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The Transmission of Monetary Policy in EMEs in a Changing Financial Environment: A Longitudinal Analysis

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Abstract

The departure from the Modigliani-Miller conditions, due for instance to market incompleteness, asymmetric information or taxation, tends to increase the importance of indirect channels by which monetary policy affects the level of economic activity in emerging market economies (EMEs). The bank lending channel highlighted by Bernanke and Blinder (1988) is a prominent example of such indirect effect of monetary policy. In this study we investigate how the bank lending channel acts above and beyond the traditional money channel that most macroeconomic models emphasize. We find that, particularly in EMEs with high bank reliance, changes in the volume of bank credit are important drivers of fixed capital formation. Using micro-level bank balance sheet data, we then show how monetary policy and sovereign risk premia affected bank credit growth in EMEs between 2001 and 2013. We find that both, changes in the monetary policy stance and changes in risk premia have had significant effects on credit volumes. Furthermore, we show that these effects tend to affect smaller banks more strongly. Our results suggest that the accommodative monetary policies that have been seen recently were contributing factors to the rapid expansion of credit in many EMEs.

JEL codes: E40, E50

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1 Introduction

Monetary policy effects are usually thought to be transmitted through the economy via the action of the short-term policy rate on longer term rates, on exchange rates and on asset prices more generally. Monetary policy may also be effective because it affects the aggregate supply of credit by the banking sector, as well as the strength of private sector balance sheets. The last two mechanisms may have received too little attention in the context of EMEs in the more recent past, as most theoretical models have tended to put the emphasis on the direct price effects of monetary policy. This may seem surprising, particularly given that credit constraints and market incompletenesses that lead to departures from the axiomatic Modigliani-Miller conditions tend to be much more evident in EMEs.

After an increase in the interest rate, deposits tend to contract. This can occur both, due to a fall in bank reserves, or due to a diminished demand for bank deposits, as alternative financial instruments become more attractive to final users. The fall in deposits then pushes banks into more expensive forms of funding, with the consequent negative effects on the supply of loans. This mechanism is traditionally known as the bank lending channel of monetary policy, which was originally highlighted by Bernanke and Blinder (1988). [1] [2] In the context of EMEs, this mechanism has been discussed in Kamin,

[1] Some authors have argued that the bank lending channel is operative even when monetary policy is not capable of affecting the volume of deposits in the banking system (see Tobin (1963) and Disyatat (2011)).

[2] Bernanke (2007) noted that not only banks, but also non-bank lenders face an external

Turner and Van't Dack (1998) and in Mohanty and Turner (2008).

Variations in the supply of credit - whether induced by monetary policy or not - will affect aggregate demand if at least a fraction of economic agents are credit constrained. It will also impact business investment, especially if bank credit and directly issued corporate debt are not perfect substitutes (Gambacorta (2005)). Technically, the latter condition is akin to stating that the Modigliani-Miller result does not hold, so that the composition of corporate funding is no longer irrelevant. The most prominent reasons for the failure of the Modigliani-Miller principle are market incompleteness, asymmetric information and taxation.

In this study we present evidence that the large relative importance of the banking sector in many EMEs has important bearings for the transmission mechanism of monetary policy in these countries. More specifically, we show that there are effects of monetary policy on the growth rate of investment that go beyond the traditional money channel. As we show, bank credit impacts fixed capital formation in countries where a substantial fraction of investment expansion is financed by banks. Based on a panel that contains the balance sheets of 1,468 EME banks, we then show how credit supply is affected by both, monetary policy and by changes in risk premia. Moreover, we find that loan concessions by smaller banks are more sensitive to monetary policy. This finding provides clear evidence of the existence of an active bank

finance premium that is influenced by monetary policy.

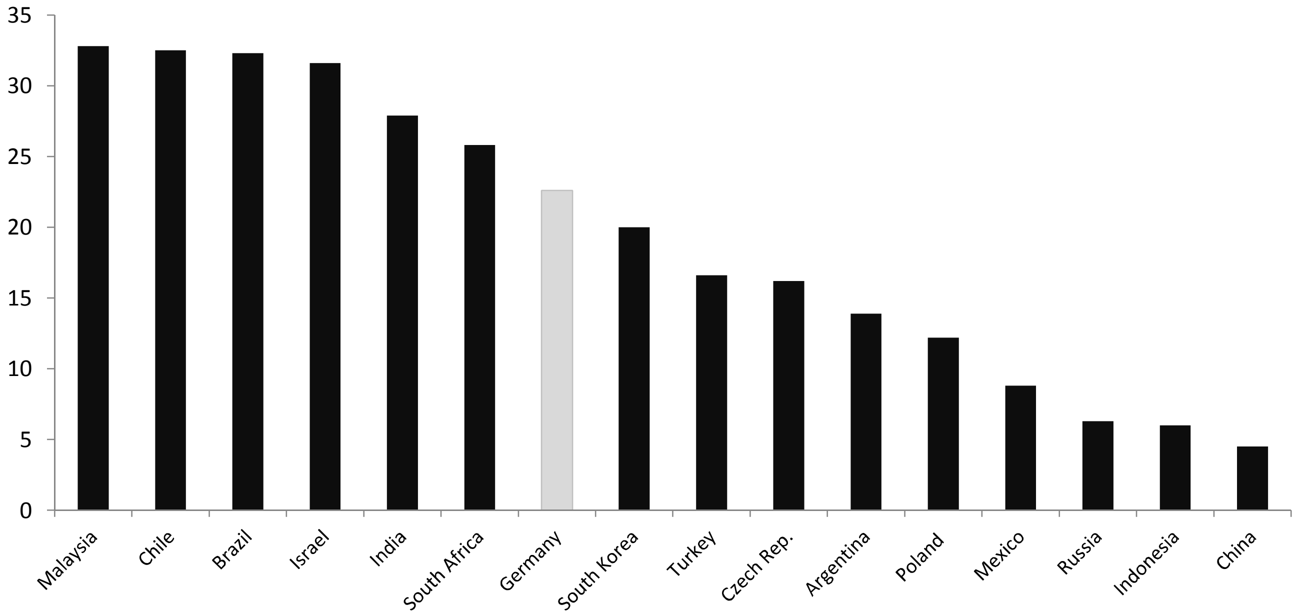
lending channel in EMEs. Over time, we argue that the amplifying credit channel could become even more important as domestic credit to GDP ratios in EMEs increase, among others due to the financial inclusion of an increasing share of economic agents. Indeed, one indication that the relative importance of bank credit in the monetary policy transmission mechanism in EMEs may have increased during the last years comes from the fact that domestic bank credit to a group of EMEs has grown from $3.2 trillion in mid-2000 to $8.2 trillion in mid-2007, and to $23.6 trillion in mid-2014. [3]

The use of relatively large and fairly representative datasets in this study has allowed us to identify the effects of both interest rates and bank credit supply on investment in EMEs with greater precision. In particular, vast heterogeneity in the degree of bank reliance among EMEs enables us to explore the changing relevance of different channels of transmission of monetary policy. Graph 1 below shows the share of corporate investments that is financed by banks in each of the current 15 largest EMEs. [4] Besides the large variation that exists between countries, it is noteworthy that in six of these EMEs bank reliance actually exceeds that of Germany – which is often referred to as the prototype example of a bank based financial system (see for instance Levine (1997, 2002)). [5] We find that this heterogeneity has

[3] Total domestic bank credit for Brazil, Chile, China, Czech Rep., Hong Kong, Hungary, Indonesia, India, Korea, Mexico, Malaysia, Poland, Russia, Saudi Arabia, Singapore, Thailand, Turkey and South Africa.

[4] Based on GDP at market prices over the last five years.

[5] The other leading example is that of Japan, for which no comparable data is available. Prototype market-based financial systems are that of the U.S. and the U.K. One important



Graph 1. Proportion of Investments Financed by Banks (in %)

Source: Enterprise Surveys. The World Bank Group.

material implications for the transmission of monetary policy. More specifically, we find evidence that the traditional money channel and the credit channel affect investment growth to different extents, depending on the degree of bank reliance of a given country. [6] In other words, we show that monetary policy affects fixed capital formation both, directly (through the cost of capital channel), and indirectly, through its effects on the volume of bank credit.

We also point out that external borrowing tends to be the marginal source of funding in many EMEs. Therefore, it appears natural that changes in risk premia that are induced by changes in global monetary conditions impact the domestic pace of credit expansion and economic activity. There is by now a literature, going back at least to Pan and Singleton (2008), that relates market volatility to risk premia. More recently, Rey (2013) has pointed to the existence of a 'global financial cycle' as lower risk aversion and uncertainty are associated with increased international capital flows and credit growth in all regions of the world. Our results, which are based on bank-level data, are in line with the findings of this literature as we show that compressions in risk premia do indeed have a very significant effect on the speed of credit

difference that needs to be borne in mind is that in EMEs the share of investment that is not financed by banks is, by and large, financed by retained earnings, rather than through capital markets.

[6] Our findings may stand in contrast with the frequently reported failure to identify clear-cut evidence of the effects of monetary policy in single equation settings in advanced economies (see Chirinko (1993) or Chatelain et. al. (2003)). Indeed, in the past, some economists have argued that the difficulty in pinning down the effect of interest rates on the cost of capital has led researchers to devote more attention to other transmission mechanisms in some advanced economies (see Mishkin (1996)).

expansion in EMEs. [7] Furthermore, we find that the effects of monetary policy and risk premia are larger for smaller banks, which is again consistent with the existence of an operative bank lending channel. All in all, our results point to the fact that the nature and the changes in the structure of financing have important bearings for the transmission of monetary policy in EME economies.

The note proceeds as follows. First, we use dynamic panel estimators to estimate the long-run price and quantity elasticities of investment for a representative sample of EMEs, based on quarterly macroeconomic data. This allows us to assess if and how investment growth is affected by bank credit. We do this considering the relative importance of bank financing for investments in each group of countries (in Section 2). In Section 3, we then look at how the supply of credit is affected by monetary policy and by risk premia. For this, we make use of micro-level banking information obtained from *BankScope*, as well as macroeconomic data. Section 4 then offers a brief discussion of the main issues raised in the paper, before we conclude.

[7] These results are also consistent with those of Cantero-Saiz, Sanfilippo-Azofra, Torre-Olmo and Lopez-Gutierrez (2014), who show that sovereign risk has played an important role in explaining bank loan volumes within the eurozone.

2 The effects of monetary policy on investment in EMEs

The fact that, as we have pointed out in the introduction, in many EMEs banks play a role in investment financing that is comparable to that played by banks in major countries in continental Europe, suggests that an empirical analysis of the contribution of the different channels of transmission of monetary policy on gross fixed capital formation, including the bank lending channel, is in order.

Within individual central banks, estimation of the impact of monetary policy shocks on economic activity over time is frequently conducted based on medium or large macroeconomic models. Such models typically contain country-specific features, which are often important. However, a limitation of focusing exclusively on variation along the time-series dimension is that, especially in the context of EMEs, this choice very often results in a relatively small number of utilizable observations. This may often pose a challenge to precise identification of the transmission mechanisms of monetary policy. [8] [9] One implication that follows is that the relatively high degree of uncertainty about the precise role played by each individual transmission mechanism

[8] The most common reasons for short usable time series - that are all well known for emerging market practitioners - are methodological changes in the way that statistics are collected, discontinuation of publication or fundamental changes in the monetary policy regime.

[9] It is well known, for instance, that the problem of multicollinearity tends to be difficult to address when the number of observations is small.

makes it more difficult to assess the implications of critical changes in the economy for monetary policy, such as, for instance, the degree of international integration or changes in the characteristics of the financial sector. To overcome this limitation, we conduct our tests using data for a panel of representative EMEs.

One way to assess the magnitude of the more immediate impact of monetary policy on aggregate investment growth within a given group of countries is to estimate an equation of the form

$$\begin{aligned}\Delta I_{i,t} &= \beta_0 \Delta I_{i,t-1} + \sum_{j=0}^{n} \beta_{1,j} \Delta r_{i,t-j} + \sum_{j=0}^{n} \beta_{2,j} \Delta bc_{i,t-j} + \sum_{j=0}^{n} \beta_{3,j} \Delta Y_{i,t-j} + \\ &\quad + \sum_{j=0}^{n} \beta_{4,j} \Delta q_{i,t-j} + \eta_{i,t}.\end{aligned}$$

where $I_{i,t}$ stands for gross fixed capital formation in country i at time t in real terms, $r_{i,t}$ for the real interest rate, $bc_{i,t}$ for domestic bank credit deflated by price variation, $Y_{i,t}$ for real output, $q_{i,t}$ for the real effective exchange rate level and $\eta_{i,t}$ for the error term. [10]

Note that the above specification allows for persistence in investment growth, so that the long-run elasticity differs from the short-run elasticity if

[10] The equation is obtained by first-differencing the expression

$$\begin{aligned}I_{i,t} &= c + \alpha_0 I_{i,t-1} + \sum_{j=0}^{n} \alpha_{1,j} r_{i,t-j} + \sum_{j=0}^{n} \alpha_{2,j} bc_{i,t-j} + \sum_{j=0}^{n} \alpha_{3,j} Y_{i,t-j} + \\ &\quad + \sum_{j=0}^{n} \alpha_{4,j} q_{i,t-j} + \theta_i + \varepsilon_{i,t},\end{aligned}$$

where θ_i captures unobserved country-specific fixed effects and $\varepsilon_{i,t}$ represents the error term. First-differencing this relation eliminates time invariant effects.

β_0 differs from zero. In principle both, changes in the (real) real interest rate and the supply of bank credit can affect investment. The control variable for economic growth also captures the accelerator effect, while the exchange rate variation is intended to capture the effects of changes in price competitiveness, as well as effects of the relative price of capital goods that are imported. The long-run elasticity of investment will be given by $\sum_{j=0}^{n} \widehat{\beta}_{k,j} / \left(1 - \widehat{\beta}_0\right)$, where $\widehat{\beta}_0$ and $\widehat{\beta}_{k,j}$ are the estimated parameters.

We use the above specification to gauge the sensitivity of gross fixed capital formation to domestic monetary policy. For this, we obtained quarterly data for a sample of 12 EMEs from 4 continents: India, Indonesia, Malaysia, South Korea; the Czech Republic, Poland and Turkey; Brazil, Chile and Mexico, as well as Israel and South Africa. Our sample covered the period between the 1st quarter of the year 2000 and the 2nd quarter of 2014. [11]

Since a well-known problem with estimating investment equations as the above is that the right hand variables are not exogenous, we employed the system GMM estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimation strategy enables consistent estimation of the effects even when explanatory variables are endogenous. [12]

The sample was separated in two groups, based on the financial structure

[11] This means that our estimates were not affected by the emerging market crises of the late 1990s.

[12] The advantage of this estimator relative to the first differenced GMM estimators proposed by Holtz-Eakin, Newey and Rosen (1988) and Arellano and Bond (1991) is that it deals with the persistence of time series in a better way.

of each country. More specifically, countries whose bank reliance exceeds the sample median between EMEs were grouped into the high bank reliance group. [13] The remaining countries - in which bank dependence was below the median for EMEs - were assigned to the low bank reliance group. Each of these groups is regionally diverse, containing countries from at least 3 continents. In other words, the grouping is not driven by regional factors. The difference between groups is quite stark: the proportion of investment financed by banks in the high bank dependence group is 2.3 times higher on average than that in the low dependence group.

Table 1 shows the estimated long-run investment elasticity for each explanatory variable. The differences in the determinants of investment growth between the two groups are striking. First we do find a negative coefficient for the effects of the real interest rate on investment growth. This effect is sizable, and also statistically significant in the case of the low bank reliance group. This is the traditional money channel by which real interest rates affect economic activity. Second, we find that bank credit growth has a very significant effect on investment growth in the high bank reliance group. [14] Finally, the last line of the table shows that appreciated exchange rates tend to be associated with slower real investment growth.

[13] Based on the proportion of corporate investment that is financed by banks.

[14] It is particularly noteworthy that the coefficients of the real interest rate and of the credit growth variables in each group of EMEs are barely affected by the inclusion or exclusion of the other control variable. This suggests that the estimated coefficients are not being contaminated by multicollinearity. The robustness of these results is likely due to the larger sample size, which allows us to identify the effects with greater precision, as evidenced by the smaller standard errors of the estimates.

Table 1

Determinants of Real Investment Growth

	Dependent variable: quarterly change in real investment					
	low bank dependence			high bank dependence		
Long-run elasticities:						
Δ (real interest rate)	-0.495***		-0.511***	-0.158		-0.126
	(0.048)		(0.060)	(0.181)		(0.177)
Δ ln (bank credit)		0.056*	0.036		0.355***	0.347***
		(0.030)	(0.041)		(0.086)	(0.072)
Δ ln (GDP)	1.369***	1.073***	1.283***	0.907***	0.586**	0.642**
	(0.309)	(0.327)	(0.234)	(0.341)	(0.239)	(0.261)
Δ ln (REER)	0.216	0.236	0.245	0.249***	0.220***	0.220***
	(0.208)	(0.208)	(0.221)	(0.077)	(0.058)	(0.062)
observations	310	310	310	298	291	291
Sargan test (p-value)	0.315	0.465	0.298	0.308	0.382	0.293
AB test for AR(2) (p-value)	0.906	0.417	0.809	0.670	0.337	0.386

System GMM estimation using the Arellano-Bover dynamic panel estimator. The null hypothesis of the Sargan test is that the instruments are valid. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively. Robust standard errors are reported in parenthesis. The sample period is 2000Q1-2014Q2. The dependent variable is the log quarterly change in real investment (s.a.).

3 The effects of monetary policy and risk premium changes on bank credit

Having established the importance of bank lending for fixed capital formation in the previous section, we proceed to investigate how monetary policy, as well as risk premia, affect bank lending volumes. For this, we analyzed the variations in the credit supply reported by EME banks on their balance sheets. Annual data were taken from *BankScope*, as previous studies have concluded that data at yearly frequency do capture heterogeneous responses to monetary policy shocks quite well (see for instance Gambacorta's (2005) detailed study on the case of Italy). Our sample covers EME banks for a period stretches from 2001 to 2013. [15]

Our dependent variable is the logarithmic change in outstanding loans, measured in national currency. Throughout we control for country fixed effects, for variations in the US monetary policy and global risk aversion (measured by the VIX), as well as for the CPI inflation rate. We kept all banks for which we had information for all balance sheet variables that were used at least for two consecutive years in the sample.

The results for our preferred specification, which is based on the Arellano-Bover dynamic panel estimator, are shown in Table 2. These results are based

[15] The countries with observations in the sample are Brazil, Chile, Colombia, Mexico, Peru, Czech Republic, Hungary, Poland, Turkey, Russia, China, India, Indonesia, Korea, Malaysia, the Philippines, Thailand, Israel and South Africa.

on winsorized variables. Winsorization was performed in order to minimize the effects of outliers or possible erroneous inputs. Estimates without winsorization are reported in Table A2, in the Appendix. On the whole, winsorization led to a small improvement in the fit of the expressions, as a result of minor changes in estimated coefficients. [16]

In what follows, we discuss our main results. First, the lower part of Table 2 shows that all bank specific variables attain the expected sign when they are found to be statistically significant. Loan growth tends to be larger for small banks, for banks with a high liquidity ratio (measured as total securities divided by total assets), with a low loan loss provision ratio and high capital (although the effect of the capital ratio is only found to be significant for the large banks subsample)). [17]

Furthermore, loan growth at the bank level is found to be persistent. It is also pro-cyclical, as higher GDP growth rates tend to be associated with larger growth rates of loan supply. This pro-cyclicality is driven particularly by the much stronger pro-cyclicality of the lending activity of smaller banks, which are more sensitive to changes in domestic economic conditions. Larger banks tend to have more developed global connections, which might provide them with a certain degree of insulation from local developments.

[16] The overall fit can be assessed by looking at the sigmas, which are the square root of the estimated variance of the error terms.

[17] The effects of bank health indicators on loan concessions turns out to be more important for the larger banks. This could be due to the fact that larger banks may be more likely to need market access for funding.

Table 2

Determinants of Bank Credit Growth

	D.V.: change in loans (in logs)		
	all	large banks	small banks
Δ ln (loans) - lagged	0.222***	0.202***	0.208***
	(0.030)	(0.030)	(0.039)
Δ ln (GDP)	0.547**	0.180	1.138**
	(0.221)	(0.223)	(0.524)
Δ policy rate	-1.687***	-0.989***	-2.476***
	(0.273)	(0.267)	(0.627)
Δ cds	-2.504***	-1.912***	-2.865**
	(0.569)	(0.579)	(1.138)
ln (assets)	-0.016***	-0.043***	-0.009
	(0.006)	(0.008)	(0.016)
liquidity ratio	0.157**	0.213**	0.142*
	(0.063)	(0.056)	(0.081)
loan loss provision	-0.678***	-0.719***	-0.416**
	(0.120)	(0.120)	(0.194)
capital ratio	-0.096	0.436**	0.102
	(0.171)	(0.212)	(0.157)
country fixed effects	yes	yes	yes
global control variables	yes	yes	yes
sigma	0.177	0.114	0.236
Hansen (p-value)	0.715	0.988	0.999
AB test for AR (2) (p-value)	0.749	0.729	0.541
observations	4642	2379	2263
no of banks	1468	537	1016

System GMM estimation using the Arellano-Bover dynamic panel estimator.
*, **, *** denote statistical significance at 10%, 5% and 1%, respectively.
Robust standard errors are reported in parenthesis.

The long-run elasticities that are derived from the first column suggest that, on average, a 100 bp increase in the policy rate is associated with a 2.2% reduction in bank loan supply. [18] The reduction is considerably larger for smaller banks – i.e. those with outstanding credit volumes below the median of the sample. The much stronger response of small banks is added indication of the existence of a bank lending channel. Smaller banks typically face higher difficulty of switching to other forms of non-deposit financing, so that their credit supply volumes have to adjust more strongly to monetary policy shocks (see Kashyap and Stein (1995)). [19]

As a comparison, Ehrmann, Gambacorta, Martinez-Pages, Sevestre and Worms (2003) estimated that a 100 basis point rate increase leads to an average credit supply reduction of 1.5% in the four largest Eurozone countries. [20] Our somewhat larger estimates, which are also based on responses at yearly frequency, may be explained by the fact that banks in developing countries have access to less alternative financing mechanisms when compared to their advanced economy counterparts, forcing them to adjust credit supply more strongly.

On the demand side, smaller firms tend to be more affected by monetary policy changes than larger ones, as they tend to have less capability to tap

[18] That is 1.687/(1-0.222).

[19] This result is also consistent with the findings of Olivero, Li and Jeon (2011). Using a sample of Asian and Latin American banks the latter authors find evidence that greater concentration in the banking sector weakens the bank lending channel.

[20] Their model controls for size, liquidity and capitalization.

alternative sources of financing (see Gertler and Gilchrist (1994)). To put it in another way, they are less insulated from eventual reductions in bank credit supply. This corroborates the idea that firms in countries with less developed capital markets would be more affected by changes in the base rate, leading to stronger output reactions.

Interestingly, increases in risk premia (measured by 5 year CDS spreads of the sovereign) curb loan supply in an important way. The long-run elasticity suggests that a 100 b.p. increase in the risk spread is associated with a 3.2% reduction in bank credit supply, on average. Again, the reduction is found to be larger for smaller banks.

The estimations delivered qualitatively similar results when we re-estimated the model using a traditional (i.e. static) panel with fixed effects. Equally, adding information on the slope of the yield curve did not change the results in any significant way (as can be seen in Table A3 in the Appendix). Finally, we tested whether changing the number of instruments in the GMM estimation by considering some macroeconomic variables exogenous affected the results. We found that this did not produce any significant change in the estimates.

4 Global Factors and the Bank Lending Channel in EMEs

The results that we found highlight some important aspects of monetary policy transmission in EMEs. In particular, we have shown evidence of a salient bank lending channel by which monetary policy can affect the level of economic activity in EMEs. This channel might well become more relevant with financial deepening. A few further points deserve attention.

First, the effects of risk premia on the pace of expansion of bank lending underscore the importance of global factors on EMEs' credit cycles. More specifically, accommodative monetary policy in global money centres might have induced yield-oriented investors to increase their demand for both, longer term bonds and EME securities, leading to a compression of risk spreads and greater debt issuing activity by EMEs. [21] If the proceeds of such issuances are then deposited in the domestic banking sector, they may fund further credit expansion (Shin (2013)). [22] This mechanism acts beyond the expansion that is induced by base rate changes, via the traditional bank lending channel. At the same time, to the extent that compressed risk premia

[21] McCauley, McGuire and Sushko (2015) show that while before the financial crisis low US rates led to increases in dollar bank credit to non-US borrowers, after 2008 dollar credit to these borrowers has been extended mostly by global bond investors.

[22] Alternatively, Adrian and Shin (2009) as well as Adrian, Moench and Shin (2010) suggest that if loose monetary policy inflates the value of equity held by global financial intermediaries, leveraged intermediaries can increase their holdings of risky securities as their VaR constraint is relaxed. This mechanism would also lead to a positive relation between monetary policy rates and risk spreads.

have been associated with currency appreciations in EMEs, credit expansion could be fuelled by the currency risk taking channel. Put differently, with external credit being the marginal source of financing for the bank sector, US dollar push factors tend to have the potential to amplify the financial cycle.

Second, monetary policy transmission via changes in bank credit supply, as identified here, are usually thought to augment the transmission through the more traditional money channel, which is based on prices. This greater leverage tends to increase the potency of monetary policy particularly in countries where bank financing is more prevalent. Indeed, it has been noted that in the past some countries have imposed restrictions on capital market financing, as they seem to have understood that this type of financing undermined the effectiveness of monetary policy. [23] By the same logic, a widening of risk premia could have the effect of strenghtening the bank lending channel, as it would tend to limit the scope for international interest rate arbitrage.

More recently, however, some authors have emphasized that monetary policy also affects the perceived strength of bank balance sheets. As a consequence, it affects the price of market funding liquidity. Thus, looking forward, the bank lending channel is likely to continue to be important even if the funding of banks is fully market based. In particular, insofar as markets are likely to constitute the marginal source of funding, the transmission of

[23] For an account of this, see for instance Borio (1995).

monetary policy through prices affects the supply of credit for banks that need to meet regulatory capital requirements (see Disyatat (2011)). The relevance of this last mechanism increases with marking-to-market.

5 Concluding Remarks

Changes in the financial structure of a country and financial deepening have significant implications for the transmission of monetary policy in EMEs. In particular, the deepening of local credit markets might have increased the relative importance of the bank lending channel in many EMEs. Furthermore, changes in risk premia on emerging market debt produce effects that go beyond changes in the domestic monetary policy stance, affecting the supply of bank credit. The reason for this is that risk perceptions affect longer term yields and, more importantly, external borrowing tends to be the marginal source of financing for many institutions.

Our results would seem to suggest that also changes in global monetary conditions that are associated with increases in risk premia on EME debts - due for instance to a moderation in global search for yield activity – could affect aggregate demand by influencing consumption and fixed capital formation. Particularly in economies where bank financing is a salient factor in investment decisions and where smaller banks respond for a significant fraction of credit policy makers may want to take these mechanisms into account when assessing their monetary policy stance. Our results also point out that the relatively accommodative monetary policies that have been seen recently were probably contributing factors to the rapid expansion of credit in many EMEs. The importance of the bank lending channel in EMEs that we report also suggests that macro-prudential policies may be important complementary tools for aggregate demand management.

Finally, the results of this study seem to indicate that analyzing the effects of monetary policy on credit supply using detailed credit registry data could be a potentially fruitful avenue for future research in emerging market economies.

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Data Sources:

real investment index:

gross fixed capital formation deflated using the GDP deflator.

Seasonally adjusted. (IMF IFS)

real interest rate:

policy interest rate minus actual 12 month CPI inflation rate.

(Bloomberg/Datastream)

real bank credit index:

domestic bank credit to private non-financial sector deflated

by CPI inflation rate. (BIS and IMF IFS)

real GDP index:

gross domestic product index. Seasonally adjusted.

(IMF IFS)

REER:

real effective exchange rate index. (BIS)

Table A1

Summary statistics (yearly data)

	observations	mean	std dev	min	max
∆ policy rate	4642	-0.0043	0.0152	-0.0775	0.0533
∆ ln (GDP)	4642	0.0430	0.0286	-0.0692	0.1322
∆ ln (CPI)	4642	0.0509	0.0240	-0.0086	0.1333
CDS spread	4642	0.0148	0.0073	0.0007	0.0511
VIX	4642	0.1954	0.0661	0.1156	0.4000
Fed Funds rate	4642	0.0072	0.0141	0.0004	0.0517
ln (total assets)	4642	7.2785	2.5469	1.3005	14.9469
liquidity	4642	0.1705	0.1505	0.0000	0.9110
loan loss provision	4642	0.0448	0.0575	0.0000	0.4972
capitalization	4642	0.1456	0.1252	0.0018	0.9983

Data before winsorizing.

Liquidity was defined as total securities/total assets, loan loss provision as the ratio NPL/total loans, and capitalization as total equity/total assets.

Table A2

Determinants of Bank Credit Growth

(without winsorizing)

	D.V.: change in loans (in logs)		
	all	large banks	small banks
∆ ln (loans) - lagged	0.219***	0.224***	0.191***
	(0.031)	(0.031)	(0.038)
∆ ln (GDP)	0.413*	0.122	1.131**
	(0.219)	(0.216)	(0.548)
∆ policy rate	-1.609***	-0.884***	-2.432***
	(0.271)	(0.271)	(0.575)
∆ cds	-2.669***	-1.880***	-2.727**
	(0.604)	(0.622)	(1.186)
ln (assets)	-0.008	-0.034***	-0.005
	(0.006)	(0.007)	(0.019)
liquidity ratio	0.141**	0.215***	0.143*
	(0.071)	(0.057)	(0.085)
loan loss provision	-0.496***	-0.560***	-0.372**
	(0.120)	(0.103)	(0.180)
capital ratio	0.101	0.536**	0.231
	(0.204)	(0.219)	(0.188)
country fixed effects	yes	yes	yes
global control variables	yes	yes	yes
sigma	0.189	0.119	0.253
Hansen (p-value)	0.621	0.990	0.999
AB test for AR (2) (p-value)	0.818	0.946	0.592
observations	4642	2379	2263
no of banks	1468	537	1016

System GMM estimation using the Arellano-Bover dynamic panel estimator.
*, **, *** denote statistical significance at 10%, 5% and 1%, respectively.
Robust standard errors are reported in parenthesis.

Table A3

Determinants of Bank Credit Growth

(including yield curve variable)

	D.V.: change in loans (in logs)		
	all	large banks	small banks
Δ ln (loans) - lagged	0.222***	0.197***	0.184***
	(0.032)	(0.030)	(0.044)
Δ ln (GDP)	0.540**	0.263	1.239**
	(0.224)	(0.229)	(0.500)
Δ policy rate	-1.895***	-1.019***	-2.665***
	(0.301)	(0.263)	(0.714)
Δ slope	0.100	-1.112***	0.366
	(0.291)	(0.235)	(0.613)
Δ cds	-2.594***	-2.307***	-3.351***
	(0.572)	(0.574)	(1.193)
Δ VIX	-0.078*	-0.094***	-0.013
	(0.041)	(0.036)	(0.101)
Δ Fed Funds rate	0.277	0.372	0.644
	(0.236)	(0.241)	(0.516)
ln (assets)	-0.015***	-0.045***	0.001
	(0.006)	(0.008)	(0.018)
liquidity ratio	0.111*	0.206***	0.125
	(0.061)	(0.054)	(0.084)
loan loss provision	-0.568***	-0.750***	-0.340*
	(0.121)	(0.126)	(0.201)
capital ratio	-0.183	0.431**	0.023
	(0.176)	(0.203)	(0.183)
country fixed effects	yes	yes	yes
sigma	0.178	0.113	0.234
Hansen (p-value)	0.907	0.999	0.999
AB test for AR (2) (p-value)	0.736	0.974	0.546
observations	4607	2353	2254
no of banks	1466	536	1012

System GMM estimation using the Arellano-Bover dynamic panel estimator.
*, **, *** denote statistical significance at 10%, 5% and 1%, respectively.
Robust standard errors are reported in parenthesis. The yield curve slope is the difference between the 2 year yield and the policy rate.