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Funding vs. Real Economy Shock

The Impact of the 2007–2009 Crisis on Small Firms' Credit Availability

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Abstract

This paper analyzes the impact of two distinct shocks stemming from the cross-border transmission of the 2007-2009 crisis on credit availability for small firms. The paper uses data from AccessBank Azerbaijan which was affected in its liquidity position during the second and third quarters of 2008 by delays in its refinancing. The Azeri real economy was hit by the global crisis from the fourth quarter of 2008 onwards with a combined decline in oil prices, exports, remittances, and domestic demand. Therefore, a pure supply side shock con be contrasted with a real economy shock that hit exactly when the bank's funding position strengthened again. The paper finds that during the *funding shock* (potential) borrowers are discouraged from applying for loans. However, for those applications made, the likelihood of loan approval is not affected. The *real economy shock,* in contrast, reduces the approval likelihood for SME loans in particular, while agro and micro loans are considerably less affected. Finally, bank relationships increase credit availability in good as well as in bad times.

Funding vs. real economy shock: The impact of the 2007-2009 crisis on small firms' credit availability

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1 Introduction

The integration and development of emerging countries' financial systems benefitted them by increased supply of finance and economic growth (e.g. Guiso, Sapienza and Zingales (2004), Bekaert, Harvey and Lundblad (2005) and Giannetti and Ongena (2009)). At the same time, these countries became more likely to feel the spillovers of shocks, such as the 2007-2009 financial crisis, that originated unrelated to local economic conditions.[1] Banks' lending to micro, small and medium enterprises (MSME banks) in emerging countries and their customers were mostly resilient to the effects of previous financial crises, whereas they are more likely to be affected by the recent crisis because they have also become more globally integrated in the past decade (Di Bella (2011), Galema, Lensink and Spierdijk (2011)). The aim of this paper is to provide evidence on the different channels through which the recent crisis was transmitted to banks providing lending to MSMEs and their borrowers in emerging markets.

The impact of financial crises on the loan portfolio of MSME banks is ex ante unclear. Banks facing liquidity shortages may be forced to cut down lending. At the same time banks might be reluctant to reject loan applications of existing borrowers even in times of crisis because they have invested in costly information acquisition (Rajan (1992), De Haas and Van Horen (2010)). With respect to the clients, a larger proportion of microenterprises, in contrast to SME businesses, is engaged in the supply of essential goods and services, for which demand fluctuates less even in times of crisis (Littlefield and Kneiding (2009)). However, it is also possible that micro borrowers are more severely hit by the crisis since especially in advanced and competitive (microfinance) markets the boundaries between micro loans and consumer finance have more and more blurred (e.g. Christen (2001) and Littlefield and Rosenberg (2004)). In such markets, many micro entrepreneurs have borrowed from multiple sources and accumulated high levels of debt which makes them vulnerable to even small changes in their income. While there is substantial evidence on the effects of the crisis on bank lending in general,[2] the evidence on how MSME banks and their clients are hit is anecdotal so far. Also, there is only limited evidence on how exactly banks reacted to *different* shocks that occurred during the crisis.

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[1] The unfolding of the crisis events is e.g. described in Brunnermeier (2009) and Ivashina and Scharfstein (2010). Popov and Udell (2011), De Haas, Korniyenko, Loukoianova and Pivovarsky (2012) and Ongena, Peydro and Van Horen (2012) study how borrowers in Emerging Europe are affected due to the cross-border transmission of the crisis in foreign-owned and internationally funded banks.

[2] De Haas and Van Horen (2010), Huang (2010), Puri, Rocholl and Steffen (2010), De Haas and Van Horen (2011), De Haas and Van Lelyveld (2011) and Jimenez, Ongena, Peydro and Saurina (2012) provide evidence on the worldwide effects of the crisis and the transmission mechanisms.

In this paper, we study two distinct shocks stemming from the global transmission of the crisis and their respective impact on credit availability for micro, small and medium firms. We analyze a unique dataset including information from all business loan applications and loan contracts of AccessBank Azerbaijan between 2006 and 2009. The bank provides an interesting object of study since it is foreign-owned and largely refinanced in foreign currency as are many MSME banks in the region. Due to the distortions in international capital markets, which, for instance, made the placement of a CDO impossible, the bank was hit by unforeseen delays in its refinancing pipeline in the second and third quarters of 2008 (the first shock) although its financial performance remained very strong.

At the same time, Azerbaijan's economy proved resilient to the international turmoil up to the last quarter of 2008 when economic growth eventually slowed down (IMF (2008), Hübner and Jainzik (2009)). The timeline of events in Azerbaijan allows us to study a pure supply side shock, the *Funding shock*, while firms had not yet been affected by the economic crisis (see also Dooley and Hutchison (2009) for this so-called decoupling of emerging markets in the beginning of the crisis). Then, we can contrast its impact on credit availability for firms of different sizes and industries from the impact of the *Real economy shock* (the second shock). Important for our study is that AccessBank Azerbaijan faced a short period of tight refinancing at a time when the economic crisis was still absent from the country, while its refinancing pipeline strengthened again from the fourth quarter of 2008 onwards, i.e. exactly at the time when Azerbaijan's economy started to slow down. This setting allows us to study how banks react to different shocks coming from the funding vs. the real economy side of their business and the mechanisms they have at hand.

Observing loan applications and the bank's decision whether to approve the application, we assess which loan types (agro, micro and SME) are affected most within the two channels identified. During the economic slowdown, we expect SME loans to be affected most as their credit quality is likely to deteriorate most. SME businesses, compared to microenterprises, are involved in a broader variety of activities and are more likely to provide non-subsistence goods and services (such as furniture and household appliances or real estate services), for which demand typically decreases in economic downturns, or may be suppliers to the oil industry.[3] Finally, we examine whether previous bank-borrower relationships help to mitigate credit constraints.

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[3] See e.g. http://www.cdcdevelopmentsolutions.org/eastern-europe-and-caucasus#Azerbijan for efforts to increase SME capacities to win contracts with the oil industry in Azerbijan. See IFC (2009) for a comparison of sectors in which SMEs and individual entrepreneurs are active.

For the first channel, we study aggregate numbers of loan requests and approvals. Our results suggest that the bank discourages potential borrowers from applying for new loans and, to a lesser extent, existing customers from requesting additional loans during the period of tight refinancing in the second and third quarters of 2008 (see Brown, Ongena, Popov and Yesin (2011) and Popov and Udell (2011) for the importance of discouragement in Eastern Europe). The bank's temporary liquidity squeeze therefore resulted in a slowdown of portfolio growth because lending had to be limited, thereby affecting all borrower groups. Generally, one would expect a pure supply shock to mainly influence the bank's ability to meet existing loan requests. However, it may also mirror itself in the number of loan applications because of the particular marketing strategy of AccessBank (and similar MSME banks)[4]. MSMEs in Azerbaijan, and those that have never had a loan before in particular, do not seem to know much about the services banks offer (IFC (2009)). To attract new borrowers, the bank therefore regularly organizes local community events to market its products. Also, the bank's staff may visit the surrounding potential clients and call their attention to the bank's business. During the time of tight refinancing, loan officers were encouraged to take vacation which is equal to curtailing the active marketing of the products and thus the number of loan applications may also decline due to the temporary squeeze in the bank's liquidity.

Second, we measure credit availability by the likelihood that a loan application is approved. For the funding shock we find that approval rates for those (potential) borrowers who actually apply for a loan are not negatively affected in any borrower group. This corroborates our conclusion that the funding shock mainly affects credit availability via the discouragement of borrowers. Approval rates remain unaffected by this shock because the economy was still growing and borrower quality therefore not systematically changed. For the real economy shock, by contrast, our findings suggest that credit availability depends on the loan type. For agro loan borrowers, loan approval is hardly affected by this event. This is surprising on first sight since agro loans are regularly classified as particularly risky because of their highly correlated risks in case of natural disasters or commodity price fluctuations (e.g. Wenner, Navajas, Trivelli and Tarazona (2007)). In this economic slowdown, however, the agro businesses in Azerbaijan remain comparatively unaffected because they mostly grow fruits or vegetables or raise sheep for the local market. Thus, such loans may offer some

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[4] Prominent examples of other MSME banks which use pro-active strategies to distribute their products and services are the ProCredit Banks, BRI Indonesia and ASA Bangladesh. See also Bankakademie (2000). Most active marketing aims at increasing financial literacy or raising awareness of savings products, however these campaigns naturally also bring other banking services to the attention of potential clients.

stability to a bank's loan portfolio in this kind of global financial and economic crises. The same seems to apply to the diversification into different loan sizes: the (repeat) micro loans in our sample show a very small reduction in approval rates during the real economy shock period which may be explained by their lower risk because they produce subsistence goods for the local market. SME borrowers who are more likely to encounter fluctuating demand for their products therefore have to face the greatest cuts to their credit availability.[5]

To confirm that the two crisis shocks have differential effects, we study an exogenous variation in the severity of the crisis shock and its impact on loan approval. We distinguish between locations in which the oil and gas industry is most important and the rest of the country and find that the real economy shock affects credit availability negatively especially in those locations that can be expected to be hit hardest, i.e. the petroleum locations. The funding shock, on the contrary, has no negative and no differential (except for SME borrowers) effect for petroleum- vs. non-petroleum locations.

Thus, the funding and the real economy shock have distinct impacts on the availability of credit to agro, micro and SME borrowers. The funding shock leads to a temporary tightening in credit availability for all borrower groups via the discouragement channel, which is an easy and fast way to slow down lending activities to save scarce funds. In contrast, the impact of the economic downturn on credit availability strongly depends on firm size and on the industry a firm operates in, by mainly reducing the availability of SME loans. This can be explained by the respectively different deterioration in credit quality due to the worsening economic situation, while borrower quality was not affected during the time of tight refinancing. Thus, in the real shock situation a more sophisticated mechanism, i.e. increased screening effort to single out the less risky clients, seems the more adequate strategy. Finally, we find that bank-borrower relationships are an important determinant for increasing credit availability in good as in bad times.

Our study contributes to the literature on the transmission of the recent crisis and its impact on bank lending. De Haas and Van Horen (2010) analyze in the syndicated loan market how banks adjust their lending behavior during a financial crisis and find that the reduction in bank lending during the crisis can at least partly be attributed to banks' increased monitoring and screening efforts. Jimenez, Ongena, Peydro and Saurina (2012) and Puri,

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[5] Although SMEs saw their sales drop, they may still have had a need for working capital to bridge temporary liquidity gaps. Demand for such loans may actually have increased during the economic downturn because, in contrast to AccessBank, most other Azeri banks faced liquidity problems during the last quarter of 2008. We find evidence in the empirical analysis that loan applications of new SME borrowers indeed increase after the onset of the economic slowdown, while loan applications from repeat SME borrowers decrease. However, for both groups the approval likelihood decreases indicating an increased riskiness of SME borrowers in general.

Rocholl and Steffen (2010) match information from loan applications and loan contracts to disentangle whether reduced credit availability is the result of demand or supply determinants. Jimenez, Ongena, Peydro and Saurina (2012) find for their sample of Spanish firms that bank balance-sheet strength determines loan approval in crisis times. Firm balance-sheet strength determines loan granting in good as well as in crisis times but matters more during the latter. Puri, Rocholl and Steffen (2010) study the effects of the financial crisis on retail lending at German savings banks and find a general decrease of loan demand after the beginning of the crisis. On the supply side, it turns out that affected banks are less likely to grant loans but that bank relationships help to mitigate this effect. Finally, Popov and Udell (2011) find cross-country evidence for Eastern Europe that firms located in areas served by foreign banks whose parent banks experience financial distress have a higher probability to be credit constrained.

In contrast to these papers, our study focuses on two distinct shocks occurring during the crisis and can thereby disentangle how different shocks impact on different borrower groups.[6] Our results imply that a funding shock may also show up in a reduced number of loan applications (i.e. on the demand side), while a real economy shock may impact on loan approval (i.e. on the supply side). Undoubtedly, having information on loan applications is an important feature in better disentangling demand and supply effects in bank lending during crisis times. Our results, however, indicate that information from loan applications may not be the remedy per se and future research in this area may need to more explicitly account for the different mechanisms banks have at hand to react to certain shocks. Our paper sheds some first light on these mechanisms.

Finally, our study is related to the literature on the performance of MSME banks and their portfolios during the East Asian financial crisis of 1997-1998. By analyzing the effects of the crisis on Bank Rakyat Indonesia (BRI), one of the largest MSME banks in the world, Patten, Rosengard and Johnston (2001) find nearly no effects on repayment behavior in the microfinance portfolio, while non-performance rates increased considerably in the SME portfolio suggesting that micro loans are less risky in times of crises compared to SME loans. Since higher default rates and reduced credit availability may both be outcomes of higher credit risk, we complement these results by showing that credit availability is similarly less affected for micro loans than for SME loans during the 2007-2009 financial and economic crisis.

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[6] In such, it is also related to the studies on specific liquidity or supply shocks to banks (e.g. Khwaja and Mian (2008) and Paravisini (2008)).

The rest of the paper is organized as follows. Section 2 provides information on Azerbaijan's economy and how it was affected by the financial crisis. Section 3 describes the institutional background as well as the data and methodology while section 4 reports the empirical results. Section 5 concludes.

2 Azerbaijan's economy and the financial crisis

Azerbaijan's economy is highly dependent on the oil and gas sector. The high real growth rates of 12 percent on average since 1998 with a peak in 2007 of 25 percent would not have been possible without the oil sector which accounts for about 60 percent of GDP and 95 percent of all exports (Economist Intelligence Unit (2009b)). Furthermore, growth is concentrated in urban areas and in the extractive sectors leading to high disparities within the country. Thus, while the average per capita income (in PPP) was at 11,413 USD in 2008 – corresponding de facto to a middle income country – an estimated 20 percent of the whole population still lives in poverty (Economist Intelligence Unit (2009b)). The omnipresent corruption and state interventions in the economy also hinder the future development of the country.[7]

The banking sector in Azerbaijan has shown high growth rates over the last years, starting from a relatively low level. Total sector assets grew by 78 percent to 8 billion USD in 2007 while the total loan portfolio increased by 102 percent to 5.4 billion USD (Central Bank Azerbaijan (2008)). Yet, financial intermediation measured as total banking assets over GDP was with 27 percent at year end 2007 still low.[8] The sector remains highly concentrated with the only state-owned bank (International Bank of Azerbaijan) accounting for 39 percent of total banking assets in April 2009. The microfinance sector is targeted by 12 banks and 20 non-banks and even though the high number of banks may lead to the impression that the country is over-banked, access to credit for micro and small enterprises remains one of the main impediments for further growth especially in rural areas (IFC (2009)).

The global financial and economic crisis affected Azerbaijan's economy from the fourth quarter of 2008 onwards and growth slowed down to 9% in 2009. Compared to other CIS countries such as Georgia, the Ukraine or Russia the overall macroeconomic and financial situation seems rather comfortable due to the high growth rates and the constant inflow of hard currency during the years *before* the crisis. While other CIS countries suffered from high

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[7] In 2008, Azerbaijan has ranked 158th out of 180 countries on the list of Transparency International (Transparency International (2008)).
[8] For means of comparison, Georgia and Russia have financial intermediation ratios of 42 and 52 percent, respectively.

currency devaluation, Azerbaijan's local currency, the Manat, remained stable. However, what was felt in the economy and in particular in sectors such as trade and construction was the drop in oil prices. Sectors that remained more or less unaffected were those which are mainly independent from international markets such as agriculture. Thus, the vulnerability of the Azerbaijani economy mainly stems from the lack of diversification which will remain a challenge for the future (Hübner and Jainzik (2009)).

With respect to the banking sector, indeed most banks had to stop lending at some point and the quality of the loan portfolio deteriorated from 2.2 to 3.2 percent of loans being delinquent by more than 90 days in the first quarter of 2009 (Central Bank Azerbaijan (2009)). With respect to deposits, crisis-effects were visible as business clients increasingly withdrew their savings to keep their businesses going and households attempted to convert their savings from Manat to USD due to their fear that the Manat would devaluate. The Central Bank provided comprehensive stabilization measures in the third quarter of 2008 which included, among others, an emergency facility for liquidity support and a decrease in the refinancing interest rate from 12 to 3 percent (Hübner and Jainzik (2009)). And while the low financial intermediation would otherwise be considered unsatisfactory, it helped the banking sector to remain somewhat immune against the effects of the crisis as the sector as a whole is only integrated into global financial markets in a limited way. Nevertheless, those few banks which are globally connected directly felt the effects of the turmoil in financial markets. Apart from that, all Azeri banks had to deal with an increase in their customers' risks when the economic crisis hit the country.

3 Institutional background, data and methodology

3.1 The bank

The data we use for the empirical analysis was generated using the Management Information System (MIS) of AccessBank Azerbaijan.[9] The mission of AccessBank is to provide financial services at European standards to micro and small businesses and low and medium income families while also offering products for larger enterprises.[10] AccessBank was founded by international financial institutions, which are still shareholders today, in October 2002 under the name Micro Finance Bank of Azerbaijan (MFBA). Until today,

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[9] To get a better understanding of the bank's business, the different loan types and borrower groups as well as the crisis events, we conducted informal interviews with the bank's management.

[10] See http://www.accessbank.az/en/index.html or AccessBank (2008) for detailed information on the bank and its business activity.

AccessBank is the only fully-fledged bank targeting the micro and small business sector in Azerbaijan.

Besides the central branch in Baku, AccessBank has 22 branches located all over the country both in rural and urban areas. Still, as of July 2009, the loan portfolio is concentrated in the trade sector and in the Baku area. With respect to the total number of clients, AccessBank is with 63,432 business loan clients in July 2009 the leading bank in Azerbaijan and has a total market share of 38% in the microfinance sector. The bank has been profitable since 2004 and in 2008 the return on equity was at 44.4 percent. Despite the crisis, the portfolio quality is very good with a portfolio at risk (PAR>30 days) of below 1 percent in mid 2009.

3.2 The borrower groups

While AccessBank also offers retail and staff loans, its focus and thus the focus of our study is on business lending. Within the business portfolio, agro, micro and SME loans are offered. The agro loan product was developed in 2007 to target farmers and the agricultural sector by offering flexible disbursement and repayment schemes tied to the agricultural cycles and the respective cash-flows of agro-businesses. The agro clients of AccessBank mainly produce food crops and livestock for local markets so that the demand for their products should be relatively unaffected by the crisis. Micro loans have amounts up to 10,000 USD (from 2008 onwards up to 20,000 USD) and SME loans have amounts of more than 10,000 USD (20,000 USD) and up to 500,000 USD.

With respect to micro and SME borrowers in general, most microenterprises are in the business of subsistence goods and services for which demand does not decline much even in times of crisis (Littlefield and Kneiding (2009)). In Azerbaijan, as in other emerging markets, microenterprises are predominantly active in small-scale retail trade or transport. SME businesses, in contrast, are involved in a broader variety of activities and rather tend to provide non-essential goods and services (such furniture and household appliances or real estate services), for which demand typically decreases in economic downturns. In contrast to the large firms in the oil and gas industry, only very few MSMEs in Azerbaijan participate in foreign trade activities (IFC (2009)). However, SME borrowers are more likely than micro borrowers to have some of their income in foreign currency and are generally better able to deal with foreign currency risk because of their higher income streams (AccessBank (2008)).

The two products not only differ by their loan sizes (and the general characteristics of the firms taking them out) but also with respect to the loan granting process. While a personal

visit of the loan officer and an analysis of the business finances as well as the debt servicing capacity are part of the rigorous financial analysis of all business clients, the process is more structured for SME loans including the consideration of longer time-periods of data and financial projections. Therefore, the loan terms of SME loans capture a broader range of individual risk factors, whereas loan terms for micro loans are more standardized due to their small amounts. That the screening process for SME loans is more extensive becomes also apparent from the fact that the time between loan applications and the approval decision is longer for SME than for micro loans.

Given the differences between the various loan types and the clients they target, we treat agro, micro and SME loans separately throughout our analysis.

3.3 The dataset

In total, the bank disbursed 251,211 loans to 151,533 clients since the start of its operations. We exclude all observations with missing loan or firm characteristics as well as all retail loans to private households and loans to bank staff to focus on the bank's main client groups. Table 1 provides a detailed overview of the bank's business loan portfolio since its start of operations. While Panel A shows the number of disbursed loans by year for our three loan categories of agro, micro and SME loans and the number of rejected loans, Panel B displays the respective total volumes of the loans disbursed. The majority of loans in our sample are micro loans (75% in terms of numbers and 56% in terms of volume). However, when considering total loan volumes, it becomes clear that SME loans make up a sizable part of the bank's business loan portfolio with a share of 35%. Agro loans, which were introduced in 2007, seem to play an increasingly important role in the bank's lending business. Rejection rates were substantial in the beginning of the bank's operations but have come down to less than 6% in 2009. One explanation is that the bank deals with more and more repeat clients over time so that it can assess their credit risk better due to reduced informational asymmetries. At the same time, (potential) borrowers might have become acquainted to the bank's loan granting standards and have learnt to better self-assess whether their loan application will be successful (see Kirschenmann (2011) for borrower learning in repeated interactions with the same lender).

[Insert Table 1 here]

For each loan the dataset includes information on the loan amount and currency requested by the borrower as stated in the loan application form as well as the granted loan terms (amount, maturity and collateral) as stated in the loan contract. Furthermore, the data not only contains information on the actual clients, but also on those who applied for a loan, but were rejected. Table 2 provides definitions of all variables.

[Insert Table 2 here]

To examine relatively balanced time periods around the crisis shocks and to make sure that our results are not driven by possible procedural changes during the early years of the bank's operations, we concentrate our empirical analysis on those loans disbursed from the beginning of 2006 onwards until the end of our observation period in August 2009.[11] We also focus on the branches that were established before the crisis so that we have observations for both time periods (before and after the various crisis events) and our results are not biased because of a change in the geographical distribution of customers. This final sample consists of 168,483 loan applications from 88,370 firms.

3.4 The timeline of events and the impact of the crisis on credit availability

Since we observe both loan applications and actually granted loans we are able to establish the impact of the financial crisis on borrowers' requests and the bank's decision to approve or reject the loan application and to assess whether the three subgroups of loans are affected differently. Figure 1 displays the timeline of events related to the international transmission of the financial crisis to AccessBank. In particular, two major crisis events that may influence loan demand and supply decisions occurred in 2008.

Firstly, AccessBank experienced unexpected, temporary delays in its refinancing pipeline during the second and third quarters of 2008 so that it did not have as much funding as would have been needed to meet total credit demand. These delays can be considered unexpected because AccessBank's financial performance was strong throughout our observation period. More specifically, with respect to debt refinancing, the bank attracted funds from various international financial institutions (not only the shareholders) and received two funds denominated in Manat from private capital sources. AccessBank has been rated BB+ by Fitch Ratings – the highest rating in Azerbaijan – which helped it to complete the first bond issue on international capital markets by an Azeri issuer in February 2008. Also, the deposit

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[11] We also run all of our regressions with the full sample of loans extended since the bank's start of operations in October 2002 and find our main conclusions to hold.

portfolio was growing. Thus, the temporarily tight refinancing was not at all caused by a change in the investors' perception of the institution but solely by the turmoil in capital markets which induced the cancellation of and delay in international refinancing. International capital markets were unable to provide the necessary liquidity because, for instance, a planned CDO could not be placed in the prevailing environment.

Together with the strong portfolio growth, these unexpected funding difficulties forced the bank to slow down its lending activities while the economy (as most other emerging market economies) was still growing. At the same time, it successfully undertook efforts to secure additional, initially not planned, financing and the funding situation relaxed from the fourth quarter of 2008 onwards although the financial crisis had reached its peak with the failure of Lehman Brothers. At first sight, this may seem counterintuitive but (commercial) investors in microfinance have shown a "flight to quality" in times of crisis (Standard & Poor's (2008)) corroborating the overall excellent performance of AccessBank during the crisis. Summarizing, this first event can be considered as a pure funding or supply side shock while there was no confounding shock to the demand side.

Generally, one would expect this event to mainly influence the bank's ability to meet given loan requests. However, the tight refinancing may also mirror itself in the number of loan applications because of the particular marketing strategy of AccessBank (and similar MSME banks). All in all, it seems that MSMEs in Azerbaijan, and those that have never had a loan before in particular, do not know much about the services banks offer and complain about their terms and conditions although only knowing them by word of mouth (IFC (2009)). To attract new borrowers, the bank therefore regularly organizes local community events to market its products (AccessBank (2007)). During the time of tight refinancing, loan officers were encouraged to take vacation which is equal to curtailing the active marketing of the products and thus the number of loan applications may also decline due to the temporary squeeze in the bank's liquidity. Therefore, we expect the tight refinancing to have a negative effect on all firms' (agro, micro and SME) credit availability via the discouragement of potential borrowers. We do not expect to find an effect on loan approval rates because the economy was still largely unaffected by the crisis.

[Insert Figure 1 here]

Secondly, together with the sharp decline in oil prices, the economic crisis finally hit Azerbaijan in the fourth quarter of 2008, exactly at the time when the funding situation of

AccessBank started to normalize. Some first spillovers of the economic crisis already occurred during the summer of 2008 when oil prices and exports started to decline. However, the sharp contraction of exports happened in the fourth quarter of 2008 and the first quarter of 2009 with exports to the neighboring CIS countries exhibiting a more sustained decline than total exports (see Appendix 1 for details). At the same time, households' income streams were affected by the effects of this global crisis as remittances fell by around 20% in 2009 compared to 2008 (World Bank (2011)). Together with the beginning slump of the retail car market and decreasing apartment sales reported in November 2008[12] this implies that the demand for products, non-subsistence goods (and services) in particular, declined from the fourth quarter of 2008 onwards. Finally, bank credit to households contracted by around 2% in 2009 compared to a rapid expansion during the years before (Economist Intelligence Unit (2010)). Turning to the bank's marketing efforts during this time period, in contrast to the period of tight refinancing, the availability of business loans was explicitly and actively marketed in 2009 to show AccessBank's ability and willingness to be a reliable partner also during the crisis (AccessBank (2009)).

Taking all this together, the effect of the real economy shock on the number of loan applications is ambiguous. On the one hand, loan applications could increase at AccessBank because of the liquidity problems and the reduced lending at other banks. On the other hand, loan applications could decrease because business borrowers saw their sales decline and thus, for instance, postponed investment. However, in contrast to the first event, we expect approval rates to decrease because of the worsening economic situation. Screening of borrowers should have become more important to identify the less risky as borrower quality in general started to deteriorate. We expect to find a differential effect for agro, micro and SME borrowers. SME loans are likely to be affected most because SME firms often produce non-subsistence goods or services or may even be suppliers to the oil industry and are therefore more likely to be hit by the economic slowdown and to see their credit quality deteriorate.

Our empirical analysis will focus on these two distinct crisis events with the pre-crisis period comprising the years 2006 and 2007.

3.5 Determinants of credit approval

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[12] See Economist Intelligence Unit (2009a) and
http://www.eurasianet.org/departments/insightb/articles/eav120108a.shtml.

We analyze the effects of the 2007-2009 crisis on the availability of credit for our sample of agro, micro and SME loans with a linear probability model (LPM)[13] in which the dependent variable $\Pr(Approved)_{i, k, t}$ is the probability of firm i to receive loan k in period t:

$$\Pr(Approved)_{i,k,t} = \alpha_i + \beta_1 C_{k,t} + \beta_2 L_{k,t} + \beta_3 F_{i,t} + \varepsilon_{i,k,t} \qquad (1)$$

$C_{k,t}$ is a dummy variable that indicates whether loan k was disbursed during one of the crisis events (i.e. the funding or the real economy shock) while $L_{k,t}$ and $F_{i,t}$ are vectors of loan and firm characteristics including 6 bank branch dummies that control for the location of loan origination.

Crisis indicators and loan characteristics

In line with the timeline of the crisis depicted in Figure 1, we include two dummy variables to compare each of the two distinct crisis periods of interest with the non-crisis years. *Funding shock* equals one during the months of tight refinancing between April and August 2008 and zero in the non-crisis years 2006 and 2007.[14] *Real economy shock*, in contrast, equals one for those loans disbursed from October 2008 onwards and zero for the loans disbursed during the non-crisis years 2006 and 2007. We account for the structure of the bank's loan portfolio by introducing the dummy variables *Agro*, *Micro* and *SME* which are one if the loan is an agro, micro or SME loan, respectively.

We include *Repeat loan* as a relationship indicator since close bank-borrower relationships have been found to increase credit availability (e.g. Petersen and Rajan (1994)).[15] It is a dummy variable indicating whether a loan is a firm's later vs. first loan. We expect the bank to be able to gather valuable private information when interacting repeatedly with the same borrower, which, in turn, may benefit the borrower (see Allen and Gale (1999), Boot (2000) and Ongena and Smith (2000)). Additionally, if a firm requests a very high loan amount, the bank may be more likely to reject the loan application or to grant a considerably lower loan amount. Therefore, we include the variable *Requested amount* which is the

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[13] We re-estimate all our regressions using probit and logit models. Since coefficients yield the same signs, we restrict the presentation of results to the LPM models due to the difficulty in deriving marginal effects in non-linear regressions with interaction terms (see Ai and Norton (2003)).

[14] Defining the pre-crisis period until August 2007 does not change our main conclusions but does not allow us to study the impact of the crisis on agro loans as these were only introduced in August 2007. The first quarter of 2008 is left out from the refinancing shock analysis to make sure that periods are clearly marked-off from each other. Yet, our results are not sensitive to assigning Q1 2008 to the non-crisis period.

[15] We repeat all estimations with two other relationship measures, the length of the bank-borrower relationship and the number of times a borrower has taken out a loan before the current loan, and find that results remain qualitatively unchanged.

requested loan amount in USD. The bank's decision to grant a loan and its willingness to grant the requested amount should critically depend on the perceived risk of the loan. One means to make a loan safer is to pledge collateral. We include the variable *Collateral* which is the value of the pledged collateral as a share of the requested amount (in %). The dummy variable *Manat requested* indicates whether a loan is requested in the local currency Manat vs. in foreign currency (USD).

Firm characteristics

We include several firm characteristics that may influence the bank's decision to grant a loan. Since most of the firms in the sample are run by their owners, owner characteristics are of particular importance. First of all, we include the borrower's *Age* (in years) at the time of the first loan with the bank. Older firm owners may be more experienced and therefore less risky borrowers, which would mean a positive relation between borrower's age and credit availability. In microfinance, often the argument is made that women are better borrowers because they are more reliable in repaying their loans (e.g. Armendariz de Aghion and Murdoch (2005)). To capture a possible gender effect, we include the dummy variable *Male* which is one if the borrower is male and zero if she is female. A similar reasoning might be true for a *Married* (dummy variable that is one if the borrower is married and zero otherwise) borrower who has responsibility towards a family so that we expect to find a positive relation with credit availability.

3.6 Summary statistics

Table 3 presents summary statistics of our loan and firm variables for the approved loans. Panel A provides statistics for the full sample, whereas Panel B displays sample means by loan category for the periods before and during the *Real economy shock*.

Panel A shows that most of the loan applications in our sample are successful (*Approved*) which may be another indication of informal discouragement of borrowers before they actually fill in a loan application. The statistics confirm that the majority of approved loans in our sample are micro loans with an average *Requested amount* of 3,986 USD. Interestingly, loans are regularly collateralized at clearly more than 100% (*Collateral*). Considering firm characteristics, the majority of borrowers are *Male* (83%) and *Married* (72%).

[Insert Table 3 here]

Panel B of Table 3 presents statistics for the three loan categories of agro, micro and SME loans. To assess changes in loan terms and the borrower pool along the crisis, it compares loan and firm characteristics of approved loans for the time before and during the *Real economy shock*. The statistics confirm that the availability of agro loans in terms of approval rates was not negatively affected by the *Real economy* event. For micro loans, the impact of the crisis on the credit availability is relatively small as well. For SME loans, in contrast, the probability that a loan application is *Approved* decreases by 6 percentage points after the economic crisis hit. The average *Requested amount* for all loan types increases regardless of the economic downturn. This is similar to Berg and Schrader (2011) who find increased demand of micro borrowers after unexpected external shocks such as volcanic eruptions. *Collateral*, in contrast, decreases for all loan types after the economic crisis hit which may be due to the fact that real estate prices dropped considerably. However, on average loans are still collateralized by much more than 100% during the economic downturn.

Establishing good bank-borrower relationships seems to be especially important for micro and SME clients as the share of *Repeat loan*s increases for both loan groups during the economic crisis. This confirms the graphical analysis in Figure 2 that existing bank-borrower relationships help to enhance credit availability in times of crises. Interestingly, the economic crisis influences the denomination of agro and micro loans considerably. After the onset of the economic downturn 90% of agro loans and 69% of micro loans are requested in local currency (*Manat*) compared to 49% and 41% before. This finding may at least partly be explained by the fear of a depreciation of the local currency towards the USD after the currencies of neighboring countries such as Russia and Kazakhstan plunged considerably due to the crisis, even though the Manat did in fact only depreciate little. The statistics on firm characteristics imply that the pool of borrowers is very similar in this respect before and during the economic crisis.

4 Results

4.1 Graphical analysis of loan applications and approvals

Figures 2 and 3 display the number of loan applications (168,483 in total) and loan approvals (158,481 in total) and the respective approval rates during the period 2006 to 2009 for new vs. repeat borrowers in our three subsamples respectively.

[Insert Figures 2 and 3 here]

Figure 2 shows that loan applications and approvals develop differently for the three subgroups. Agro loan applications drop considerably between April and June 2008, but interestingly, repeat borrowers are much less discouraged.[16] After this short period of retrenchment loan applications again steadily increase for both new and repeat borrowers (Figure 2a). This is a first indication that the agricultural sector remained mostly unaffected by the economic crisis. Nevertheless, the bank's tight refinancing clearly affects agro lending because clients were obviously deterred from applying for loans. *Loan approval rates* (approved loans as a share of applied loans) decrease somewhat, for the new borrowers in particular, during the period of the tight refinancing but remain at high levels of more than 94% afterwards (Figure 3a).

For micro loans, we similarly observe a considerable decrease in loan applications in the second quarter of 2008 for new and repeat loans (Figure 2b). The *approval rate* analysis (Figure 3b) shows that new micro loans are on average about 4 percentage points less likely to be approved than repeat micro loans and that approval rates are more volatile for new than for repeat micro borrowers. However, while the discouragement effect seems to be smaller for repeat borrowers, their approval rates decrease slightly after the economic crisis hit. These findings suggest that both the bank's liquidity squeeze as well as the economic downturn affected micro borrowers' credit availability

Figure 2c reveals that the demand for new and repeat SME loans is more volatile; however there is also a clear decline in the number of loan applications after March 2008. Considering the *approval rates* of SME loans (Figure 3c), we observe a negative trend after the start of the economic crisis. Approval rates for SME loans decrease much more than for agro and micro loans from around 90% to 50% for new SME loans and from above 95% to 75% for repeat SME loans. This indicates that the comparatively bigger firms in our sample are more seriously hit by the crisis. There are several potential reasons for these findings: First, during the tight refinancing period it may have been easier and cheaper for the bank to "save" a certain amount of liquidity by discouraging as well as denying some SME loans in contrast to an even larger number of micro loans. Second, the larger firms may have had to cope with a larger and more persistent decrease in demand for their products once the economic crisis hit implying that lending to the more heterogeneous SMEs became more

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[16] Partly the drop may be due to seasonal effects as agro clients' income streams usually peak in spring and summer. However, if the decrease was only driven by cyclical patterns in agriculture, effects should have been similar for new and repeat agro borrowers (as is the case exactly one year later during the second quarter of 2009). Apart from that, micro and SME loans show a sharp decrease in loan applications starting at exactly the same point in time.

risky than lending to agro and micro businesses.[17] Third, SME clients are more likely to finance fixed assets which are first to be postponed in times of crises while micro clients often take out working capital loans. And fourth, with a decrease in housing prices in Azerbaijan, borrowing to finance real estate became less attractive.

The graphical analysis in Figure 2 suggests that both <u>external events</u> have an impact on the lending operations of AccessBank but that these effects vary for the three different types of loans. While credit availability for agro borrowers decreases for a very short period during the refinancing delays, credit availability for micro borrowers is tightened moderately and for SME borrowers most persistently.[18] Apart from that, Figure 2 establishes the different <u>channels</u> through which the funding and the real economy shock influence credit availability. The refinancing delays seem to mainly work via the discouragement channel (i.e. less active marketing, loan officers on holidays), whereas the real economy effect works via the loan approval channel as well.

Moreover, the analysis shows that previous bank relationships help borrowers to mitigate negative crisis effects which is in line with the findings of, for instance, Berg and Schrader (2011) and Puri, Rocholl and Steffen (2010). This relationship effect works mainly through the discouragement channel, i.e. repeat borrowers are less likely to be discouraged. If they apply for a loan, their approval likelihood is generally higher than that for new borrowers, but it also decreases during the economic downturn.

As the structure of our dataset also allows us to measure credit availability on an individual level, the following analysis will be concerned with the impact of the crisis on loan approval rates.

4.2 Funding shock and the likelihood that a loan application is approved

We start our analysis by studying the effect of the unexpected refinancing delays on the likelihood that a loan application is approved by the bank. Table 4 reports results from LPM regressions for the full sample and our three subsamples based on our three loan categories. Standard errors are reported in parentheses and are adjusted for clustering at the borrower level. All coefficients are multiplied by 100 so that they can directly be read as percentages.

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[17] Interestingly, Figure 2 also shows that loan applications of new borrowers increase after the onset of the economic slowdown, while loan applications from repeat borrowers decrease. This is in line with our reasoning that loan applications may actually increase during the economic downturn because of the liquidity problems of other Azeri banks. However, the decline in approval likelihoods for both new and repeat SME clients indicates the increased riskiness of SME borrowers in general. This also indicates that intense screening is the adequate mechanism to deal with a shock that is a pure real economy shock for AccessBank but also a liquidity shock for the other banks in the country.

[18] Analyzing total loan volumes and volume constraints also reveal that SME borrowers are most affected by the crisis.

The results confirm the evidence from the graphical analysis and show that the refinancing shock mainly impacted on firms' credit availability via the discouragement channel. Those loans that were actually applied for have, if anything, a higher likelihood to be approved during the months of tight refinancing compared to the non-crisis years of 2006 and 2007.

The estimates in Column (1) show, for the full sample, that the approval likelihood for loan applications of SME borrowers (the base category) made during the *Funding shock* is 2.9 percentage points higher than their approval likelihood during the non-crisis period. *Agro* and *Micro* loan applications are significantly more likely to be successful than SME loan applications during the non-crisis years. On average, agro (micro) loan applications have an 8.4 percentage point (5.0 percentage point) higher probability to be finally granted compared to SME loan applications in 2006 and 2007. To study how the relation between our loan groups and the probability of loan approval is influenced by the funding shock, we study the interaction terms *Agro*Funding shock* and *Micro*Funding shock*. Both interaction terms are negative but only marginally significant and smaller than the main effects. This means that, during the time of tight refinancing, the difference in the probability to be granted a loan decreases somewhat when comparing agro and micro to SME loans but the former still have a higher approval likelihood.

Columns (2) to (4) report estimates of LPM regressions for agro, micro and SME loans respectively to further disentangle differences in the factors determining loan approval rates for these three categories. Now, the main effect of our *Funding shock* indicator displays the impact of the unexpected refinancing delays on new loans' approval likelihood showing that the *Funding shock* has no negative impact at all on loan approvals for those new loans that were actually applied for. The significantly positive main effect of *Repeat loan* implies that being a repeat borrower is crucial for increasing credit availability for all three loan groups in the non-crisis period with the effect being most pronounced for SME loan. Since SME loans involve considerably larger loan amounts, the information gathered from previous interactions with borrowers may be most valuable in this segment.

The interaction term *Repeat loan*Funding shock* is insignificant for agro and significantly negative but very small for micro loans. This indicates that, whether in good or bad times, having a previous relationship with the bank is similarly beneficial in increasing the approval likelihood after applying for a loan. For SME loans, the interaction term *Repeat loan*Funding shock* is significantly negative but economically smaller than the main effect of *Repeat loan*. This means that repeat compared to new SME borrowers still have a higher approval likelihood during the time of tight refinancing but the difference in approval

likelihoods becomes much smaller. This is in line with the interpretation of the graphical findings that the relationship effect mainly works via less discouragement for the repeat borrowers during the time of tight refinancing.

The denomination of the loan influences credit availability adversely for the three loan groups. While agro and micro loans are more likely to be approved when they are requested in *Manat*, SME loans requested in *Manat* are less likely to be granted. One explanation for this result lies in the bank's funding structure. Since it receives most of its funding in USD, it has an incentive to lend on in foreign currency to prevent currency mismatches on its own balance sheet. At the same time, the bank seems to channel its funds according to the borrowers' abilities to deal with foreign currency risks since SMEs are likely to be more capable to handle USD loans or even earn (some of) their income in USD (Brown, Kirschenmann and Ongena (2011) provide similar evidence for micro and SME lending in Bulgaria).

Since the missing refinancing funds during the second and third quarters of 2008 were to be denominated in USD which should have impacted on the bank's preferred lending currency we study the interaction term *Manat*Funding shock* for the three loan types in unreported regressions (results are available from the authors on request). Indeed, this analysis reveals that SME loans are less likely to be approved when requested in Manat only during the non-crisis period but actually more likely to be approved when requested in Manat during the time of tight refinancing. There is no such effect found for SME loans when studying the interaction effect *Manat*Real economy shock*.

Turning to the impact of the firm characteristics, we find that only the variable *Married* has a uniform, significantly positive impact on loan approval rates for all three loan categories. Of all our firm characteristics it seems to provide the strongest signal to the bank. The borrower's gender works in the opposite direction for SME and agro vs. micro loans. For SME and agro loans, being *Male* decreases the probability to receive a loan. Yet, male borrowers who request micro loans have a slightly higher probability to succeed in applying for a loan in comparison to female borrowers. Finally, a borrower's *Age* at first loan disbursement plays a minor role in determining credit availability.[19]

4.3 Real economy shock and the likelihood that a loan application is approved

Table 5 re-runs our regressions from Table 4 but concentrates on the effect of the real economy shock on the bank's decision to approve a loan application. As before, standard

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[19] Including *Age squared* as an additional variable, we find *Age* to be positive and *Age squared* negative, but effects are either insignificant or very small.

errors are reported in parentheses and are adjusted for clustering at the borrower level. All coefficients are multiplied by 100 so that they can directly be read as percentages. The results confirm the main hypothesis: the real economy shock has, in contrast to the funding shock, some negative impact on credit approval rates, but the effect varies significantly between agro, micro and SME loans.

[Insert Table 5 here]

More specifically, in Column (1) the variable *Real economy shock* shows that SME loan applications made from October 2008 onwards compared to the non-crisis years have, on average, a 6.1 percentage point lower chance to be approved. The results on the differential impact of the real economy shock on loan approval in the three loan groups differ considerably from the funding shock results with both main effects and both interaction terms being significantly positive. This means that the probability to be granted a loan is not only higher for *Agro* and *Micro* loans compared to SME loans in the non-crisis years but that this effect is even more pronounced after the onset of the economic downturn. For instance, during the non-crisis years *Agro* loans are 6.8 percentage points more likely to be approved than SME loans. During the economic crisis, this difference in probabilities increases by another 6.6 percentage points. The effects are qualitatively the same for *Micro* loans, yet they are economically smaller.

The separate regressions for agro, micro and SME loans respectively in columns (2) to (4) of Table 5 include the interaction term *Repeat loan*Real economy shock* to assess whether previous bank relationships are especially beneficial during the economic crisis. The main effect of our *Real economy shock* indicator displays the impact of the economic downturn on new loans' approval likelihood. It is positive for agro and micro loans, however for the latter it is negligible in economic terms. For new SME borrowers, in contrast, the probability to receive a loan decreases during the economic crisis by 7 percentage points. As in the case of the tight refinancing period, we find that being a repeat borrower increases the likelihood of loan approval similarly in good as in bad times.[20] The results for the other loan and firm characteristics are qualitatively very similar to Table 4.

Summarizing, we find that the impact of the economic crisis on credit availability strongly depends on firm size and on the industry a firm operates in. These results relate to the specific structure of Azerbaijan's economy with its larger firms being more dependent on oil

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[20] The interaction effect is significantly negative for micro loans, yet it is economically not very large.

price fluctuations and facing more variable demand for their products. Micro firms, on the contrary, rather produce subsistence goods or deliver essential services and agro borrowers mostly grow fruit and vegetables or raise sheep for the local market so that both are considerably less affected by economic fluctuations. These varying levels of affectedness seem to influence the bank's risk assessment of firms and to finally translate into accordingly varying levels of credit availability.

4.4 Geographical variation in the crisis shock

To confirm that the two shocks are distinctly different, we use the location of the branch that granted the loan, which is also a proxy for the location of the firm, to study exogenous variation in the severity of the crisis shock in the following analysis. Given that Azerbaijan's economy is weakly diversified and highly dependent on the oil and gas sector, we distinguish between *Petroleum locations*, i.e. locations in which the oil and gas industry is most important according to the State Statistical Office of the Republic of Azerbaijan[21] and the location of the major oil and gas fields, and the rest of the country. These petroleum locations are the capital city of Baku and the close-by next biggest city Sumqayit. We then analyze the interaction effects *Funding shock*Petroleum location* and *Real economy shock*Petroleum location*. We expect the latter interaction term to be significantly negative as the petroleum locations should be affected more severely by the economic downturn. In contrast, the funding shock led to short funding which should have restricted lending in all branches over the country. Therefore, we expect the interaction term *Funding shock*Petroleum location* to be statistically insignificant.

Table 6 displays results for LPM regressions on the bank's decision whether to approve a loan application or not for the full sample and the three subsamples based on our loan type categories. Columns (1-4) present the results for the effect of the funding shock, while columns (5-8) contain the respective results for the real economy shock.

[Insert Table 6 here]

As expected, the interaction term *Funding shock*Petroleum location* is not statistically significant in the full sample as well as for agro and micro loans. Together with the significantly positive main effect *Funding shock* this indicates that for loans made in non-petroleum locations approval rates for those borrowers who actually apply for a loan are

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[21] See www.azstat.org/statinfo/industry/en/index.shtml#.

higher during the time of tight refinancing in comparison to the non-crisis years, while this effect is not significantly different in petroleum locations. For SME loans, in contrast, the interaction effect displayed in column (4) is significantly negative but economically smaller than the main effect of *Funding shock*. This means that SME loans made in petroleum compared to non-petroleum locations still have a higher approval likelihood during the time of tight refinancing but the difference in approval likelihoods becomes much smaller.[22]

With respect to the real economy shock, we additionally deepen the analysis by dividing its effect into a short-term (*Real economy shock 2008*) and a long-term (*Real economy shock 2009*) component capturing the respective months in 2008 or 2009 after the onset of the economic downturn.[23] For the full sample in column (5), the very small positive main terms of *Real economy shock 2008* and *Real economy shock 2009* together with the larger and significantly negative interaction effects show that loans made in petroleum locations have a significantly lower approval likelihood after the start of the economic slowdown than loans made in non-petroleum locations. The latter finding also holds when studying the three loan categories separately in columns (6-8). For SME loans in column (8) the interaction terms are not statistically significant but economically relevant. We find that in the early months of the economic slowdown the approval likelihood of SME loans in petroleum locations also decreases, while, in contrast to agro and micro loans, this decrease is reversed again in the longer-term. Interestingly, we also find that SME borrowers seem to be hit by the crisis in the whole country, whereas agro and micro borrowers are only affected in petroleum locations as for the latter two groups the main effects *Real economy shock 2008* and *Real economy shock 2009* are positive. For SME borrowers, in contrast, the approval likelihood for loans granted in non-petroleum locations also decreases significantly and considerably with some delay in 2009 compared to the non-crisis years.

These results confirm our hypothesis that the real economy shock is distinctly different from the funding shock. The real economy shock affects credit availability negatively especially in those locations that can be expected to be hit hardest, i.e. the petroleum locations. The funding shock, on the contrary, has no negative and no differential (except for SME borrowers) effect for petroleum- vs. non-petroleum locations. This confirms our previous finding that the refinancing delays are a pure supply shock impacting on credit availability mainly through the discouragement channel.

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[22] This result is mainly driven by the fact that for the 10% of SME loans that are actually requested in non-petroleum locations the approval likelihood increases considerably during the time of tight refinancing, while this increase is only very moderate in the petroleum locations where 90% of SME loans are applied for.

[23] Our conclusions are unaltered if we refrain from this additional time split, but the differential short-term vs. longer-term effect for SME loans would remain hidden in this analysis.

5 Conclusions

This paper studies the impact of the financial crisis on the credit availability for micro, small and medium enterprises in Azerbaijan using a unique dataset of 168,483 loans made between January 2006 and August 2009 by AccessBank Azerbaijan. The timeline of events in Azerbaijan allows us to study a pure supply side shock to the bank's refinancing in the second and third quarters of 2008, while firms had not yet been affected by the economic crisis. Then, we can contrast its impact on credit availability for firms of different sizes and industries from the impact of the economic crisis shock that reached Azerbaijan in the fourth quarter of 2008. On top of this, the structure of the dataset allows us to analyze credit availability on an aggregate level as well as on an individual loan level, thereby identifying two major channels of credit constraints.

By analyzing aggregate numbers of loan applications and approvals, we derive the first channel of credit constraints. We observe that its tight refinancing in the second and third quarters of 2008 seems to lead the bank to discourage (potential) borrowers from applying for new or additional loans. The bank's temporary liquidity squeeze therefore resulted in a slowdown of its credit portfolio so that not all the demand could be met during this limited period of time. At the individual loan level, for the funding shock we find that approval rates for those (potential) borrowers who actually apply for a loan are not negatively affected in any borrower group. For the real economy shock, by contrast, our findings suggest that credit availability for agro loan borrowers is hardly affected by this event while micro loans face a moderate and SME loans a considerable reduction in approval rates. Apart from that, our results show that bank relationships help increase credit availability in good as in bad times.

To gain deeper insights into the differential effects of the two crisis shocks on loan approval, we study an exogenous geographic variation in the severity of the crisis shock by distinguishing between locations in which the oil and gas industry is most important and the rest of the country. These results confirm that the two shocks differently impact on credit availability. The real economy shock affects credit availability negatively especially in those locations that can be expected to be hit hardest, i.e. the petroleum locations. Our results for the funding shock, on the contrary are in line with our previous finding that the refinancing delays are a pure supply shock impacting on credit availability mainly through the discouragement channel.

In contrast to anecdotal evidence from some more advanced and competitive markets in Eastern Europe (e.g. ProCredit Holding (2009)) which suggests that banks worried especially

about their lending to micro clients and limited their exposure in that segment because many of these clients carried high levels of (consumer) debt, we find that credit availability is mostly affected for SME customers. However, one caveat has to be made concerning the interpretation of our results. To comprehensively assess the effects of the crisis on credit availability for the various types of enterprises one would have to more explicitly take into account how many borrowers have been deterred from applying for a loan by their loan officers. While we can provide some evidence on this aspect in our aggregate analysis, it is possible that the active marketing strategy which the bank uses to attract new customers is more intensively employed in the segment of micro loans compared to SME loans. This would imply that a decrease in these marketing activities would have a larger impact on the micro than on the SME loan portfolio and we would underestimate the negative effect of the crisis on micro credit availability. This opens up room for future empirical research to broaden the evidence on the effects of the financial crisis on credit availability.

Our results have implications for policy makers and development practitioners aiming at sustainably fostering credit access for micro, small and medium businesses in developing and transition economies. First, supporting MSME banks in building up diversified credit portfolios that include various loan categories with respect to size and industry may increase these banks' stability in times of a global financial and economic crisis as the 2007-2009 one. However, further research on how different banks' portfolio quality is affected by such a crisis would be needed to shed more light on this aspect. Second, broadening MSME banks' refinancing basis to achieve greater resilience against external shocks remains an important topic. Recent attempts to create adequate (long-term) refinancing instruments in local currency therefore seem to be a crucial step to help MSME banks to overcome refinancing problems.

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Table 1. Lending by year and loan type

This table reports statistics on the bank's loan portfolio for the full sample and the following subsamples for the whole period since the bank's foundation in October 2002: *Agro*: Loans intended for agricultural investments. *Micro*: Loans with loan amounts up to 10,000 USD (from 2008: also with amounts up to 20,000 USD). *SME*: Loans with loan amounts of more than 10,000 USD and up to 500,000 USD. *Rejected*: Loan applications that were turned down by the bank.

Panel A. Number of loans disbursed and rejected

	Rejected	Disbursed			Total
		Agro	Micro	SME	
2002	81		104		185
2003	502		2,891	66	3,459
2004	424		4,008	175	4,607
2005	518		7,224	436	8,178
2006	1,362		16,491	813	18,666
2007	2,408	2,163	32,531	1,328	38,430
2008	3,088	10,105	41,246	1,633	56,072
2009	3,144	15,643	35,529	1,008	55,315
Total	11,527	27,902	140,024	5,459	184,912

Panel B. Total volumes of loans disbursed (USD)

	Agro	Micro	SME	Total
2002		113,077		113,077
2003		5,691,747	1,269,945	6,961,692
2004		46,077,936	4,673,496	50,751,432
2005		62,583,051	12,365,058	74,948,108
2006		32,118,408	25,377,105	57,495,513
2007	3,103,264	58,840,534	44,415,355	106,359,153
2008	18,285,522	101,915,005	68,532,216	188,732,742
2009	27,117,810	90,049,888	40,972,025	158,139,722
Total	48,506,596	397,389,645	197,605,200	643,501,441

Table 2. Variable definitions

Variable	Definition
Dependent variable	
Approved	Borrower's loan request was approved (1=yes, 0=no)
Loan characteristics	
Real economy shock	Loan was granted after the onset of the economic downturn (10/2008) vs. loan was granted in 2006 or 2007 (1=yes, 0=no)
Funding shock	Loan was granted during the time of tight refinancing between 04/2008 and 08/2008 vs. loan was granted in 2006 or 2007 (1=yes; 0=no)
Agro	Loan is an agro loan (1=yes, 0=no)
Micro	Loan is a micro loan with an amount up to 10,000 USD (20,000 USD from 2008 onwards) (1=yes, 0=no)
SME	Loan is an SME loan with an amount between 10,000 (20,000) and 500,000 USD (1=yes, 0=no)
Requested amount	Requested loan amount (USD)
Collateral	Value of collateral as a share of the requested amount (%)
Repeat loan	Loan is a repeat loan vs. first loan (1=yes, 0=no)
Manat requested	Loan is requested in the local currency AZN (Manat) vs. USD (1=yes, 0=no)
Branch	Branch dummies which are one if loan was granted at one of the following branches: Baku, Gyanja, Khachmaz, Lenkoran, Sheki and Sumqayit
Petroleum location	Loan was granted in a location with high importance of the oil and gas sector, i.e. Baku or Sumqayit (1=yes; 0=no)
Firm characteristics	
Age	Age of firm owner at date of disbursement of first loan (years)
Male	Firm owner is male vs. female (1=yes, 0=no)
Married	Firm owner is married at date of disbursement (1=yes, 0=no)

Table 3. Descriptive statistics

Panel A. Loan and firm characteristics

This table displays summary statistics for our loan and firm variables based on the main analysis sample starting in 2006. See Table 2 for definitions of all variables. Note that summary statistics for the variable *Approved* are calculated including all loans while for all other variables only those loans that were approved by the bank are included in the calculations.

	N	Mean	Median	Minimum	Maximum
Loan characteristics					
Approved	168,483	0.94	1	0	1
Real economy shock	118,848	0.55	1	0	1
Funding shock	76,131	0.30	0	0	1
Agro	158,481	0.18	0	0	1
Micro	158,481	0.79	1	0	1
SME	158,481	0.03	0	0	1
Repeat loan	158,481	0.47	0	0	1
Requested amount	158,481	3,986	2,000	80	5,000,000
Collateral	158,481	275	192	0	34,618
Manat requested	158,481	0.59	1	0	1
Firm characteristics					
Age	158,481	42	42	19	83
Male	158,481	0.83	1	0	1
Married	158,481	0.72	1	0	1

Panel B. Sample means by loan type and crisis

This table reports sample means of our loan and firm variables for the non-crisis (years 2006 and 2007) and the *Real economy shock* period for the subsamples of *Agro*, *Micro* and *SME* loans. ***, **, * denote that variables are significantly different from each other at the 0.01-, 0.05- and 0.1-level using a two-sided T-test. See Table 2 for definitions of all variables. Note that summary statistics for the variable *Approved* are calculated including all loans while for all other variables only those loans that were approved by the bank are included in the calculations.

	Agro loans				Micro loans				SME loans			
	Real economy shock = 0 N = 2,163	Real economy shock = 1 N = 18,366	Diff		Real economy shock = 0 N = 49,022	Real economy shock = 1 N = 45,776	Diff		Real economy shock = 0 N = 2,141	Real economy shock = 1 N = 1,380	Diff	
Loan characteristics												
Approved	0.95	0.96	-0.02	***	0.94	0.94	-0.01	**	0.89	0.84	0.06	***
Repeat loan	0.34	0.34	0		0.40	0.56	-0.16	***	0.70	0.73	-0.03	**
Requested amount	1,710	2,180	-470	***	2,271	3,109	-838	***	41,333	51,307	-9,973	***
Collateral	343	240	251	***	357	202	155	***	501	462	40	**
Manat requested	0.49	0.90	-0.41	***	0.41	0.69	-0.28	***	0.02	0.01	0.01	
Firm characteristics												
Age	44.47	43.68	0.79	***	42.25	40.97	1.28	***	43.46	42.68	0.78	***
Male	0.88	0.90	-0.02	***	0.83	0.80	0.03	***	0.91	0.91	0	
Married	0.80	0.79	0.01		0.72	0.70	0.03	***	0.83	0.82	0.01	

Table 4. Funding shock and loan approvals

This table reports results from LPM regressions for the full sample and the subsamples of *Agro*, *Micro* and *SME* loans for the period 2006-2009. Standard errors are reported in parentheses and account for clustering at the borrower level. All coefficients are multiplied by 100 so that they can directly be read as percentages. The dependent variable is *Approved* which is a dummy variable indicating whether a loan application was approved by the bank or rejected. All explanatory variables are defined in Table 2. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level

	(1) Full sample	(2) Agro loans	(3) Micro loans	(4) SME loans
Funding shock	2.946***	0.951	1.391***	7.027***
	(1.125)	(0.826)	(0.347)	(2.485)
Agro	8.409***			
	(0.865)			
Micro	5.000***			
	(0.726)			
Agro*Funding shock	-2.251*			
	(1.252)			
Micro*Funding shock	-1.979*			
	(1.141)			
Repeat loan	5.460***	2.299**	5.701***	10.831***
	(0.170)	(0.938)	(0.206)	(1.471)
Repeat loan*Funding shock		0.546	-0.836**	-6.452**
		(1.091)	(0.396)	(2.713)
Ln(Requested amount)	-0.579***	2.123***	-0.655***	-0.198
	(0.136)	(0.495)	(0.144)	(0.763)
Collateral	0.006***	0.016***	0.006***	0.005***
	(0.001)	(0.003)	(0.001)	(0.001)
Manat requested	1.250***	1.633**	1.222***	-9.182*
	(0.193)	(0.712)	(0.201)	(5.170)
Age	0.018*	0.008	0.024**	-0.081
	(0.010)	(0.027)	(0.010)	(0.066)
Male	0.660***	-1.362*	0.895***	-3.359**
	(0.238)	(0.725)	(0.253)	(1.637)
Married	1.245***	1.455**	1.153***	2.913**
	(0.223)	(0.733)	(0.236)	(1.479)
Constant	86.619***	74.273***	91.778***	86.720***
	(1.659)	(4.510)	(1.267)	(9.061)
Observations	80,277	6,303	70,765	3,209
R² adjusted	0.035	0.043	0.035	0.045
Branch fixed effects	yes	yes	yes	yes

Table 5. Real economy shock and loan approval

This table reports results from LPM regressions for the full sample and the subsamples of *Agro*, *Micro* and *SME* loans for the period 2006-2009. Standard errors are reported in parentheses and account for clustering at the borrower level. All coefficients are multiplied by 100 so that they can directly be read as percentages. The dependent variable is *Approved* which is a dummy variable indicating whether a loan application was approved by the bank or rejected. All explanatory variables are defined in Table 2. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level.

	(1) Full sample	(2) Agro loans	(3) Micro loans	(4) SME loans
Real economy shock	-5.403***	2.695***	0.678**	-6.998***
	(1.077)	(0.687)	(0.292)	(2.448)
Agro	6.760***			
	(0.846)			
Micro	3.999***			
	(0.709)			
Agro*Real economy shock	6.555***			
	(1.182)			
Micro*Real economy shock	5.518***			
	(1.089)			
Repeat loan	4.991***	2.717***	5.906***	10.325***
	(0.145)	(0.932)	(0.204)	(1.475)
Repeat loan*Real economy shock		-1.520	-1.311***	1.699
		(0.968)	(0.317)	(2.678)
Ln(Requested amount)	-0.793***	1.427***	-0.866***	-0.807
	(0.124)	(0.355)	(0.133)	(0.808)
Collateral	0.006***	0.020***	0.006***	0.005***
	(0.001)	(0.002)	(0.001)	(0.001)
Manat requested	1.359***	2.747***	1.246***	-14.507***
	(0.173)	(0.534)	(0.182)	(4.933)
Age	0.014*	0.007	0.023**	-0.109*
	(0.008)	(0.016)	(0.009)	(0.064)
Male	0.230	-1.543***	0.502**	-0.667
	(0.194)	(0.392)	(0.212)	(1.718)
Married	1.012***	0.743*	0.939***	3.166**
	(0.184)	(0.410)	(0.202)	(1.430)
Constant	89.869***	76.688***	93.750***	92.561***
	(1.518)	(3.085)	(1.155)	(9.581)
Observations	118,135	17,536	96,608	3,991
R² adjusted	0.031	0.040	0.028	0.054
Branch fixed effects	yes	yes	yes	yes

Table 6. Loan approvals and firm location

This table reports results from LPM regressions for the full sample and the subsamples of *Agro*, *Micro* and *SME* loans for the period 2006-2009. Standard errors are reported in parentheses and account for clustering at the borrower level. All coefficients are multiplied by 100 so that they can directly be read as percentages. The dependent variable is *Approved* which is a dummy variable indicating whether a loan application was approved by the bank or rejected. All explanatory variables are defined in Table 2. ***, **, * denote significance at the 0.01-, 0.05- and 0.1-level.

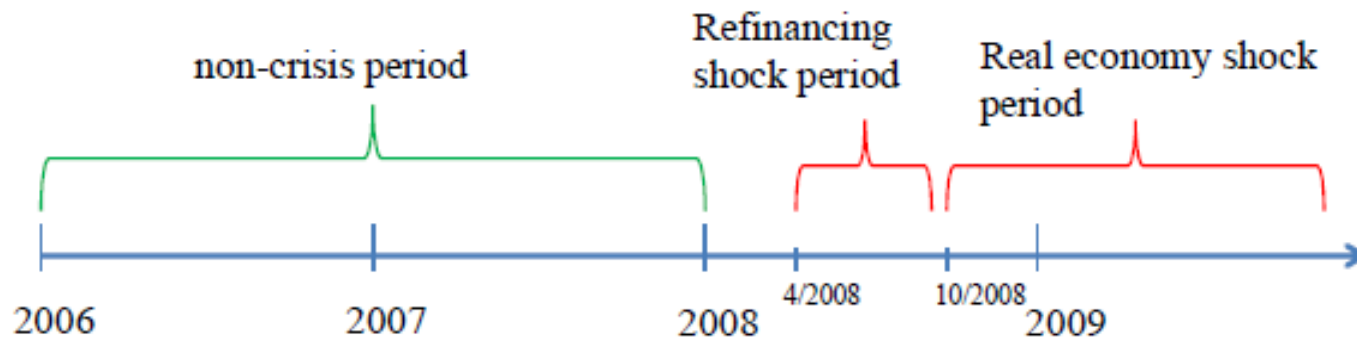|	(1) Full sample	(2) Agro loans	(3) Micro loans	(4) SME loans		(5) Full sample	(6) Agro loans	(7) Micro loans	(8) SME loans
Petroleum location	1.564***	2.609**	1.521***	6.614*	Petroleum location	1.587***	1.188**	1.480***	0.774
	(0.245)	(1.151)	(0.257)	(3.403)		(0.178)	(0.552)	(0.197)	(2.101)
Funding shock	1.391***	1.572**	1.198***	12.078***	Real economy shock 2008	0.808**	1.824***	0.415	3.517
	(0.349)	(0.715)	(0.425)	(4.306)		(0.341)	(0.422)	(0.503)	(4.088)
					Real economy shock 2009	0.973***	1.453***	0.859***	-11.766***
						(0.220)	(0.291)	(0.324)	(3.579)
Funding shock*Petroleum location	-0.268	-1.366	-0.108	-10.596**	Real economy shock 2008*Petroleum location	-1.584***	-3.423***	-1.092*	-3.732
	(0.394)	(1.365)	(0.466)	(4.464)		(0.437)	(1.251)	(0.576)	(4.356)
					Real economy shock 2009*Petroleum location	-1.744***	-0.908	-1.324***	3.292
						(0.269)	(0.681)	(0.361)	(3.793)
Agro	6.558***					8.344***			
	(0.709)					(0.558)			
Micro	4.472***					5.539***			
	(0.650)					(0.542)			
Constant	86.223***	71.428***	91.285***	79.488***		86.744***	75.843***	93.324***	79.263***
	(1.628)	(4.421)	(1.260)	(9.086)		(1.303)	(2.508)	(0.993)	(7.974)
Observations	80,277	6,303	70,765	3,209		158,840	24,984	128,497	5,359
R² adjusted	0.028	0.039	0.027	0.043		0.024	0.035	0.021	0.051
Loan and firm characteristics	yes	yes	yes	yes		yes	yes	yes	yes
Branch fixed effects	no	no	no	no		no	no	no	no

Figure 1. Timeline of events

Figure 2. Loan applications and approvals for new vs. repeat borrowers

This figure displays the total number of loan applications and approvals for the three subsamples of *Agro*, *Micro* and *SME* loans and for new vs. repeat borrowers respectively. The two vertical lines indicate the start of the funding shock (April 2008) and the real economy shock (October 2008).
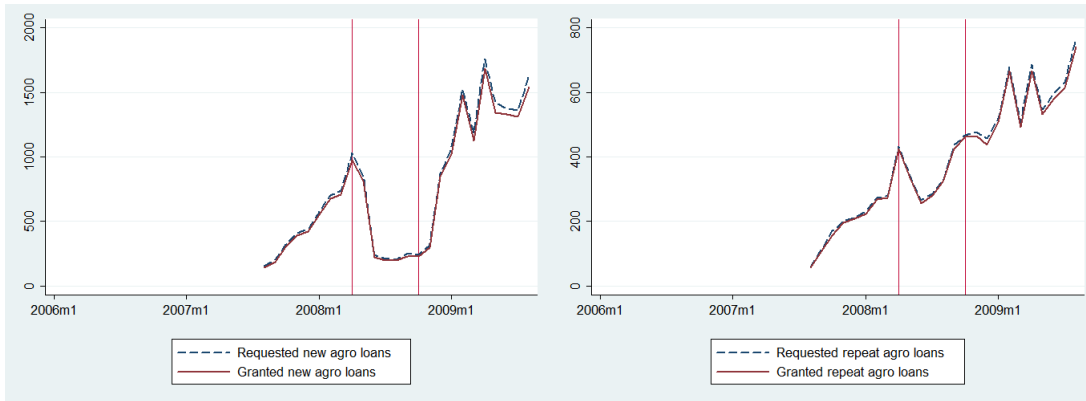
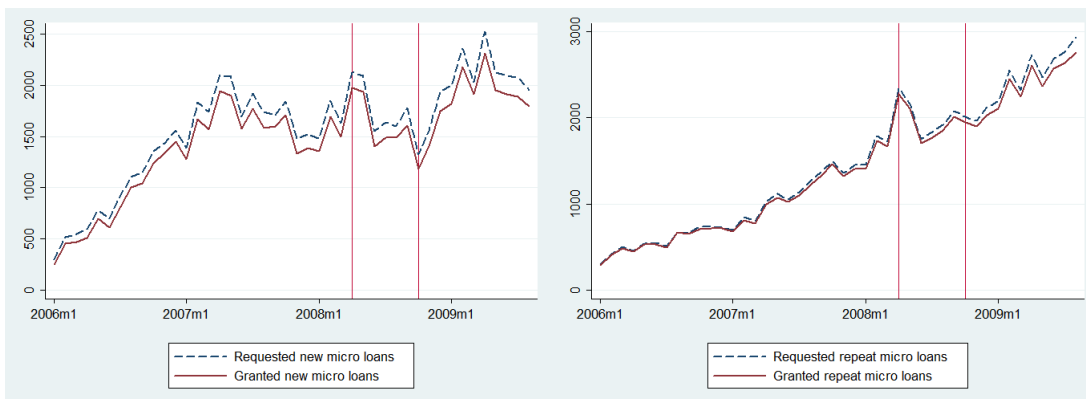### Figure 2a. Agro loans

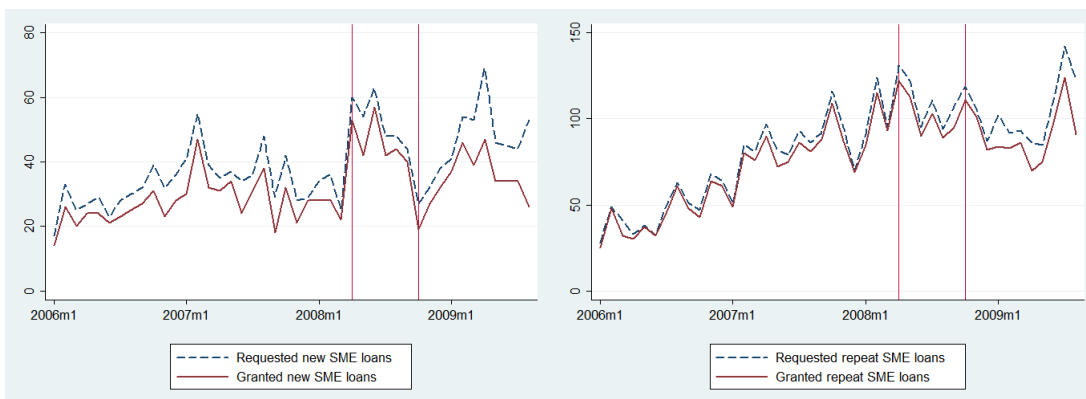### Figure 2b. Micro loans

Figure 2c: SME loans

Figure 3. Loan approval rates for new vs. repeat borrowers

This figure displays approval rates for the three subsamples of *Agro*, *Micro* and *SME* loans and for new vs. repeat borrowers respectively. The two vertical lines indicate the start of the funding shock (April 2008) and the real economy shock (October 2008).

Figure 3a. Agro loans

Figure 3b. Micro loans

Figure 3c. SME loans

Appendix 1. Exports 2006-2009

Total exports (in thousand USD)

Exports to CIS countries (in thousand USD)