consumer deposits to total assets (*C-Funding*) in columns(3)−(4) and interest expenses to total assets (funding costs, *I-Expense*) in columns (5)−(6). The sample is 453 banks in 10 CEE countries in years 1998−2012. Details of all variables construction and data sources are described in Table 1 in Appendix S1 to this paper. All columns report OLS estimates. Estimates for other macro and bank controls are suppressed. In models (1), (3) and (5) private and state domestic banks are the reference group. In models (2), (4) and (6) private domestic banks are the reference group. The numbers in parentheses are robust standard errors.

$^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$.

loans to changes in host country's monetary policy and that the bank lending channel is not triggered in foreign-owned banks due to the lack of response of their funding to monetary policy. We also contribute to the literature on the effectiveness of monetary policy during the global financial crisis.

Our findings suggest that there are important differences in dynamics of deposits among foreign, state-owned and private domestic banks. Cerqueiro, Degryse, and Ongena (2011) argue that borrowers in more concentrated markets face higher switching costs which makes it easier for banks to pass the increase in central bank rate onto customers. The importance of market power for loans is also confirmed in the recent work of Wang et al. (2020). In our view, further investigation of deposit markets, with a focus on market power, in the context of the traditional bank lending channel literature is an interesting avenue for the future research.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. Supporting Information