

Transmission of a Global Financial Crisis Shock to an Emerging Economy

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Abstract

Using a unique dataset consisting of all corporate loans in Pakistan, we study the impact of the global financial crisis (GFC) on the lending ability of its banking sector. We also take into account various bank and loan types along with extensive margins, firm size effects and impact of information asymmetry. Our findings show that the Pakistani banking sector was indeed affected by the GFC as high exposure banks, who borrow relatively more internationally, reduce lending to local firms and this impact is larger for small firms. We also find differences in the lending ability of various bank types and loan types. By using direct information asymmetry measure, we find that banks reduced lending after the financial shock. However, the information gathered from the previous relationship of the borrower with relatively low exposure banks can overcome the negative financial shock and increase lending after the shock. These findings are very relevant in the context of the spillover effects of the GFC and have important policy implications for emerging markets.

Keywords: Financial Contagion, Financial Crisis, Banks, Information Asymmetry

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1. Introduction

Banks around the world are interconnected because they provide lending and other financial services, not only to domestic financial and non-financial firms, but also to customers abroad. On one hand, this interconnection provides liquidity support and reduces the idiosyncratic risk of individual banks via diversification, while on the other hand it also leaves banks vulnerable to systemic shock in the form of a speculative attack, financial panic, or herd behavior (Kleimeier et al., 2008). An important question is whether, and to what extent, this systemic shock is transmitted to the real economy.¹ In this regard, the impact of the last global financial crisis (GFC) of 2007-09 on real businesses has also attracted considerable attention (see Ivashina and Scharfstein, 2010; Giannetti and Laeven, 2012; Schnabl, 2012; de Haas and van Horen, 2013; Berg and Kirschenmann, 2015). However, the impact of the GFC on emerging markets has been the subject of relatively few studies, probably due to the limited availability of data.²

As we had access to the relevant data, we study the impact of the GFC on an emerging market. In doing so, we analyze the changes in credit availability to firms in Pakistan as a result of the exogenous economic shock, measured as borrowing outside Pakistan by Pakistani banks.³ Since the banks and financial intermediaries in developed countries were directly and most severely affected during the GFC, we examine whether transmission of capital flows from international banks to local banks in an emerging economy was also affected by the liquidity constraints faced by the international banks (Khwaja and Mian, 2008; Cetorelli and Goldberg, 2012). Pakistan had close trading relationship with the countries from where the GFC originated. Based on 2006 data, United States was the biggest trading partner of Pakistan. Moreover, six European countries were also among the top ten trading partners of Pakistan.⁴ We reckon that the countries with significant trading relationship with Pakistan were also closely linked to the Pakistani banking sector. Therefore, the main objective of this paper is to study whether the financial shock that originated in those countries impacted the Pakistani economy during the GFC through the credit channel. To that end, we use a unique dataset

¹ There is extensive literature which studies the impact of financial shocks on the real economy (see Bernanke, 1983 and Bernanke and Blinder, 1988, 1992 for early examples). See also BIS (2011) for a survey of the linkages between the financial and real sectors.

² Among the few papers that have addressed this issue in emerging markets, Paravisini et al. (2015) study credit shock to exporting firms in Peru, and Berg & Kirschenmann (2015) study the impact of GFC on the agriculture sector in Azerbaijan.

³ We also use advances outside Pakistan as a percentage of total bank advances as a proxy for calculating international exposure to establish if the shock was a general financial one.

⁴ Appendix Table 1 shows the trading links with top twelve countries in the world.

obtained from the Credit Information Bureau (CIB) of the State Bank of Pakistan, comprising all business loans made to firms by commercial banks in Pakistan, to estimate the transmission of the economic shock via spillover from banks to real firms.

In order to establish the adverse effects of international shocks through the banking system, the Pakistani banking sector provides an ideal setting to study the transmission of international financial shocks, as local banks differ greatly in their international exposure. The international exposure of these banks ranges from zero to 22.3%. We measure this international exposure by the borrowing of Pakistani banks outside Pakistan from other financial institutions, and hypothesize that the higher the borrowing outside Pakistan, the higher the financial shock to banks, and hence those banks transmit the shock to the real economy in Pakistan. Our primary variables of interest are high, intermediate and low exposure banks, classified as follows. Banks which have over 8% of their total borrowing outside Pakistan are considered as high exposure ones, while those with between 4% to 8% borrowing outside Pakistan are classified as intermediate exposure banks, and those with less than 4% borrowing outside Pakistan as low exposure banks.⁵ The higher the exposure of the banks, the more they are expected to transmit the financial shock to the local market.⁶ This classification is similar to that of Schnabl (2012), who classifies banks into these categories and then measures the impact of lending changes by each type of bank on firms in Peru. The uniqueness of our dataset lies in the fact that it covers the period of the GFC perfectly, i.e., from April 2006 to March 2011. It contains all the business loans that were outstanding at the month-end with each bank, which allows us to address the identification challenge arising from the economic events that triggered the financial shocks. These shocks may also affect credit demand.

Our findings show that the banking sector in Pakistan was indeed affected by the GFC, as the lending ability of various banks was negatively affected (i.e., the intensive margin), similar to the findings of Forbes (2001), Forbes and Chinn (2004), Khwaja and Mian (2008), Schnabl (2012) and Cetorelli and Goldberg (2012). Our empirical results also indicate that there was transmission of financial shock from international markets to Pakistan. This finding is

⁵ We have also examined the sensitivity of our results to different exposure thresholds by changing thresholds to over 6% (high exposure banks), 3-6% (intermediate exposure banks) and below 3% (low exposure banks) and to over 9% (high exposure banks), 5-9% (intermediate exposure banks) and below 5% (low exposure banks). Our results are robust to changes in these thresholds and are available upon request from authors.

⁶ As discussed above, we also use advances outside Pakistan as a percentage of total bank advances as a proxy for calculating international exposure. The higher the exposure outside Pakistan, the greater the chances of transmission of shock from outside to domestic Pakistani banks. This definition of transmission is similar to international financial contagion. Most of the results are robust to this definition of high, intermediate and low exposure.

interesting because Ali (2009) notes that Pakistan has been relatively well-insulated against contagion coming from international financial markets.⁷ Our results, however, confirm that lending by Pakistani banks to local firms was reduced. This reduction in lending was reported by the high exposure banks, while there was increase in lending by the low/relatively low⁸ exposure banks. We also find that “foreign” banks⁹ transmit the global financial crisis shock and reduce their lending. The findings on the exit from the market of old firms and the extension of credit to new firms (i.e., the extensive margin) indicate that the firms which borrow from relatively low exposure banks are less likely to exit and are more likely to have survived after the crisis. However, lending to small firms was reduced, irrespective of whether they borrowed from relatively low or high exposure banks. The findings regarding different types of banks reveal that private and big banks reduce their lending; however, contrary to Farooq and Zaheer (2015), we do not find any statistically significant evidence that the granting of Islamic loans increased after the financial shock. We find that high exposure banks reduced their agricultural loans after the financial shock in contrast with Berg and Kirschenmann (2015). However, relatively low exposure banks increased their lending in that regard. This is intuitive, because the relatively low exposure banks are mostly domestic, small banks, which mainly focus on agriculture financing. Our findings on information asymmetry show that bank reputation as a proxy for information asymmetry, as well as the previous interaction of the borrower with the bank, were not able to overcome the information asymmetry problems and banks still reduced lending after a financial shock. However, highly reputed banks with relatively low exposure were able to overcome the information asymmetry problems and increased their lending after the GFC.

Our paper adds to the existing literature in the following ways. First, it complements the rare literature on the transmission of the global financial crisis from developed countries to banks and firms in an emerging economy. Second, we provide a detailed analysis of different bank types (e.g., private and privatized banks¹⁰) and different types of loans (e.g., Islamic, export

⁷ Dungey and Gajurel (2015), however, in a multi-country study, show that Pakistani banking sector experienced systemic and idiosyncratic contagion during the global financial crisis.

⁸ From Table 4 onward, we combine the intermediate exposure and low exposure bank proxies, and use the term ‘relatively low’ exposure banks. Therefore, banks with 8% or less international exposures are classified as relatively low exposure banks.

⁹ “Foreign” banks are those banks, a treatment group, who have international borrowing compared to the banks which do not have any international borrowing at all, a control group.

¹⁰ Four large government owned banks in Pakistan were privatized in the massive wave of banking sector privatization during the 1990s. Because of this, they are classified as ‘privatized’ in our database, and we continue using this term throughout this paper. This ‘privatized’ proxy should also be considered as a proxy for large banks, because they have about 41% of the market share.

and agriculture loans) provided by local banks. By doing this, we are better able to analyze the impact of the global financial crisis on the real economy in Pakistan. Third, our analysis also sheds light on information asymmetry and its impact on lending changes after the recent financial crisis using loan level data. Lastly, our dataset perfectly covers the relevant data period, i.e., from April 2006 to March 2011, giving us the possibility to conduct the analysis for both pre-crisis and post-crisis periods.¹¹

The remainder of the paper is structured as follows. Section 2 provides the study background, while Section 3 describes the data. The methodology adopted in the paper is described in section 4. Section 5 presents the results and the conclusion is provided in section 6.

2. Theoretical background and related literature

Our paper is related to two strands of literature. The first is the literature on the transmission of financial shocks, which operates through various channels. Next to the asset price channel¹² of transmission, the credit channel operates through information asymmetry in financial markets.¹³ This channel proposes two types of transmission: the bank lending channel and firms' borrowing channel. According to the bank lending channel, banks play an important role in solving the asymmetric information problem; certain borrowers will not be able to have access to credit in the presence of a financial shock to banks. Existing work on the bank lending channel includes Kashyap et al. (1994), Peek and Rosengren (1997), Kashyap and Stein (2000), Ashcraft (2001), Khwaja and Mian (2008) and Cetorrelli and Goldberg (2012). The firm borrowing channel implies that when a financial shock reduces the net worth of firms, it raises the adverse selection problem, leading to a decreased lending to firms. A decline in net worth also increases the moral hazard problem because firms have lower equity at stake and are more likely to engage in risky investment projects. Lenders can observe this and reduce lending to firms (Oliner and Rudebusch, 1996; Bernanke et al., 1996). Other papers have analyzed the transmission channels of international financial shocks through the banking system. Allen (2012) showed that bank liquidity shocks are transmitted from the parent to the subsidiary,

¹¹ Earlier papers using the same data included the period 1996-2001/2 (Khwaja and Mian, 2005, 2008; Mian, 2006; Zia, 2008) and April 2006 to December 2008 (Baele et al., 2014).

¹² See Taylor (1995) and Bernanke and Gertler (1995) for the interest rate channel, Bryant et al. (1993) and Macdonald and Taylor (1993) for the exchange rate channel, and Modigliani (1975) for the wealth effects of transmission.

¹³ See Bernanke (1993), Bernanke and Gertler (1995), Cecchetti (1995) and Hubbard (1995) for the credit channel.

thereby negatively affecting lending by the subsidiaries. Similarly, Kane et al. (2015) studied the channels which affect credit provision during a financial crisis. Their results indicate that cross-border lending was affected, mainly due to liquidity difficulties faced by international banks and increased uncertainty.

The second strand of literature which our paper relates to is international financial contagion. The literature on this strand can be divided into studies focusing on financial sector linkages for the propagation of economic shock (Forbes and Rigobon, 2002; Corsetti et al., 2005; Bekaert et al., 2005; Derviz and Podpiera, 2007; Jokashthira et al., 2013), and others which focus on trade linkages (Eichengreen et al., 1996; Forbes, 2001, 2004; Claessens and Forbes, 2001; Forbes and Chinn, 2004; Blanchard et al., 2010). Forbes (2001) describes three channels through which an economic shock can be transmitted to other countries: a competitiveness effect, which has a negative effect on exports because of the adverse impact on relative competitiveness; an income effect, which also has a negative effect because of the adverse impact on income in the importing country and hence a reduction in demand for imports; and a cheap import effect, which has a positive effect because of the positive impact on relative competitiveness, and hence an increase in demand for imports. This paper complements the research on the international transmission of financial shocks and international financial contagion.

Overall, our study relates closely to work by Khwaja and Mian (2008), Schnabl (2012) and Cetorelli and Goldberg (2010). Khwaja and Mian (2008) and Schnabl (2012) study the transmission of liquidity shock to real firms by using firm fixed effects to identify the bank lending channel. These studies, however, differ from ours, as that of Khwaja and Mian (2008) analyzes the transmission of domestic liquidity, whereas Schnabl (2012) studies the transmission of liquidity shock across countries. We discuss the spillover of financial shock from the developed world to an emerging economy during the global financial crisis, and subsequently the transmission of that financial shock to real firms by local banks. Our paper is also different from that of Cetorelli and Goldberg (2010) in the sense that they analyze the financial contagion from banking systems in developed countries to emerging markets, using data on capital flows within global banks, while we study the transmission of financial shock from developed banking systems to an emerging market using loan level data.

3. Data

We use a unique dataset for our empirical analysis which primarily consists of loans provided by Pakistani banks to local firms. The data were obtained from the Consumer Protection Department of the State Bank of Pakistan, which maintains the domestic credit registry known as the Credit Information Bureau (CIB). CIB is an online facility that allows financial institutions to upload and retrieve information through a virtual private network. Since 2006, the State Bank of Pakistan has upgraded the CIB's technical and reporting structure. The new facility has the capacity to incorporate a large number of validation rules to ensure the integrity and accuracy of the submitted data. Banks in Pakistan verify the credit history of a loan applicant with CIB if the application exceeds PKR 500,000. The CIB dataset has already been studied in different contexts by Khwaja and Mian (2005, 2008), Mian (2006), Zia (2008) and Baele et al. (2014).¹⁴ Our data cover the period from April 2006 to March 2011, spanning the period before and after the financial crisis of 2007-2009.

The CIB reports the identity code for each loan contract. Based on this, we can identify the industry and total exposure of the borrower. In addition, the database provides information on key loan characteristics, such as maturity, collateral, product name, type of loan, the approved limit and the remaining outstanding amount. Because the database does not provide banks' financial information, data on bank characteristics such as total capital ratio, total assets, liquid assets and the number of branches of each bank were obtained from Bankscope.

As we are studying the impact of the financial crisis on the changes in lending ability of the Pakistani banking sector, we divided our data into three samples: pre-crisis, crisis and post-crisis. The pre-crisis period includes data from April 2006 to June 2007; the crisis period ranges from July 2007 to March 2009; and post-crisis is from April 2009 to March 2011. We follow Dungey and Gajurel (2015) in defining the crisis period. They use July 2007 to March 2009 as a crisis period and find that Pakistani banking sector experienced systematic contagion as well as idiosyncratic contagion during the global financial crisis.¹⁵

Because we are interested in the changes in lending before and after the crisis, we start with 100,938 loan observations from 23,188 borrowers.¹⁶ We discard all loans given by any other

¹⁴ Because of the technical and reporting structure upgrade, the quality of the data has further improved since 2006.

¹⁵ We also use NBER US recessions to define the crisis period from January 2008 to July 2009. The recession period in the US was from December 2007 to June 2009 (<http://www.nber.org/cycles.html>). Except for Export and Islamic loans, our results are not sensitive to a slightly different definition of the crisis period (January 2008 to July 2009).

¹⁶ Our original dataset included almost 6 million loan-month observations during the 59-month sample period (April 2006 to March 2011)

financial institution except twenty one commercial banks, which gives us 71,621 observations. We also discard loans given as a non-funded facility, which then leaves us with 59,183 observations. Some of our analysis contains all these observations. However, because of the firm fixed effects approach, we filter out the borrowers who borrowed only from one bank and include only those firms which borrowed from more than one bank prior to the crisis. In the next step, we consolidate the borrowing portfolios of all borrowers corresponding to the respective lenders, controlling for the various financial products under consideration.¹⁷ This gives us 33,245 observations; most of our analysis is made on this number of observations, from 11,524 borrowers.

The filtered dataset includes a total of twenty one banking institutions in Pakistan. These include eight private, four privatized, two provincial and two nationalized banks, two foreign and three Islamic banks operating in Pakistan. Our dependent variable is the change in loan i of firm j from bank b (ΔL_{ijb}). We transform all the loan values to logarithmic form and obtain the difference between the logarithmic values of lending by banks prior to and after the shock, such that a positive value indicates that there has been an increase in lending post financial crisis, and a negative value indicates that lending has decreased following the GFC. Our primary variables of interest are high, intermediate and low exposure banks. As explained above, we classify these as follows: banks which have over 8% of their borrowing from outside Pakistan are considered as high exposure and those with between 4% to 8% and less than 4% borrowing from outside Pakistan are classified as intermediate exposure and low exposure banks, respectively. The higher the exposure of banks, the more they are expected to transmit financial shock to the local market. This classification is similar to that of Schnabl (2012), who classifies banks into these categories and then measures the impact of lending changes by each type of bank to firms in Peru. In Table 1, we provide the list of banks in our dataset along with their average market share measured as average total assets as a percent of average total assets of all the banks for the period from 2006 to 2011 in our dataset. We also provide average borrowing outside Pakistan as a percent of total borrowing for the period from 2006 to 2011. We observe international exposure of banks from zero to 22.3% and there is enough variation in the sample to exploit the transmission of global

¹⁷ For example, if firm A borrows from bank B in two ways through products Y and Z, we then consolidate the borrowing from bank B with respect to both the products, so there will be two observations from bank B: one w.r.t product Y and the other w.r.t Z. In this way we are able to ascertain the changes in lending of the various product types in our analysis.

financial crisis shock.

(Insert Table 1 about here)

In addition to our core proxies, we use a number of control variables, which have been shown to influence the change in bank lending to real firms. We focus on bank and borrower/loan characteristics and follow the literature (see, for example, Khwaja and Mian, 2008; Schnabl, 2012; Baele et al., 2014; Zaheer and Farooq, 2015) when selecting and measuring these controls. Kapan and Minoiu (2013) show that better capitalized and more liquid banks were better able to continue credit supply during the 2007–2008 crisis. Building on this finding, we use the bank capital ratio as a proxy for solvency, and the liquid assets to total assets ratio as a proxy for bank liquidity. In addition, we add the natural log of the number of branches as a control variable, as the branch network is one of the factors leading to bank runs during a crisis (He and Manela, 2012). Furthermore, the size of bank may also affect changes in lending, because larger banks are typically considered to be more stable. We use total bank assets as a proxy for the size of the bank. For borrower/loan characteristics, we use size of loan as the proxy for the size of the borrower. In addition to loan size, we also consider other loan characteristics including loan maturity, whether the loan is secured, and whether it is a performing loan. Loan maturity can have a negative impact on the change in lending if banks do not want to commit a large amount of funds over a long term. Similarly, security for the loan, and whether the loan is performing, are also important because they may have an effect on the lending ability of banks. Finally, we also use loan type dummies, bank controls and firm fixed effects for some regressions as robustness checks. Details of the variables used in the paper and their definitions are given in Appendix Table 2.

4. Methodology

This section outlines the econometric setting that we use to estimate the transmission of bank financial shocks to real firms. This estimation poses a key empirical identification problem arising from changes in credit supply by Pakistani banks, and credit demand by Pakistani firms. For example, a reduction in lending by a bank to a firm may reflect a credit supply shortage in the bank, lower credit demand from the firm, or a combination of both. More specifically, if an export-oriented local firm (e.g., Nishat Mills) borrows more from a foreign bank (e.g., Citibank), and its export opportunities decrease following the global financial crisis, then Nishat Mills might reduce borrowing from Citibank, and Citibank's lending may

decrease relative to a local bank (e.g., United Bank Limited). To address this potential identification problem, we follow Khwaja and Mian (2008) and Schnabl (2012) and use firm fixed effects and consider the fact that the same firm borrows from more than one bank. Our analysis controls for the changes in credit demand at the firm level by checking for loan relationships within firms, rather than across firms. Thus if a firm is borrowing from both bank A and bank B, we check for the changes in borrowing from bank A relative to bank B by the same firm. Using this approach we are able to identify the changes in credit demand by firms due to the changes in credit supply from banks.

We implement the following strategy for identification using the Ordinary Least Squares (OLS) method. We start with baseline model of Schnabl (2012), which is as follows:

$$\Delta L_{ijb} = \beta_j + \beta_1 E_b + \varepsilon_{ijb} \dots\dots\dots(1)$$

The dependent variable in equation (1), ΔL_{ijb} is the change in loan i of firm j from bank b which shows the changes in borrowing by a firm from a bank prior to and after the financial shock. The right hand side of the above equation includes β_1 which are firm fixed effects that absorb all firm specific credit demand shocks, while E_b denotes exposure of the bank to a financial shock. We identify bank exposure in three categories: high, intermediate and low. In order to include the control variables and other variables of interest we extend the baseline model (1) and estimate the following model (2):

$$\Delta L_{ijb} = \beta_1 + \beta_2 E_b + \beta_3 X_{bt} + \beta_4 Y_{ijt} + \beta_5 Z_t + \varepsilon_{ijb} \dots\dots\dots(2)$$

β_2 in model (2) is the coefficient of interest and checks the transmission of a financial shock after controlling for credit-demand shocks at the firm level. The key assumption in the analysis is that all firms reduce their lending in equal proportions from all banks after the credit crunch. This assumption is plausible for both high and intermediate exposure banks due to their similar characteristics, but not for low exposure banks. Therefore, we control for bank characteristics (X_{bt}) in our analysis. The sample is restricted to firms that borrow from more than one bank prior to the shock. As the specification includes firm fixed effects, the coefficient of interest is calculated only for firms that borrow from more than one bank. In addition to the bank characteristics, we also control for borrower/loan characteristics (Y_{it})

and macroeconomic variables (Z_t) to capture any borrower/loan and macroeconomic factors that might have an impact on changes in loan i of firm j from bank b (ΔL_{ijb}).

5. Empirical Results

4.1 Descriptive statistics

Table 2 provides descriptive statistics for 33,245 loans to 11,524 borrowers from 21 banks; these are also reported by exposure type. The high and intermediate exposure banks are similar in number, but the intermediate ones are larger in size, which can be seen by the average of total assets for both categories, which are PKR 42,412 million¹⁸ and PKR 47,868 million respectively. Low exposure banks are quite small in size compared to the high and intermediate exposure ones. Liquid assets are approximately 14.1%, 19.8% and 13.2% of total assets for the high, intermediate and low exposure banks, respectively, making intermediate exposure banks the most liquid of all the categories. However, the high exposure banks are the best capitalized, and the mean capital ratios for the high, intermediate and low exposure banks are 15.4%, 13.8% and 11.6%, respectively. It is interesting to see if high exposure banks transmit shocks to firms despite being the best capitalized. The presence of intermediate exposure banks is greater, with a median of 1,078 branches, compared to high exposure banks with a median of 994 branches, and low exposure banks with 122. This shows that most of the big banks with large branch networks fall into the category of intermediate exposure. The highest percentage in the high exposure category is that of privatized banks with 73.9%, followed by foreign banks with 14.4%. In the intermediate exposure category, the largest percentage is that of nationalized banks, at 43.5%, followed by private banks at 28.6%. However, the low exposure banks are mostly private banks, with 61.6% of the total banks, followed by privatized banks with 18.5%. We observe that the characteristics of the high, intermediate and low exposure banks are quite similar with regard to the highest number of loans being term loans, followed by export loans.

(Insert Table 2 about here)

4.2 Bank lending channel

¹⁸ 1 USD ~ 124 PKR, 1 EUR ~ 146 PKR and 1 GBP ~ 163 PKR on 31st July 2018.

The findings related to the transmission of financial shocks to real firms are reported in Table 3. Column 1 shows our baseline results. The results provide support for our theoretical argument, which is consistent with Schnabl (2012) that intermediate and low exposure banks increased their lending because of the international financial shock post-GFC. The low exposure banks increased their lending more than the intermediate exposure ones. This is consistent with our hypothesis that the less that banks are exposed internationally, the lower the shock they transmit to the real economy. However, when we include bank, borrower, loan and macroeconomic controls in our model (equation 2), as shown in columns 2, 3 and 4 of Table 3, the intermediate exposure banks increase their lending to firms more than the low exposure ones.¹⁹ This is perhaps due to the fact that intermediate exposure banks are the most liquid of all the categories and are able to withstand international financial shocks. The magnitude and statistical significance of the coefficients of the other control variables are mostly in line with the literature. We find positive coefficients for capital ratio, meaning that the better capitalized banks increased their lending after the crisis, confirming the findings of Kapan and Miniou (2013) that better capitalized banks can better withstand shock. However, we find negative coefficients for the liquid assets to total asset ratio, showing that the more liquid banks reduce their lending after the financial shock. We find that the big banks provide more lending to big borrowers after the shock, as shown by the positive significant coefficients of the natural logarithm of total assets, as well as the natural logarithm of loan size. The banks with large branch networks reduced their lending after the financial shock.

In column 3, we run the same regression as in column 2 but with macroeconomic variables. We add macroeconomic variables like GDP growth and natural logarithm of manufacturing production^{20,21} to control for the effect of economic contraction/recession.²² We find negative relationship with both the economic variables indicating that economic contraction/recession indeed leads to reduction in lending after the financial shock. Overall we find the same results

¹⁹ This is contrary to Schnabl (2012). However, when we use advances outside Pakistan to determine the international exposure of banks, we find similar results.

²⁰ We restrict ourselves to using only GDP growth and natural logarithm of manufacturing production because of high correlation with other macroeconomic variables.

²¹ We also use other macroeconomic variables like CPI, natural logarithm of manufacturing production and unemployment rate that show mild correlation. The results, not reported here, remain robust with the inclusion of these macroeconomic variables. Furthermore, despite high correlation we use all the macroeconomic variables like GDP growth, CPI, natural logarithm of manufacturing production, unemployment rate, natural logarithm of trade deficit, interest rate and natural logarithm of broad money. Our results, not reported here, remain consistent even with the inclusion of all these macroeconomic variables.

²² We thank the anonymous reviewer for highlighting this very important point.

as in Column 2 but the coefficients of the intermediate and low exposure banks are smaller in magnitude. Moreover, all the control variables keep the same sign, except the coefficient of natural logarithm of maturity and secured loans. In column 4, we show the bank lending channel using complete model with all the controls and firm fixed effects. The coefficients of both the intermediate and low exposure banks slightly increase in magnitude compared to the results in column 3. However, all the control variables remain the same economically and statistically. This indicates that the changes in lending can only be explained by the financial shock.

(Insert Table 3 about here)

In order to find the lending effect of “pure” domestic banks which do not have international borrowing, we classify banks in a control group and in a treatment group.²³ Control group includes purely “domestic” banks²⁴ which do not borrow internationally at all and treatment group includes “foreign” banks that do have international borrowing. We keep the structure of the regression models same as in Table 3. The results reported in Table 4 show that treatment group, “foreign” banks being international borrower, transmit the financial crisis shock and reduce lending after the crisis.

(Insert Table 4 about here)

4.3 Extensive margin results

Following Khwaja and Mian (2008) and Jimenez et al. (2012, 2014), we also study whether the financial shock had an impact on the extensive margin of banks, by forcing firms to exit the market or reducing the entry of new firms. The results are reported in Table 5. We define ‘*Exit*’ to be equal to 1 if the loan is not renewed at some point during the GFC period. We use all the bank and borrower/loan characteristics and loan type controls in all our regressions. As previously, we start our analysis with firm fixed effects to control for changes in demand at the firm level. The results are shown in column 1 of Table 5. We find that a one standard deviation increase in borrowing from intermediate and low exposure banks reduces exits by 1.06 percentage points. In addition, we run a non-linear probit model, whose results are reported in column 2. Economically, the results are stronger than FE model. Overall, we conclude that

²³ We thank the anonymous reviewer for highlighting this very important point.

²⁴ We also make two different control groups. In one group, we classify banks as “domestic” if their international borrowing is less than 0.5% and in the other group; we classify banks as “domestic” if their international borrowing is less than 1%. Our results remain consistent with these two additional classifications.

firms borrowing from intermediate exposure banks are less likely to exit the market after the financial shock, and that this likelihood is even lower if they borrow from low exposure banks.

In columns 3 and 4 of Table 5, we show banks' ability to make new loans. We use 'Entry' as a dependent variable to study this, defined as 1 if a new loan is made after the financial shock (during the period from April 2009 to March 2011). Again, we use all the bank and borrower/loan characteristics and loan type controls in all of our regressions. Similarly, we also run FE and non-linear probit models to study this. In column 3, we show the results of our preferred FE model and find that a one standard deviation increase in borrowing from intermediate exposure banks increases the entry of firms by 1.01 percentage points (the results are not statistically different from zero) and by 1.02 points in the case of low exposure banks. Similar to what was observed in the results for 'Exit', the results are stronger for the non-linear probit model. Overall, we find that firms borrowing from low exposure banks are more likely to obtain new loans after a financial shock, and that this likelihood is higher if they borrow from intermediate exposure banks.

(Insert Table 5 about here)

We further extend our analysis of the extensive margin to observe if the impact of financial shock on the 'Exit' and 'Entry' of small firms is the same. For this, we combine the proxies of the intermediate and low exposure banks, terming them '*Relatively low*' exposure banks. The results are reported in Table 6. In column 1 of Table 6, we run regression with only the '*Relatively low*' proxy, and find that the effect is same as that shown by the intermediate and low exposure proxies separately. Since most of the small firms have only one bank relationship, we run OLS regression and report the results in column 4; for comparison, we run FE regression in column 2. We obtain very similar results in both models, showing that small firms are more likely to exit the market after a financial shock. However, the interaction between 'small firms' and 'relatively low' exposure firms still gives a negative sign, but only statistically significant in FE regression, indicating that small firms borrowing from relatively low exposure banks are less likely to exit the market. To be consistent with Table 5, we also run a non-linear probit model and find very similar results. With regard to entry into the loan market, small firms are less likely to obtain a new loan after the financial shock. However, our results are not statistically different from zero if they borrow from relatively low exposure banks. The results are economically the same if we run a non-linear probit model. Overall, our results are consistent with previous research that small firms are adversely affected during a financial

shock (Petersen and Rajan, 1994; Berger and Udell, 1995, 2002). However, our results are different from Khwaja and Mian (2008) in this particular context of the extensive margin for small firms. They find no difference between smaller and larger firms, whereas we find that smaller firms are adversely affected during the financial shock. One possible explanation in our setting is that the quantum of the shock originating from GFC is much higher than the domestic liquidity shock after the nuclear tests of May 1998 by Pakistan, as studied by Khwaja and Mian (2008).

(Insert Table 6 about here)

4.4 Bank lending channel for small firms

In Table 3, we found interesting results for the intensive margin of small firms. We therefore extend the analysis of Table 3 to small firms, and show the corresponding results of the bank lending channel in Table 7. Our dependent variable is the same as in Table 3, i.e., the log change in bank lending during the crisis. In column 1 of Table 7, we start with our full FE model, as in column 3 of Table 3, meaning that we include all the bank and borrower/loan characteristics, together with loan type dummies, bank control and macroeconomic variables, but we use our new combined proxy of ‘*Relatively low*’ exposure banks. We find a positive coefficient (Table 7, column 1) showing that relatively low exposure banks increased their lending after the financial crisis. However, we can see from the statistically significant negative sign in column 2 that lending to small firms was reduced during the financial crisis. We also do not find any significant effect if smaller firms borrowed from relatively low exposure banks. As explained above, since most of the small firms have only one relationship, we run OLS regression in column 4 to study the bank lending channel for small firms. The results are stronger, confirming our argument that smaller firms mostly borrow from only one bank. This also shows that the variation in lending by relatively low exposure banks across firms is higher than the variation in lending within firms. These results are consistent with those of Khwaja and Mian (2008) and Schnabl (2012), showing that lending to small firms is affected more by the major banks after an exogenous shock in the domestic market.

(Insert Table 7 about here)

4.5 Bank lending channel for different bank types

We now turn our attention to checking the impact of exogenous shock on the different bank types in Pakistan, and report the results in Table 8. Private and privatized banks make the

highest percentage of loans in Pakistan. We call privatized banks as “*Big banks*” in Table 8.²⁵ We therefore check whether there are any differences if these are relatively low or high exposure banks. We classify small local banks as private banks, contrary to the list issued by the State Bank of Pakistan.²⁶ We exclude the top four big banks from this list and show their bank lending channels separately. The results for private banks are reported in columns 1 and 2 of Table 8. We can see from the ‘*Private bank*’ dummy that this type of bank increases lending after the financial shock. However, if these private banks are relatively low exposure banks, they reduce their lending after the financial shock. The results remain the same without firm fixed effects when we run OLS regression in column 3. Next, we devise a ‘*Big bank*’ dummy equal to 1 if the bank is one of the four big banks. As expected, big (privatized) banks reduced their lending to real firms after the financial shock, whereas these banks increased their lending if they are relatively low exposure banks. The results are quite intuitive, and show that big highly exposed banks transmit financial shock to real firms.

(Insert Table 8 about here)

4.6 Bank lending channel for different loan types

Following Schnabl (2012), Farooq and Zaheer (2015) and Berg and Kirschenmann (2015), we study the bank lending channel via export loans, Islamic loans²⁷ and agricultural loans. The results are reported in Table 9. Columns 1 and 2 of Table 9 do not find any change in lending by both relatively low and high exposure banks. These results are similar to those of Schnabl (2012) because he also does not find any change in lending by either intermediate or low exposure banks for exporters. However, he finds that intermediate exposure banks increase lending to non-exporters after the liquidity shock.²⁸

Next, in columns 3 and 4 of Table 9, we show the change in lending by Islamic Banks. In Pakistan, conventional and Islamic banking co-exist. Islamic Banking refers to a system of banking or banking practices that are consistent, both in objectives and operations, with the Shari’ah. As highlighted by Baele et al. (2014), the key distinguishing features of Islamic

²⁵ As noted before, top four big privatized banks have about 41% of the market share.

²⁶ http://sbp.org.pk/f_links/index.asp

²⁷ Note there are Islamic branches of conventional banks in Pakistan, so there are loans extended by these branches.

²⁸ When we split the sample into intermediate exposure and low exposure banks, as done by Schnabl (2012), we find very similar results - that our findings for exporters are not statistically significant for either intermediate or low exposure banks and for non-exporters; both intermediate and low exposure banks increase their lending. We do not report these results due to limited space.

Banking, the prohibition of interest (*riba*), excessive leverage, and its focus on risk sharing, may make Islamic banks quite different from conventional banks.²⁹ Some papers look at the comparative performance of Islamic and conventional banks during the GFC (for example, Hasan and Dridi, 2010; Beck et al., 2013; Farooq and Zaheer, 2015). They conclude that Islamic banks performed better in terms of profitability, intermediation ratio, asset quality and resilience to financial shocks. Our analysis is closely related to that of Farooq and Zaheer (2015), who use bank level data and show that Islamic banks granted more loans during financial crisis. We use loan level data to look at the same impact; however, in our case the financial panic is not home grown, but comes from abroad. Furthermore, we look at how different exposure banks make Islamic loans. Contrary to Farooq and Zaheer (2015), we do not find that banks granted more Islamic loans during periods of GFC as can be seen from the ‘*Islamic loan*’ dummy, as well as the interaction between ‘*Islamic loan*’ and ‘*relatively low*’ in columns 3 and 4 of Table 9. In unreported results we find that the results are sensitive to the inclusion of macroeconomic variables. With the exclusion of macroeconomic variables, we find that banks grant more Islamic loans during the financial shock but relatively low exposure banks reduce advancing Islamic loans. This finding shows that the granting of Islamic loans is dependent on the economic contraction/recession. A severe shock has stronger impact on the behaviour of Islamic banks while granting Islamic loans. Overall, we see that the impact of a financial shock on Islamic loans is similar to conventional loans. This finding is similar to those of Bader et al. (2008) and Chong and Liu (2009).

Finally, in columns 5 and 6 of Table 9, we conduct analysis of agricultural loans. As highlighted by Berg and Kirschenmann (2015) in the context of Azerbaijan, agriculture is a very local sector for an agriculture-based economy. Lending to such a sector is thus expected to be immuned to any global financial shock. Similar to Azerbaijan, Pakistan is also an agriculture-based economy and our dataset allows us to segregate loans given for agricultural purposes. We devise an ‘*Agri*’ dummy equal to 1 if the loan is given for such purposes. Contrary to economic theory, we find that even loans to the agriculture sector decreased following the financial shock, as can be seen from the negative and statistically significant coefficient ‘*Agri*’ in column 5 of Table 9. However, the relatively low exposure banks increased their granting of agricultural loans.

²⁹ Consistent with the Credit Information Bureau (CIB) of the State Bank of Pakistan, we use the term *Islamic banking* for banks operating as Islamic banks as per the definition given above; all other banks being conventional banks.

(Insert Table 9 about here)

4.7 Bank lending channel and information asymmetry

One of the contributions of this paper is the results shown in Table 10, which represent the impact of information asymmetry on the changes in lending to firms during the GFC. We devise direct proxies of information asymmetry following Sufi (2007), Bharath et al. (2011) and Chaudhry and Kleimeier (2015) and observe the bank lending channel via information asymmetry between the borrower and lender. Our first proxy is the natural log of 1+ number of previous loans ' $\ln(1+\text{no of previous loans})$ '. This proxy relates to the borrower's reputation in the credit market and whether this reputation has any impact on changes in lending after the financial shock. The results are reported in column 1 of Table 10. We do not find any impact of borrower reputation on the lending decision of banks, as can be seen from the statistically insignificant coefficient of ' $\ln(1+\text{no of previous loans})$ '. Since we do not find any significance, we do not make any further analysis of borrower reputation.

Next, using the market share of deposits as a proxy for bank reputation, we assume that the banks with a higher reputation would perhaps not reduce their lending following the financial shock, due to a fear of loss of reputation and hence their share of deposits. Contrary to our hypothesis, we find that highly reputed banks reduce their lending after a financial shock and are not able to withstand the financial shock by themselves. However, we do not find any significant impact if these reputed banks have relatively low exposure. The results are given in columns 2 and 3 of Table 10.

Following Sufi (2007), we distinguish the presence of information asymmetry by using a relationship dummy. We code '*relationship*' equal to 1 if the borrower has previously obtained a loan from the same bank. Here, we want to see if previous interaction between the bank and the borrower reduces information asymmetry and that the bank can withstand the financial shock and is able to increase lending. We expect to find a positive sign for the '*relationship*' proxy if the information about the borrower is so positive that it can overcome the negative financial shock. We do not find any statistically significant impact of only '*relationship*' dummy but we do find positive and significant impact of the interaction of relationship with the relatively low exposure banks in columns 4 and 5 of Table 10. This indicates that the information about the borrower is so positive that it is able to overcome the negative financial

shock. We find very similar results when we use the REL number proxy proposed by Bharath et al. (2011). The REL number is defined as the ratio of number of loans advanced by a bank to a borrower and the total number of loans advanced by that bank. Overall, the results from this table are consistent with our main results that only relatively low exposure banks are able to withstand the financial shock.

(Insert Table 10 about here)

6. Conclusion

As small developing countries may be more vulnerable to exogenous economic shocks due to inherent political instability and financial risk, it is important to analyze the impact of the financial crisis on real businesses in those economies. Moreover, in the absence of fully developed capital and financial markets, most local businesses rely heavily on bank financing in developing markets. The small and medium enterprises that form the core of emerging markets may also suffer due to the shortage of funds from banks and other financial institutions as a result of exogenous economic shocks.

Studying the Pakistani market as a case in point, and capitalizing on the unique dataset of all corporate loans, we have identified changes in post-financial shock lending using various bank and loan level variables. We have shown that lending to small firms and lending by private banks decreased, irrespective of the fact whether they borrowed from low or high exposure banks. However, lending by relatively low exposure big banks increased after the global financial crisis. The findings regarding different types of loans revealed that Agricultural loans increased after the financial shock (i.e., GFC), both from relatively low exposure banks. Our findings on information asymmetry showed that bank reputation as a proxy for information asymmetry was not able to overcome information asymmetry problems and that high exposure banks still reduced their lending after the financial shock. However, previous interactions of the borrower with relatively low exposure banks were able to overcome these problems and increased their lending after the GFC.

Our work is important from a regulatory perspective as it identifies that emerging markets are open to shocks from the international financial markets, despite their limited linkages with them, hence mechanisms need to be developed to better cope with any such events in the future. This brings us to areas for further research; first, we would like to check the impact of financial shock on the interbank market of Pakistan, to see whether the liquidity crunch only affected

firms, or also interbank liquidity. Another interesting potential area of research could be on the regulatory side, observing the current funding structures of banks in the country and devising a set of guidelines outlining limits to international exposure.

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Table 1
List of Pakistani banks, their market share and their borrowing outside Pakistan

This table provides average market share by total assets and average borrowing outside Pakistan by Pakistani banks from 2006 to 2011. Column (1) lists the all the banks in our dataset ranked by market share. Column (2) reports the market share and Column (3) reports borrowing outside Pakistan by Pakistani banks as a percent of total borrowing.

Pakistan Banks	Market Share	Borrowing Outside Pakistan
(1)	(2)	(3)
National Bank of Pakistan	16.92	7.60
Habib Bank Limited	15.48	22.30
United Bank Limited	10.71	7.30
MCB Bank Limited	8.44	9.60
Allied Bank of Pakistan	7.60	0.70
Standard Chartered Bank Pakistan Limited	5.85	8.90
Askari Bank Limited	4.70	0.40
The Bank of Punjab	4.58	0.50
NIB Bank	4.04	0.40
Habib Metropolitan Bank Limited	3.85	2.50
Faysal Bank Limited	3.40	0.60
Bank Alhabib Limited	3.03	4.80
Meezan Bank	2.85	0.90
Royal Bank of Scotland	2.72	0.10
Soneri Bank Limited	1.70	8.80
BankIslami Pakistan Limited	0.85	0.00
KASB Bank Limited	0.82	6.00
AlBaraka Bank Pakistan Limited	0.82	16.70
Mybank Limited	0.75	1.70
The Bank of Khyber	0.71	1.20
First Women Bank Limited	0.20	0.00

Table 2
Descriptive statistics

This table presents descriptive statistics for 33,245 loans to 11,524 borrowers by 21 banks. These loans are further divided by exposure type. High, Medium and Low exposure banks. The banks with over 8% of their borrowings outside Pakistan are classified as high exposure banks, the banks between 4% to 8% borrowings outside Pakistan are classified as intermediate exposure and the banks with less than 4% borrowings outside Pakistan are classified as low exposure banks. All the variables are measured in Pakistani Rupee (PKR). For variable definitions, see Appendix Table 2.

	All			High			Intermediate			Low		
	Mean	Median	St dev	Mean	Median	St dev	Mean	Median	St dev	Mean	Median	St dev
Loan characteristics												
Loan size	1,920	62	15,942	2,060	50	19,076	2,730	72	22,320	1,390	66	68,812
Maturity	761	365	992	722	365	1,055	726	364	1,098	807	375	880
Secured	0.950	1.000	0.217	0.947	1.000	0.224	0.927	1.000	0.259	0.965	1.000	0.184
Non performing loans	0.078	0	0.269	0.068	0.137	0.251	0.137	0.137	0.344	0.055	0.137	0.228
Bank characteristics												
Capital ratio	13.311	12.360	4.501	15.391	13.390	4.957	13.792	10.580	4.247	11.575	10.980	3.482
Total assets	33,129	31,478	23,254	42,412	34,320	2,242	47,868	54,682	27,314	18,780	17,286	89,040
Liquid assets	5,240	3,560	4,325	5,990	6,020	2,980	9,460	9,800	5,583	2,490	2,120	1,366
Number of branches	620	272	536	946	994	544	880	1,078	482	252	122	250
Bank types (%)												
Nationalized Banks	0.105		0.307	0.137		0.137	0.435		0.496	0.007		0.086
Private	0.379		0.485	0.117		0.322	0.286		0.452	0.616		0.487
Privatized	0.384		0.486	0.739		0.439	0.279		0.449	0.185		0.388
Islamic	0.052		0.222	0.024		0.154	0.030		0.170	0.083		0.276
Foreign	0.089		0.285	0.144		0.351	0.137		0.137	0.097		0.296
Loan types (%)												
Agriculture	0.014		0.118	0.022		0.146	0.020		0.140	0.006		0.074
Consumer loans	0.001		0.038	-		-	0.001		0.030	0.003		0.052
Export loans	0.287		0.453	0.296		0.456	0.247		0.431	0.303		0.460
Financing	0.075		0.263	0.067		0.251	0.151		0.358	0.040		0.196
Islamic	0.052		0.222	0.024		0.154	0.030		0.170	0.083		0.276
Import loans	0.002		0.045	0.000		0.010	0.002		0.039	0.004		0.061
Leasing	0.087		0.282	0.137		0.137	0.137		0.137	0.137		0.137
Micro credit	0.002		0.050	0.030		0.172	0.017		0.128	0.164		0.370
Overdraft	0.447		0.497	0.005		0.071	0.001		0.025	0.002		0.039
Term loan	0.032		0.175	0.550		0.498	0.485		0.500	0.355		0.479
Number of observations	33,245			10,603			7,786			14,856		

Table 3**Bank lending channel: Intensive margin**

This table presents the fixed effects regression results of the impact of financial shock on low and intermediate exposure banks during the GFC. All regressions include firm fixed effects, regressions 2 to 4 include loan type dummies and bank controls and regressions 3 and 4 include macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. * Indicates significance at the 10% level, ** Indicates significance at the 5% level and *** Indicates significance at the 1% level.

	Log change in bank lending			
	FE	FE	FE	FE
	(1)	(2)	(3)	(4)
Intermediate Exposure	1.89 *** (3.13)	3.76 *** (14.49)	1.36 *** (4.40)	1.39 *** (5.14)
Low Exposure	2.43 *** (7.18)	2.82 *** (11.37)	0.97 *** (4.25)	0.99 *** (4.44)
Bank characteristics				
Capital ratio		0.38 *** (9.43)	0.14 *** (6.01)	0.15 *** (6.22)
Ln(Assets)		0.98 (1.32)	0.74 * (1.87)	0.76 * (1.75)
Liquid assets to total assets ratio		-56.57 *** (-11.73)	-19.91 *** (-11.88)	-18.76 *** (-11.76)
Ln(number of branches)		-0.77 ** (-1.97)	-0.73 *** (-2.99)	-0.80 *** (-3.04)
Borrower/loan characteristics				
Ln(maturity)		-0.30 (-1.08)	0.27 (1.21)	0.21 (0.98)
Secured		0.39 (0.99)	-0.51 (-1.64)	-0.76 ** (-2.44)
Ln(loan size)		0.44 *** (5.72)	0.52 *** (6.60)	0.52 *** (6.55)
Non performing loan		3.10 *** (6.45)	4.08 *** (6.61)	3.86 *** (6.64)
Macroeconomic variables				
GDP growth			-4.87 *** (-46.49)	-4.80 *** (-41.02)
Ln(Manufacturing production)			-65.30 *** (-53.33)	-64.73 *** (-53.46)
Firm fixed effects	Y	Y	Y	Y
Loan type dummies	N	Y	N	Y
Bank controls	N	Y	Y	Y
R ²	0.006	0.105	0.349	0.351
Number of observations	33,245	33,245	33,245	33,245

Table 4

Bank lending channel for "foreign" banks

This table presents the fixed effects regression results on the bank lending channel for "foreign" banks. All regressions include firm fixed effects, regressions 2 and 4 include loan type dummies, bank controls and macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. * Indicates significance at the 10% level, ** Indicates significance at the 5% level and *** Indicates significance at the 1% level.

	Log change in bank lending			
	FE	FE	FE	FE
	(1)	(2)	(3)	(4)
Foreign	-7.24 *** (-8.89)	-11.96 *** (-5.27)	-2.61 ** (-2.47)	-2.64 *** (-2.63)
Bank characteristics				
Capital ratio		0.26 *** (7.93)	0.10 *** (5.97)	0.11 *** (6.03)
Ln(Assets)		2.86 ** (2.20)	1.21 ** (2.16)	1.23 ** (2.08)
Liquid assets to total assets ratio		-47.35 *** (-11.22)	-16.49 *** (-8.79)	-15.23 *** (-9.18)
Ln(number of branches)		-2.13 *** (-2.84)	-1.10 *** (-3.31)	-1.16 *** (-3.35)
Borrower/loan characteristics				
Ln(maturity)		-0.29 (-1.22)	0.28 (1.34)	0.20 (0.99)
Secured		-0.02 (-0.04)	-0.63 ** (-2.11)	-0.90 *** (-2.98)
Ln(loan size)		0.45 *** (5.74)	0.52 *** (6.62)	0.52 *** (6.58)
Non performing loan		3.02 *** (5.13)	4.08 *** (7.17)	3.85 *** (7.07)
Macroeconomic variables				
GDP growth			-4.90 *** (-41.01)	-4.83 *** (-37.93)
Ln(Trade deficit)			-65.04 *** (-49.36)	-64.42 *** (-49.19)
Firm fixed effects	Y	Y	Y	Y
Loan type dummies	N	N	N	Y
Bank controls	N	Y	Y	Y
R ²	0.003	0.103	0.348	0.350
Number of observations	33,245	33,245	33,245	33,245

Table 6
Bank lending channel: Extensive margin

This table presents the fixed effects, Probit and OLS regression results on the extensive margin of bank lending channel when we consider small firms. All regressions include firm fixed effects except regressions 3, 4, 7 and 8, loan type dummies, bank controls and macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. * Indicates significance at the 10% level, ** Indicates significance at the 5% level and *** Indicates significance at the 1% level.

	Exit				Entry			
	FE (1)	FE (2)	Probit (3)	OLS (4)	FE (5)	FE (6)	Probit (7)	OLS (8)
Relatively low	-0.05 *** (-5.26)	-0.03 *** (-3.61)	-0.05 ** (-2.03)	-0.02 *** (-4.13)	0.01 (1.60)	0.01 (1.61)	0.10 *** (2.61)	0.01 *** (3.74)
Small firms		0.28 *** (25.82)	0.97 *** (33.27)	0.33 *** (49.25)		-0.03 *** (-4.43)	-0.15 *** (-3.22)	-0.03 *** (-8.11)
Small firms*Relatively low		-0.02 * (-1.86)	-0.02 (-0.58)	-0.01 (-1.45)		0.01 (1.42)	0.04 (0.80)	0.00 (0.59)
Bank characteristics								
Capital ratio	0.00 *** (-2.84)	0.00 *** (-5.27)	-0.01 *** (-3.64)	0.00 *** (-9.27)	0.00 *** (3.31)	0.00 *** (4.71)	0.02 *** (7.43)	0.00 *** (9.05)
Ln(Assets)	-0.06 *** (-8.12)	-0.06 *** (-7.02)	-0.16 *** (-6.57)	-0.07 *** (-13.07)	0.04 (1.39)	0.04 *** (6.14)	0.27 *** (7.19)	0.05 *** (15.11)
Liquid assets to total assets ratio	0.14 ** (2.32)	0.20 *** (2.76)	-0.05 (-0.25)	0.11 ** (2.44)	-0.44 *** (-10.27)	-0.45 *** (-9.67)	-3.82 *** (-12.96)	-0.56 *** (-19.63)
Ln(number of branches)	0.05 *** (6.94)	0.04 *** (6.51)	0.14 *** (7.74)	0.05 *** (11.97)	-0.03 (-1.58)	-0.03 *** (-6.33)	-0.21 *** (-7.63)	-0.04 *** (-14.57)
Borrower/loan characteristics								
Ln(maturity)	-0.03 *** (-3.30)	-0.03 *** (-11.20)	-0.13 *** (-17.11)	-0.04 *** (-23.05)	0.04 *** (5.58)	0.04 *** (18.62)	0.21 *** (16.94)	0.04 *** (35.83)
Secured	0.01 (0.61)	0.00 (0.28)	0.01 (0.15)	-0.01 (-0.62)	-0.01 (-0.98)	-0.01 (-1.15)	-0.07 (-1.20)	0.00 (0.43)
Ln(loan size)	-0.01 *** (-3.72)	0.00 (0.55)	0.00 (0.28)	0.00 *** (3.33)	-0.01 *** (-28.27)	-0.01 *** (-31.39)	-0.05 *** (-33.09)	-0.01 *** (-53.62)
Non performing loan	-0.10 *** (-3.14)	-0.10 *** (-6.40)	-0.19 *** (-6.73)	-0.08 *** (-12.75)	0.20 *** (6.65)	0.20 *** (19.26)	0.54 *** (13.87)	0.13 *** (31.25)
Macroeconomic variables								
GDP growth	0.11 *** (14.04)	0.10 *** (44.45)	0.54 *** (48.85)	0.12 *** (84.03)	-0.19 *** (-118.94)	-0.19 *** (-123.55)	-0.93 *** (-66.67)	-0.19 *** (-206.39)
Ln(Manufacturing production)	1.16 *** (12.89)	1.10 *** (18.01)	5.45 *** (28.60)	1.28 *** (33.37)	-2.07 *** (-25.40)	-2.06 *** (-51.36)	-13.1 *** (-45.55)	-2.16 *** (-89.87)
Firm fixed effects	Y	Y	N	N	Y	Y	N	N
Loan type dummies	Y	Y	Y	Y	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y	Y	Y	Y	Y
R ² /Pseudo R ²	0.129	0.178	0.179	0.219	0.553	0.554	0.576	0.557
Number of observations	33,245	33,245	33,245	59,183	33,245	33,245	33,245	59,183

Table 5
Bank lending channel: Extensive margin

This table presents the fixed effects and Probit regression results on the extensive margin of bank lending channel. All regressions include firm fixed effects except regressions 2 and 4, loan type dummies, bank controls and macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. * Indicates significance at the 10% level, ** Indicates significance at the 5% level and *** Indicates significance at the 1% level.

Table 7
Bank lending channel for small firms

This table presents the fixed effects and OLS regression results on the bank lending channel for small firms. All regressions include firm fixed effects except regression 4, loan type dummies, bank controls and macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. * Indicates significance at the 10% level, ** Indicates significance at the 5% level and *** Indicates significance at the 1% level.

	Log change in bank lending			
	FE	FE	FE	OLS
	(1)	(2)	(3)	(4)
Relatively low	1.17 *** (5.35)	1.15 *** (6.23)	1.32 *** (5.95)	1.21 *** (8.74)
Small firms		-0.74 *** (-3.72)	-0.45 (-1.54)	-1.53 *** (-9.36)
Small firms*Relatively low			-0.45 (-1.38)	-0.57 *** (-2.97)
Bank characteristics				
Capital ratio	0.15 *** (6.64)	0.15 *** (7.60)	0.15 *** (7.61)	0.16 *** (13.17)
Ln(Assets)	0.80 * (1.83)	0.81 *** (3.51)	0.83 *** (3.60)	1.41 *** (10.19)
Liquid assets to total assets ratio	-17.79 *** (-11.03)	-17.94 *** (-9.65)	-17.87 *** (-9.61)	-18.45 *** (-16.54)
Ln(number of branches)	-0.78 *** (-2.88)	-0.76 *** (-4.46)	-0.78 *** (-4.55)	-1.03 *** (-10.03)
Borrower/loan characteristics				
Ln(maturity)	0.21 (0.96)	0.21 *** (2.68)	0.20 *** (2.63)	0.59 *** (13.06)
Secured	-0.79 ** (-2.53)	-0.77 ** (-2.13)	-0.75 ** (-2.08)	-0.45 ** (-2.13)
Ln(loan size)	0.52 *** (6.56)	0.50 *** (44.25)	0.50 *** (44.18)	0.39 *** (51.92)
Non performing loan	3.86 *** (6.69)	3.86 *** (9.13)	3.85 *** (9.11)	2.36 *** (14.88)
Macroeconomic variables				
GDP growth	-4.80 *** (-41.02)	-4.79 *** (-77.71)	-4.79 *** (-77.72)	-5.26 *** (-145.30)
Ln(Manufacturing production)	-64.8 *** (-54.05)	-64.64 *** (-40.29)	-64.65 *** (-40.30)	-68.85 *** (-72.56)
Firm fixed effects	Y	Y	Y	N
Loan type dummies	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y
R ²	0.351	0.351	0.351	0.373
Number of observations	33,245	33,245	33,245	59,183

Table 8**Bank lending channel for different types of banks**

This table presents the fixed effects regression results on the bank lending channel for private and big banks. All regressions include firm fixed effects, loan type dummies, bank controls and macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. * Indicates significance at the 10% level, ** Indicates significance at the 5% level and *** Indicates significance at the 1% level.

	Log change in bank lending			
	FE	FE	FE	FE
	(1)	(2)	(3)	(4)
Relatively low	0.95 *** (5.81)	1.75 *** (9.46)	0.77 *** (3.97)	-0.24 (-0.86)
Private banks	1.53 *** (4.81)	4.45 *** (11.73)		
Private banks*relatively low		-3.52 *** (-8.81)		
Big banks			-1.48 *** (-3.69)	-3.09 *** (-5.91)
Big banks*relatively low				1.98 *** (5.73)
Bank characteristics				
Capital ratio	0.17 *** (6.70)	0.20 *** (7.59)	0.13 *** (5.80)	0.15 *** (6.26)
Ln(Assets)	0.84 ** (2.26)	0.95 ** (2.54)	0.14 (0.26)	-0.05 (-0.09)
Liquid assets to total assets ratio	-15.69 *** (-8.55)	-20.63 *** (-9.68)	-19.25 *** (-11.93)	-22.82 *** (-13.55)
Ln(number of branches)	-0.45 * (-1.68)	-0.44 * (-1.65)	0.06 (0.14)	0.37 (0.78)
Borrower/loan characteristics				
Ln(maturity)	0.22 (0.97)	0.21 (0.91)	0.21 (0.97)	0.23 (1.00)
Secured	-0.83 *** (-2.69)	-0.84 *** (-2.71)	-0.93 *** (-3.06)	-0.86 *** (-2.76)
Ln(loan size)	0.52 *** (6.53)	0.52 *** (6.48)	0.52 *** (6.56)	0.52 *** (6.57)
Non performing loan	3.79 *** (6.35)	3.77 *** (6.34)	3.77 *** (6.10)	3.74 *** (5.84)
Macroeconomic variables				
GDP growth	-4.79 *** (-44.25)	-4.75 *** (-41.94)	-4.78 *** (-44.76)	-4.73 *** (-45.24)
Ln(Manufacturing production)	-65.04 *** (-56.53)	-65.58 *** (-56.17)	-64.48 *** (-51.16)	-64.08 *** (-46.94)
Firm fixed effects	Y	Y	Y	Y
Loan type dummies	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y
R ²	0.352	0.353	0.351	0.352
Number of observations	33,245	33,245	33,245	33,245

Table 9
Bank lending channel for different types of loans
Table 10

Bank lending channel and information asymmetry

This table presents the fixed effects regression results on the dynamics of information on the bank lending channel. All regressions include firm fixed effects, loan type dummies, bank controls and macroeconomic variables. Standard errors are clustered at firm level. For definitions of the variables, see Appendix Table 2. For each independent variable, the top row reports the estimated coefficient, and the bottom row reports the t-statistic in parentheses. *

	Log change in bank lending						
	FE	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Relatively low	1.17 *** (5.34)	1.08 *** (5.18)	1.10 *** (3.63)	1.10 *** (3.63)	0.86 *** (2.67)	1.10 *** (3.63)	0.86 *** (2.71)
Ln(1+No of previous loans)	0.02 (0.18)	0.02 (0.17)	0.02 (0.17)	0.02 (0.17)	0.02 (0.15)	0.02 (0.17)	0.02 (0.15)
Market share		-19.48 *** (-4.39)	-19.39 *** (-3.78)	-19.38 *** (-3.78)	-19.45 *** (-3.81)	-19.39 *** (-3.78)	-19.48 *** (-3.82)
Market share*relatively low			-0.20 (-0.06)	-0.17 (-0.05)	-0.06 (-0.02)	-0.20 (-0.06)	-0.04 (-0.01)
Relationship dummy				-0.04 (-0.31)	-0.48 ** (-1.98)		
Relationship dummy*relatively low					0.64 ** (2.41)		
REL number						0.30 (0.06)	-15.39 * (-1.69)
REL number*relatively low							22.80 ** (2.22)
Bank characteristics							
Capital ratio	0.15 *** (6.62)	0.18 *** (6.47)	0.18 *** (6.74)	0.18 *** (6.69)	0.18 *** (6.67)	0.18 *** (6.71)	0.18 *** (6.70)
Ln(Assets)	0.80 * (1.83)	1.52 *** (3.89)	1.53 *** (3.61)	1.53 *** (3.62)	1.53 *** (3.65)	1.53 *** (3.62)	1.53 *** (3.64)
Liquid assets to total assets ratio	-17.80 *** (-11.05)	-14.43 *** (-8.07)	-14.38 *** (-8.10)	-14.38 *** (-8.09)	-14.43 *** (-8.09)	-14.38 *** (-8.09)	-14.43 *** (-8.09)
Ln(number of branches)	-0.78 *** (-2.88)	-0.52 * (-1.68)	-0.52 (-1.61)	-0.52 (-1.61)	-0.53 (-1.62)	-0.52 (-1.61)	-0.53 (-1.62)
Borrower/loan characteristics							
Ln(maturity)	0.21 (0.96)	0.19 (0.88)	0.19 (0.88)	0.19 (0.88)	0.19 (0.88)	0.19 (0.89)	0.19 (0.88)
Secured	-0.79 ** (-2.54)	-0.61 * (-1.96)	-0.61 * (-1.94)	-0.61 * (-1.94)	-0.60 * (-1.91)	-0.61 * (-1.94)	-0.60 * (-1.91)
Ln(loan size)	0.52 *** (6.56)	0.52 *** (6.60)	0.52 *** (6.59)	0.52 *** (6.62)	0.52 *** (6.63)	0.52 *** (6.62)	0.52 *** (6.63)
Non performing loan	3.86 *** (6.71)	3.87 *** (6.81)	3.87 *** (6.80)	3.87 *** (6.85)	3.87 *** (6.86)	3.87 *** (6.84)	3.87 *** (6.85)
Macroeconomic variables							
GDP growth	-4.8 ***	(4.79) ***	(4.79) ***	(4.79) ***	(4.79) ***	(4.79) ***	(4.79) ***
Ln(Trade deficit)	-64.8 *** (-54.08)	(64.91) *** (-55.34)	(64.91) *** (-55.03)	(64.91) *** (-55.21)	(64.94) *** (-55.20)	(64.92) *** (-55.23)	(64.96) *** (-55.22)
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y
Loan type dummies	Y	Y	Y	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y	Y	Y	Y
R ²	0.351	0.351	0.351	0.351	0.351	0.351	0.351
Number of observations	33,245	33,245	33,245	33,245	33,245	33,245	33,245

Appendices:

Appendix Table 1
Trading partners of Pakistan

This table provide the volume of trade with top twelve partners in the world for the period from 2006 to 2011.

	2006	2007	2008	2009	2010	2011
United States of America	2,457,623	1,245,627	1,592,077	1,420,631	2,046,680	2,085,948
China	2,408,284	3,550,471	4,011,344	2,781,915	3,811,769	4,791,694
United Arab Emirates	2,166,537	652,189	1,768,073	1,811,002	3,412,873	4,897,792
Afghanistan	926,559	748,185	1,362,075	1,252,701	1,546,291	2,460,766
Germany	492,740	401,416	585,628	551,895	4,372	311,664
Spain	378,858	374,992	354,304	292,044	339,721	386,373
Bangladesh	210,949	216,917	336,385	291,263	562,908	864,494
Turkey	199,700	286,457	334,867	254,967	488,415	595,803
United Kingdom	193,614	273,853	132,923	161,359	478,298	676,944
Netherlands	171,002	147,637	255,460	40,733	62,098	245,535
Italy	74,123	133,405	43,999	124,515	75,523	265,851
Belgium	44,666	154,244	169,996	141,852	269,856	382,946

Appendix Table 2
Variable Definitions

Dependent variable	
Ln(difference (Lijb))	Difference between the natural logarithm value of pre crisis and post crisis loan amounts
Independent variables	
Lender Characteristics	
High exposure banks	Dummy variable equal to 1 for all banks that have over 8% of total borrowing outside Pakistan, 0 otherwise
Intermediate exposure banks	Dummy variable equal to 1 for all banks that have between 4% to 8% of total borrowing outside Pakistan, 0 otherwise
Low exposure banks	Dummy variable equal to 1 for all banks that have below 4% of total borrowing outside Pakistan, 0 otherwise
Relatively low exposure banks	Dummy variable equal to 1 for all banks with international loans below 8% and 0 otherwise
Exit	Dummy variable equal to 1 if the loan is not renewed at some point during the Global Financial Crisis period of July 2007 to March 2009.
Entry	Dummy variable equal to 1 if a new loan is made after the Global Financial Crisis of July 2007 to March 2009.
Islamic banks	Dummy variable equal to 1 for Islamic banks, 0 otherwise
Private banks	Dummy variable equal to 1 for private banks 0, otherwise
Privatized banks	Dummy variable equal to 1 for banks that were previously government owned but were privatized during the financial liberalization era (hence privatized), 0 otherwise
Bank Characteristics	
Capital ratio	Capital ratio of the bank
Ln(Assets)	Natural logarithm of the total assets of the bank
Liquid assets to total assets ratio	Ratio of all liquid assets (assets which can easily be converted to cash) of the bank to total assets
Ln(number of branches)	Natural logarithm of the number of bank branches
Borrower/Loan Characteristics	
Ln(maturity)	Natural logarithm of the level of the maturity amount
Secured	Dummy variable equal to 1 if loan is secured and 0 otherwise
Ln(loan size)	Natural logarithm of loan amount outstanding
Non performing loan	Dummy variable equal to 1 if NPL amount exists, 0 otherwise
Small firms	Dummy variable equal to 1 if firm is classified as small and 0 otherwise
Export loans	Dummy variable equal to 1 if loan is export loan and 0 otherwise
Islamic loans	Dummy variable equal to 1 if loan is Islamic loan and 0 otherwise
Agri loans	Dummy variable equal to 1 if loan is Agri loan and 0 otherwise
Ln(1 + no of previous loans)	Natural logarithm of 1 plus the number of previous loans made to a borrower
Market share	Market share of deposit of a bank in percentage
Relationship dummy	Dummy variable equal to 1 if there is previous relationship with lender, 0 otherwise
REL number	Ratio of the number of loans advanced by a bank to a borrower and the total number of loans advanced by that bank
Macroeconomic Variables	
GDP growth	Gross Domestic Product growth
Ln(Manufacturing production)	Natural logarithm of manufacturing production
CPI	Consumer Price Index
Unemployment rate	Unemployment rate
Ln(Trade deficit)	Natural logarithm of trade deficit
Interest rate	Interest rate
Ln(Broad money)	Natural logarithm of broad money (M2)