SMEs and access to bank credit

Degryse, Hans ; Matthews, Kent; Zhao, Tianshu

DOI:
10.1016/j.jfs.2018.08.006

Document Version
Peer reviewed version

Citation for published version (Harvard):
Degryse, H, Matthews, K & Zhao, T 2018, 'SMEs and access to bank credit: Evidence on the regional propagation of the financial crisis in the UK', *Journal of Financial Stability*, vol. 38, pp. 53-70. https://doi.org/10.1016/j.jfs.2018.08.006

SMEs and access to bank credit: Evidence on the regional propagation of the financial crisis in the UK

Hans Degryse
(KU Leuven, IWH-Halle and CEPR; Faculty of Economics & Business, Naamsestraat 69, 3000 Leuven, Belgium; hans.degryse@kuleuven.be)

Kent Matthews
(Cardiff University; Cardiff Business School, Colum Drive, Cardiff CF10 3EU, UK; matthewsk@cardiff.ac.uk)

Tianshu Zhao
(University of Birmingham; Birmingham Business School, University House, 116 Edgbaston Park Road, Birmingham, B15 2TY; t.zhao@bham.ac.uk)

Corresponding Author: Hans Degryse; hans.degryse@kuleuven.be

Highlights

- Bank credit to SMEs is examined before and after the Global Financial Crisis (GFC)
- Credit supply is related to local bank market strength and functional distance (FD)
- Pre-GFC credit supply was unrelated to bank market strength or FD
- Post-GFC credit supply was greater in areas of strong bank markets and shorter FD
- Evidence of a 'flight to headquarters' following the GFC

SMEs and access to bank credit: Evidence on the regional propagation of the financial crisis in the UK

Abstract

We study the sensitivity of banks' credit supply to small and medium size enterprises (SMEs) in the UK with respect to the banks' financial condition before and during the financial crisis. Employing unique data on the geographical location of all bank branches in the UK, we connect firms' access to bank credit to the financial condition (i.e., bank health and the use of core deposits) of all bank branches in the vicinity of the firm for the period 2004-2011. Before the crisis, banks' local financial conditions did not influence credit availability irrespective of the functional distance (i.e., the distance between bank branch and bank headquarters). However, during the crisis, we find that SMEs with banks within their vicinity that have stronger financial conditions faced greater credit availability when the functional distance is close. Our results point to a "flight to headquarters" effect during the financial crisis.

Keywords: financial crisis, credit supply, flight to headquarters, flight to quality, bank organization

JEL-codes: G21, G290, L140

1. Introduction

Small and medium enterprises (SMEs) faced increased difficulties to tap bank credit during the global financial crisis. But did they all face the same difficulty? We study the role of bank organization and banks' financial health in the propagation of shocks to the supply of credit to SMEs. In contrast to others, we take a national perspective and study a "flight to headquarters" effect in the supply of credit to SMEs. Using a unique hand-collected dataset containing detailed information on all bank branches in the UK and information on banks' headquarters, we study how variation in banks' financial conditions in the vicinity of a firm, impacts on the supply of bank credit. We examine the existence of regional heterogeneity in credit constraints with respect to the experience of SMEs in the manufacturing industry in the UK during 2004-2011, four years leading up to the global financial crisis and four years after.

Our focus on SMEs[1] in the manufacturing industries responds to the widespread concern in the UK regarding the continued difficulty SMEs face in obtaining external finance after the 2008 financial crisis. This is in sharp contrast to the early to mid-2000s in which credit was more widely available (Armstrong et al., 2013). As banks are specialists in overcoming frictions in credit markets (Diamond, 1984; Freixas and Rochet, 2008), informationally opaque SMEs may face difficulties to substitute bank credit for alternative sources of external financing. Accordingly, SMEs should suffer disproportionately from disruption in the supply of bank credit, and the response of bank credit provision in reaction to a common external negative shock would be heterogeneous across banks (Kashyap and Stein, 1995, 2000; Bernanke, 2007). Additionally, Popov and Udell (2012) have shown that firms in transition economies that have more healthy banks within their vicinity faced fewer credit constraints during the financial crisis. We extend this line of reasoning by focusing on how the impact of

[1] At the start of 2011 there were around 4.5 million SMEs forming 99.9 per cent of all businesses, accounting for over half of private sector employment and nearly half of all private sector turnover (BIS, 2012).

banks' financial conditions in the vicinity of a firm further depends on the banks' organizational structure in that vicinity.

There is strong evidence that retail banking markets are local in nature (Degryse and Ongena, 2005, 2009; Cohen and Mazzeo, 2007). Problems of asymmetric information, agency and uncertainty in relation to SME lending dictate the geographical "closeness" of banks and firms. Two types of 'closeness' are hypothesized to be relevant. First, the proximity between bank branches and borrowers (*operational distance*) and second, the proximity between bank branches and the bank's headquarter (*functional distance*). While the importance of operational distance lies in the reduction of the principal-agent problem between local branch officers and SMEs, that of functional distance is in the mitigation of the principal-agent problem between local branch officers and senior officials at upper layers within the bank organization. Thus, the branch banking system is inherently spatial on both dimensions of closeness and the branching infrastructure. The characteristics of local markets would affect the function of nation-wide and local banks with respect to the credit creation for SMEs, leading to the spatial variation in access to bank credit.

The impact of the banks' local market characteristics on the access to bank credit of SMEs, however, would vary across *normal times* and *crisis times*. In normal times, when banks easily raise funds from wholesale markets, its reliance on branches to fund loans is less pronounced (Dewally and Shao, 2014). The normal flow of loanable funds will depend on normal economic conditions and the risk appetite of the banks. However, during a financial crisis things could be considerably different. With the withdrawal of liquidity in the inter-bank market, banks' financial health and the availability of loanable funds are expected to play a more prominent role in the sensitivity of banks' provision of credit to SMEs. Increased risk perception could influence the willingness and the terms on which banks are prepared to lend. This could translate into selective deleveraging of bank lending, resulting in a "flight to quality"

or "flight to headquarters". One version of "the flight to quality" argument is that following a negative aggregate shock, banks contract their credit to smaller and riskier firms, while accommodating increased credit demand from larger and safer firms (Lang and Nakamura, 1995; Bernanke et al., 1996). Banks could also display a "flight to headquarters" even within a country. For example De Haas and Van Horen (2013) show that multi-market banks withdraw less from markets that are relatively "close" in a geographic sense or in terms of lending relationship. Since closeness bears important implications for the handling of the principal-agent problem in lending, the prioritization toward markets which are "close" is an effective way of overcoming increased information asymmetries and uncertainty at times of crises (Cetorelli and Goldberg, 2012).

In this paper, we take these issues to the data. We hypothesize that local banking market characteristics influence the credit constraints faced by SMEs. We further examine how the organizational characteristics of banks in the vicinity of the borrowing firm influences the extent to which banks' financial conditions are propagated across localities, and specifically the effect of the financial crisis. Finally, we study the "flight to quality" by investigating whether distance disproportionally impacts lower quality firms after the crisis. Regarding the "flight to headquarters" effect, we test if firms with lower likelihood of distress are less likely to suffer from the heterogeneous propagation of the financial condition of banks across localities.

We follow Presbitero et al (2014) in identifying the functional distance effect in bank credit provision to SMEs. Our contribution is to confirm this finding for the UK, but rather than depend on survey information, we utilise actual data of short-term financing by SMEs in manufacturing. Our main findings can be summarized as follows. First, a larger functional distance between branches and headquarters lead to lower credit supply during the financial crisis. Second, banks' local financial conditions (i.e., bank health and funding structure) did

not influence bank credit supply in the period running up to the crisis. However, during the financial crisis, firms located in the vicinity of banks with stronger financial conditions faced lighter bank credit constraints when functional distance is shorter. Third, we do not find overwhelming evidence for a 'flight to quality' but document a 'flight to headquarters'.

The UK banking market is well suited for our investigation. The outcome of the inter-related process of deregulation, technological innovation, and consolidation of the past three decades, has been the transformation of the banking system from a decentralized system into a centralised one (Mason, 2010). Regional and local banks have largely disappeared, and the supply of finance to SMEs is provided through the branch banking systems of a small number of major nation-wide banks. As a means of reducing operating costs and tightening control over credit risk, large nation-wide banks have rationalized branch networks, and concentrated decision-making at head office (French et al., 2008; Appleyard, 2013). Personal 'face-to-face' relationships have increasingly been replaced by impersonal 'arms-length' relationships (Pratt, 1998). Large-scale bank branch rationalization during 1989-2003 has led to branch shrinkage by over one-third. Moreover, in most cases the lending authority was withdrawn from the remaining local branches and assigned to a few central decision-making centres.

The rest of the paper is as follows. Section 2 discusses our identification strategy, present our empirical model and describe the construction of variables. The data are described in Section 3. We present the empirical results in Section 4 and report further results and additional robustness tests in the appendix. Section 5 concludes.

2. Empirical methodology and identification strategy

2.1.Credit constraints and local banking markets

An analysis of regional differences in bank credit provision to SMEs raises the classic problem of disentangling demand from supply effects. The countercyclical component in credit

demand would suggest an increase in the demand for short-term bank credit in an economic downturn, driven by credit smoothing and distress borrowing (Bernanke and Gertler, 1995).[2] However, the demand for credit could also decline during a financial crisis due to a worsening in economic expectations (Dow and Montagnoli, 2007). In this paper, we follow an empirical strategy in the spirit of Kashyap et al. (1993).[3] We measure the degree of supply-driven credit constraints by the share of short-term bank credit in total short-term finance for SMEs. The identification strategy rests on the insight that a monetary shock operates through an output-induced effect on credit demand and would influence the demand for all types of funding, while a monetary shock that operates through a bank lending channel affects the supply of bank debt only (Oliner and Rudebusch, 1996). Consequently, the greater use of substitutes to bank credit can be interpreted as the existence of credit constraints driven by the variation in the supply behaviour of banks (Demiroglu et al., 2012). Arguably, bank credit as a proportion of overall external funding is a better proxy for the supply condition of bank credit than the interest rate on loans, because it aggregates the overall economic cost of bank credit, relative to its alternatives, including its availability, the price and non-price terms, and conditions (Kashyap et al., 1993; Sufi, 2009; Kahle and Stulz, 2013).

We hypothesize that the characteristics of a local banking market capture the ability of banks in a branch banking system to deal with soft information-intensive SME lending. To examine the impacts on SME credit constraints before and after the financial crisis, the following baseline model is specified and estimated separately for the pre-2008 and post-2008 periods:

[2] The Department for Business, Innovation and Skills (BIS) documents that SMEs in the post-2008 financial crisis period exhibited an increased likelihood of applying for external funding as well as an increased need for finance for working capital and cash flow, relative to 2006-2007.

[3] Other approaches to isolating demand and supply effects have been to use (i) survey data on loan applications and bank decisions (Popov and Udell 2012; Ongena et al., 2013; Presbitero et al., 2014; Beck et al., 2017; Pigini et al., 2016), (ii) firm-fixed effects for firms with multiple banking relationships (e.g., Khwaja and Mian, 2008; Jiménez et al., 2012, 2014), and (iii) a disequilibrium model to identify credit constrained firms (Atanasova and Wilson, 2004; Carbo-Valverde et al., 2009, 2016).

$$\ln Y_{irt} = \alpha + \alpha_1 X_{irt-1} + \alpha_2 ECON_{rt-1} + \beta_1 LOCALBANK_{rt-1} + \lambda_r + \upsilon_t + \varepsilon_{irt} \qquad (1)$$

where Y_{irt} is the degree of bank-credit constraints that a SME manufacturing firm *i*, located in area *r*, at time *t* faces, measured by the ratio of short-term bank debt over the sum of short-term bank debt and trade credit (TC) as an inverse indicator of credit constraints (for short, FINMIX).

Variables definitions are in Table 1. The vector X_{irt-1} consists of time-varying firm-specific controls[4]. Following the literature, it contains, firm size (LNASSET), which proxies for expected bankruptcy costs, information asymmetry, and bargaining power (larger firms face lower credit constraints and therefore show a higher FINMIX); asset tangibility (TANG - tangible assets divided by total assets), as a proxy for the availability of collateral, (higher tangible assets lowers the probability of bankruptcy and is positively associated with bank finance); interest coverage (INTCOV - profit before interest paid divided by interest expenses) facilities access to bank credit since it reflects the capacity of firms to generate cash flow to meet short-term obligations (Jones and Tuzel, 2013); liquidity (INTFIN - cash flow from operations divided by the product of the duration of the firm's cash cycle (CCC)[5] and daily operating cost) is positively associated with FINMIX since it reflects the capacity of firms to generate net cash flow to cover its working capital and also captures firm profitability (Kremp and Severstre, 2013). Two other variables are net-worth (NETWORTH) and the cash flow-to-debt ratio (CASHDEBT). A higher net-worth ratio and cash flow-to-debt ratio might reflect a higher capacity to use non-debt finance and long-term debt and therefore might be associated with a lower short-term debt in general (Bougheas et al., 2006). However, to the extent that a

[4] The use of one period lagged values of independent variables has been recommended by the literature as a more transparent method to handle endogeneity issues (Clemens et al., 2012).

[5] The cash cycle is measured by the sum of average inventory age and average collection period minus average payment period in line with Huang et al., (2011).

higher net-worth ratio and a higher cash flow-to-debt ratio are associated with lower default risk, they could facilitate greater access to bank credit.

Following De Haan and Sterken (2006) we proxy for growth opportunities by including intangible assets (INTANG, the ratio of intangible assets over total assets). Since intangible assets are mainly composed of firms' investment in R&D activities and goodwill acquisition, higher intangible assets could be associated with firms' confidence in deriving economic benefits from the investment. Finally, we introduce account receivables (TRADEDEBT, - account receivables over total sales). The impact of trade debt on firms' bank credit constraint is an empirical issue due to the presence of two opposing forces. Firms that transact using trade credit incur account payables on receipt of trade credit and account receivables as the provider of the trade credit. The empirical evidence suggests that firms are likely to match the maturities of the contract terms for their payables and receivables, and this will lead to a positive association between trade credit extension and trade credit demand (Bastos and Pindado 2013). However, account receivables could be used for invoice factoring or/and as collateral for securing bank loans, and therefore would influence firms' access to bank credit (Wu et al., 2012).

The vector $ECON_{rt-1}$ consists of the local unemployment rate to capture time-varying economic conditions at the locality level. The vector $LOCALBANK_{rt-1}$ contains the characteristics of the local banking market; $OPDIS_{rt-1}$, $FUNDIS_{rt-1,}$ and HHI_{rt-1}. $OPDIS_{rt-1}$ refers to time-varying locality-specific operational proximity. We calculate this by using the total number of branches of individual banks in a given locality divided by the surface area of the locality. This is a proxy for the closeness between local SMEs and local loan officers. The literature suggests this acts a proxy for transportation and information costs borne by borrowers and lenders (Alessandrini et al., 2009). $FUNDIS_{rt-1}$ measures the time-varying locality-specific functional distance representing the closeness between local loan officers and headquarters.

Following Alessandrini et al. (2009) we first compute the logarithm of the average driving time of branches held by each bank in a given locality *r* to the headquarters of each bank. We then use the number of branches of each bank in locality *r* as a percentage of the total number of branches of all banks in locality *r* as a weight to compute the weighted average of functional distance of each locality[6]. HHI_{rt-1} is the time-varying locality-specific Herfindahl-Hirschman index. This is computed by using the share of branches held by individual banks in each locality[7]. Finally, λ_r is a vector of locality dummies to control for time-invariant locality-specific effects, υ_t is a vector of time dummies to account for time-varying effects that commonly impact each locality and ε_{irt} is an idiosyncratic error term.

2.2.Local banking market characteristics and the transmission of banks' financial conditions

We conjecture that the access of bank credit by SMEs is affected by the financial condition of banks, which differs across localities due to the variation in the characteristics of local banking markets.

The following empirical models are estimated for the pre-2008 and post-2008 period, separately:

$$\ln Y_{irt} = \alpha + \alpha_1 X_{irt-1} + \alpha_2 ECON_{rt-1} + \beta_1 LOCALBANK_{rt-1} + \beta_4 FIN_{rt-1} + \lambda_r + \upsilon_t + \varepsilon_{irt} \quad (2)$$

$$\ln Y_{irt} = \alpha + \alpha_1 X_{irt-1} + \alpha_2 ECON_{rt-1} + \beta_1 LOCALBANK_{rt-1} + \beta_4 FIN_{rt-1} + \beta_5 FIN_{rt-1} * LOCALBANK_{rt-1} + \lambda_r + \upsilon_t + \varepsilon_{irt} \quad (3)$$

[6] Specifically, the functional distance of locality *r* is measured by $\sum_{b=1}^{B} \frac{branches_{br} * \ln(\frac{\sum distance\ of\ each\ branch\ of\ bank\ b\ at\ locality\ r\ to\ the\ headquaters_b}{branches_{br}})}{\sum_{b=1}^{B} branches_{br}}$. where $branches_{br}$ is the total number of branches of bank *b* at locality *r*. *B* is the number of banks that have branches at locality r.

[7] Since financial figures are not available at the branch level we follow Degryse and Ongena, (2005) by using information on the branch distribution to calculate HHI.

In addition to the covariates discussed in model (1), FIN_{rt-1} is a vector of time-varying locality-specific bank financial conditions. Two indicators of the heterogeneous response of bank credit supply to a negative shock are; the capitalization of banks, and the use of market-based sources of loanable funds (Bonaccorsi and Sette, 2012). The ratio of equity over total assets proxies for capitalization (CAPITAL) and the proportion of consumer deposits over the sum of total deposits and short-term borrowing (COREDEP) is used to capture the dependence on wholesale funding. Arguably, banks with a higher proportion of consumer deposits are better able to shield its borrowers from unexpected tightening in the wholesale market (Black et al., 2007; Ivashina and Scharfstein 2010) To link the financial condition of banks to the locality, we construct a locality-specific bank financial conditions index (Popov and Udell, 2012; Ongena et al, 2013). First, we identify which banks are present in a given locality and how many branches each bank has in that locality. Second, we compute a locality-specific bank financial conditions index using a weighted average financial condition of banks in a given locality from the consolidated balance sheet of the bank. We apply two different weighing schemes. The first employs equal weight to each bank in each locality. The assumption behind this is as long as there is a physical presence of the bank in the locality, local firms would have an equal opportunity of doing business with any particular bank. The second weighing scheme employs information on the ratio of branches of each bank in a given locality over the total number of branches of individual banks in that locality. Banks with more branches therefore get a larger weight. The argument is that firms have a higher probability of doing business with banks that have a stronger penetration in the locality. The results from using COREDEP, and the second weighting procedure is presented in the Appendix as part of the wider robustness tests.

The financial conditions index is computed for each year of our sample using yearly information on branches and banks' financial conditions. Therefore, the locality-specific bank

financial conditions index also has a time-variation. The sign and significance of coefficients for FIN_{rt-1} and its interaction terms with the characteristics of the local banking market capture the heterogeneous impact of financial conditions of banks across localities. In particular, β_5 should not be significantly different from zero if banks use its financial strength to distribute credit equally across localities independent of local characteristics. Put differently, a statistically insignificant β_5 implies a horizontal supply of funds across localities in a branch banking system due to balanced intra-bank flows between bank branches and their headquarters.

2.3. "flight to quality" or "flight to headquarters"?

Finally, we investigate the extent to which the heterogeneous propagation of financial conditions of banks across markets is driven by a "flight to headquarters" versus a "flight to quality" effect. Following Giannetti and Laeven (2012a), the difference between the "flight to headquarters", and the "flight to quality" effect is that the former arises from banks' rebalancing their loan portfolios towards markets that are closer to headquarters, while the "flight to quality" effect arises from banks' rebalancing their portfolios towards borrowers with lower likelihood of financial stress. Our empirical strategy therefore is to test whether firms with lower likelihood of financial stress would be less likely to be exposed to the heterogeneous propagation of banks' local financial conditions.

We estimate:

$$\ln Y_{irt} = \alpha + \alpha_0 Z_{ir} + \alpha_1 X_{irt-1} + \alpha_2 ECON_{rt-1} + \beta_1 LOCALBANK_{rt-1} + \beta_4 FIN_{rt-1} + \beta_6 FIN_{rt-1} * LOCALBANK_{rt-1} * Z_{ir} + \beta_7 FIN_{rt-1} * LOCALBANK_{rt-1} * (1 - Z_{ir}) + \lambda_r + \upsilon_t + \varepsilon_{irt} \quad (4)$$

where Z_{ir} is a dummy variable equal to unity if the firm *i* in locality *r* falls into the category of having a lower likelihood of financial stress and zero otherwise. SMEs are split into high

(HIGH) and low (LOW) likelihood of distress category on the basis of Altman's (1968) z-score[8] and total assets. If the firm has a z-score (LNASSET) which is higher than the sample median in 2007, we treat it as a low likelihood of financial stress with value unity and zero otherwise. The coefficient β_6 represents the heterogeneous impact on firms with lower likelihood of financial stress and β_7 denotes the heterogeneous impact on firms with higher likelihood of financial stress. The difference between β_6 and β_7 captures the variation between the two groups. In order to further identify a potential "flight to quality". In some specifications of equation (4), we include only double interactions between Z_{ir} and FIN_{rt-1} (and thus disregard β_6 and β_7).

A final comment about the dependent variable FINMIX; while the change in the composition of external funding is helpful for distinguishing the credit constraint driven by the supply behaviour of banks, Oliner and Rudebusch (1996) emphasize that such identification requires: first that the potential substitution for bank credit has to be practically available for SMEs; and second, that it has to be a suboptimal choice relative to bank credit[9]. Trade credit (TC) is an option to obtain short-term credit provided by suppliers in conjunction with product sales. The manufacturing sector is most likely to use bank credit as well as trade credit as it purchases a large part of intermediate goods from their suppliers (Cunat, 2007)[10]. Therefore, TC can be treated as the predominantly available informal non-institutional external finance.

[8] We follow Sufi (2009) and calculate the z-score using the following formula: z-score=((3.3* operating profit+ total sales+1.4* retained profit+1.2* working capital)/total assets)

[9] An implicit assumption that serves our identification strategy is that trade credit has no spatial dimension. Given that the sample is of manufacturing companies, and manufacturing is in the tradeable sector which relies more broadly on national or global demand, the assumption of the non-existence of a locality-specific supply of trade credit is not implausible (Mian and Sufi, 2014).

[10] In the UK, 70% of the total short-term debt (credit extended) and 55% of the total credit received by firms consists of trade credit (Kohler et al., 2000). For the population of manufacturing companies in the UK, 'trade creditors to current liability' ratio exceeded 75% in 2004 (Wilson, 2008; Paul and Wilson, 2007).

However, several disadvantages[11] make TC unattractive relative to bank loans, *ex ante* (Nilsen, 2002). Since TC is lower down the pecking-order of finance than formal institutional bank credit (Petersen and Rajan, 1997), buyers will exercise TC moderately if they do not face significant credit constraints. While large public firms can raise liquidity externally from capital markets, the literature on debt structure and trade credit suggests that TC is the most important alternative sources of liquidity for informationally opaque SMEs[12] (Sufi, 2009; Demiroglu et al., 2012; Garcia-Appendini and Montoriol-Garriga, 2013). Indeed, the empirical literature suggests that the demand for trade credit is positively related to credit constraints (Nilsen, 2002; Carbo-Valverde et al., 2012). Moreover, the substitution relationship between information-motivated bank credit rationing and trade credit is stronger once credit market conditions deteriorate (Biais and Gollier, 1997; Petersen and Rajan, 1997; Nilsen, 2002; Mateut et al., 2006; Guariglia and Mateut, 2006; Yang, 2011; Demiroglu et al., 2012; Huang et al., 2011).

3. Data and descriptive statistics

Following the convention used by Eurostat and other European Union bodies, we use NUTS3 as our definition of locality[13]. The number of NUTS3 in 2003 in Scotland, England and Wales was 128. The dataset is compiled from several sources. Information about firm-specific annual

[11] The disadvantages include the restriction of the use of financing (TC is tied to the purchases of goods from the suppliers), its short-term nature, significant late payment penalties, reputational cost associated with late payment, and a possible increase in the selling price set by the supplier (Paul and Guermat, 2009).

[12] The literature identify several reasons for suppliers to extend trade credit. These are; informational advantages over institutional lenders (Petersen and Rajan 1997); liquidation advantage over banks in liquidating firm's collateral (Fabbri and Menichini 2010); maintaining a customer–supplier relationship during an economic downturn (Bougheas et al., 2009); and trade credit as the outcome of supplier competition (Tsuruta, 2014).

[13] The Nomenclature of Units for Territorial Statistics (NUTS) is a hierarchical classification of spatial units that provides a breakdown of the European Union's territory for the purposes of producing comparable regional statistics. NUTS identifies geographical areas at a series of nested levels, with NUTS 3 in the range 150,000-800,000 population. Given our time frame, the construction of locality is based on the classification of NUTS3 in 2003.

financial statements and the postcode of registered addresses is collected from FAME. Following the *Companies Act 2006,* SMEs are defined as entities that have an annual turnover not exceeding £25.9 million and that have fewer than 250 employees by 2008. This ensures that firms included in the analysis were SMEs at the time of the financial crisis. We use the primary UK SIC (2007) code as the criterion for the classification of firms in the manufacturing industry and limit the sample to SMEs in the manufacturing industry with primary trading or registered address in England, Scotland and Wales. The registered address of firms is used to identify their physical location and cross-checked with that of the official UK government register[14].

Data on the annual consolidated financial statement of banks is taken from Bankscope. In the case of merger, we replace the annual consolidated financial statement of the target bank with that of the acquiring bank. The information on the postcode of the headquarters of each bank included in our analysis relies on information on the registered address of each bank. The location of branches of Major British Banks is taken from the *Annual UK Clearings Directory*[15]. The Clearings Directory includes the geographical area, the sort code, title, and the postal address of branches. The combination of the four pieces of information is sufficient to identify the physical location of branches. In addition, we trace back information from the previous annual clearings directory when there is ambiguity in the information published in the directory in a later period. In the case of merger, we classify the branches of the target bank as that of the acquiring bank and also adjust the location of the headquarters from the merger onwards accordingly. While we have the full postcode of the registered address of firms and the full postcode of the headquarters of banks, we do not always have the full postcode of the physical location of branches. However, we identify the postcode sector of the name of the

[14] Data on firms was extracted from FAME declaring an overdraft facility.

[15] The Clearings Directory identifies the locations of branches each year. For banks that are not in the category of Major British Banks, we assume the bank has one branch which is located at the same location as its headquarters. Experian's Shop*Point data indicates that 97.5% of branches of banks belong to Major British Banks.

geographical area where the branches are located from *Geocoder* and the postcode lookup tool from *oCo Carbon*[16]. To match the postcode with NUTS3, we utilise *GeoConvert*, an online geography matching and conversion tool created by Mimas[17] at the University of Manchester. The driving distance in minutes and miles between the physical location of branches and the headquarters of banks is taken from *Bing map UK*[18]. The surface area of each NUTS3 measured in square kilometres is obtained from Eurostat. Data on the unemployment rate is obtained from Labour Market Statistics (*Nomis*). Since the data is available at Local Authority District level (LAD) and not at NUTS3 level, *GeoConvert* is used to identify the corresponding NUTS3. The total number of observations is 9713. The data set is an unbalanced panel[19] over the period 2004-2011. The observation unit is at firm-year-locality level. The largest number of firms at yearly level is 2630[20]. The number of NUTS3 included in our analysis is 125. The summary statistics and definitions of variables are presented in Table 1. We present figures for the entire period, and the 2004-2007 and 2008-2011 sub-periods. The last column displays a test for differences between the two sample periods. We learn that FUNDIS has increased over time, and that banks' financial conditions (CAPITAL and COREDEP) have deteriorated over time.

4. Empirical Results

4.1.Baseline results

We estimate model (1) is over the two periods 2004-2007 and 2008-2011. The results are presented in Table 2, columns (1) and (2) respectively.

[16] http://oco-carbon.com/
[17] http://mimas.ac.uk/
[18] While around 74 percent of bank branches have their HQs in London, the remainder is spread across all the economic regions of the UK
[19] An unbalance panel serves to handle the concern over the problem of selection and survivorship bias.
[20] As Franklin et al. (2015) note, small firms do not report every year and accounting exemptions for SMEs reduce the sample availability.

We begin our discussion with the estimated results of firm-specific characteristics. Firms with higher tangibility have a higher financing mix showing that higher collateral facilitates the use of bank credit as a source of external finance. This is consistent with the presumption that a higher intangible asset ratio is associated with stronger support from banks for external financing (De Haan and Sterken, 2006). These results are statistically significant and hold for both periods. Other firm-specific variables show a mixed picture. Specifically, in the latter period, large firms with higher internal financing capacity and profit, have better access to bank credit. Size and interest coverage ratio have been used as indicators for the presence of financial constraints in the literature. The results echo the argument that banks have, in the post financial crisis period, adopted a more restrictive policy regarding the supply of credit to SMEs. It also concurs with the finding that size is the main contributor to the different degree of access to bank credit of firms during the economic recession (Cowling et al., 2012).

We find that firms with a higher cash-flow-to-debt ratio have a lower short-term bank debt ratio in the post-crisis period. This reflects the objective of reducing exposure to external debt in the post-crisis period. Arguably, higher cash flow facilitates the materialization of such intentions. The results are explicable if one takes into account the substitution between short-term and long-term debt. A higher cash flow-to-debt ratio may also reflect a greater capacity for firms to use long-term debt. A high debt to cash flow ratio would trigger the banks' 'early-warning' system prompting a restructuring towards short term debt to strengthen the power of a repayment call (Barclay and Smith, 1995). Finally, we find that a lower net-worth ratio is associated with a higher short term bank debt ratio for the period 2004-2007 only. In part, this may reflect the mood of optimism and mispricing of risk by banks leading up to the financial

crisis (Breedon, 2012). The unemployment rate as locality-specific time varying variable is not significant.[21]

We next move to the results of our main variables of interest. A higher operational proximity (*OPDIS*) has a significantly positive impact on financing mix in the 2004-2007 period. This result suggests that SMEs in a local banking market with higher branch density per square kilometre encounters a lower degree of credit constraint. This result is in line with the empirical finding on the positive impact of physical proximity between branches of banks and borrowers, on the financial constraints of firms (Benfratello et al., 2008). Also in column (1), we find that a lower *HHI* in the local banking market is associated with a higher short-term bank debt ratio. Therefore, our result suggests that SMEs located in a banking market with a lower concentration ratio face lower credit constraints. This finding lends support to the argument that competition in the market place mitigates credit constraints for informational sensitive SMEs. The distance between the local branches and the HQ of branches (*FUNDIS*) is not statistically significant.

Turning to the results for the 2008-2011 period (column 2), we find *OPDIS* and *HHI* are no longer significant. The insignificant result of the *HHI* index is consistent with the view that competition for the provision of bank credit at times of financial crisis is muted. The heightened uncertainty of the business environment weakens the responsiveness of local credit to local competition. In contrast, the significantly negative coefficient on *FUNDIS* suggests that SMEs located in an area where the banking system is more functionally distant faced a higher degree of credit constraint in the post-crisis period. Based on the results of column 2, SMEs in the manufacturing industry, *ceteris paribus*, experience a 32% decrease in the financing mix if they are located in areas with a one standard deviation longer *FUNDIS*.

[21] In unreported robustness exercises, we further include GDP growth per capita and changes in a regional housing price index as further time-varying locality controls. Our main results are unaffected.

Our results are consistent with the view that UK banks have retreated from areas that are more distantly located from their headquarters in times of banking stress and also consistent with the "flight home" bias of banks in the post-crisis period (Presbitero et al., 2014).

A concern about endogeneity arises regarding FUNDIS, as the location of a bank's headquarter may be a carefully calibrated endogenous decision. We note that our identification strategy relies upon time-series variation in FUNDIS due to the inclusion of locality fixed effects. This variation may come from changes in bank branches, or changes in a bank's headquarters (e.g., stemming from mergers and acquisitions). To further mitigate endogeneity concerns, we focus on variation in FUNDIS that comes from changes in headquarter locations only, and changes which stem from branch closures or openings (and possibly changes in headquarters locations). To do so, we create two mutually exclusive dummy variables (1) "NO CHANGES" equal to one when there are no branch changes between 2007 and the year under consideration, zero otherwise, and (2) "CHANGES" equal to one when the number of branches in a locality changed between 2007 and the year in consideration, and zero otherwise. We interact these dummy variables with FUNDIS. When doing so, we find -0.751*** and -0.755*** as coefficients for CHANGE*FUNDIS and NOCHANGE*FUNDIS, respectively. [22] As there is no statistical difference between these two coefficients, the endogeneity of the location of the headquarters is less likely to be a concern for our estimated result on FUNDIS. In later tables we therefore continue focusing on the FUNDIS variable.

Another concern could be that FUNDIS is correlated with other potential drivers of credit constraints such as bank size (e.g., Berger et al. 2005), or organizational complexity (e.g., Degryse et al., 2009). We therefore add additional variables next to FUNDIS proxying for these alternative explanations. In particular, in columns (2) and (5) of Table 2, we include a measure

[22] The changes in headquarters, due to Merge and Acquisition, mainly took place in 2009. When restricting our sample period to the treated period, 2009-2010, we find again similar coefficients for CHANGE*FUNDIS and NOCHANGE*FUNDIS (i.e., -0.699* and -0.685*), and also these two are not statistically different.

of banks' size in an area proxied by a (branch-weighted) natural log of banks' total assets (LNTA). In columns (3) and (6) we add a measure of organizational complexity based upon the (branch-weighted) natural of log of the number of banks' branches (LNNOBRA). In each of the specifications, this new variable turns insignificant and our main findings on FUNDIS remain.[23]

Overall, our findings suggest that our three main variables of interest, namely, operational proximity, concentration ratio and functional distance, are relevant for the degree of credit constraints faced by SMEs. However, their impact differs between the pre-crisis and post-crisis period. While a shorter operational proximity and lower degree of concentration is associated with lower credit constraints in the pre-crisis period, their impact is insignificant in the post-crisis period. But the effect of functional distance shows that a longer distance is associated with tighter credit constraints for SMEs in the post-crisis period but not in the pre-crisis period.

How to explain the contrasting roles of operational and functional distance in both periods? Operational distance is relevant pre-crisis. Greater branch proximity may lead to higher competition and reduce credit constraints. This insight is in line with the finding on HHI. With the advent of the crisis, hard information may have become less informative and decisions may rely more on soft information. Such information travels less smoothly within a bank implying that functional distance becomes important. Furthermore, the result of functional distance also reflects the fragile trust between local loan officers and senior management at HQ during the crisis. Local competition as measured through operational distance and HHI plays less a role as many banks faced a more difficult environment.

[23] This non-significance continues to hold when including LNTA and LNNOBRA jointly, or dropping FUNDIS from the specification.

4.2.The characteristics of the local banking market and the transmission of banks' financial conditions

To evaluate the transmission of the financial condition of banks on the credit constraints of SMEs across localities, model (1) is augmented with a measure of time-varying locality-specific bank financial conditions (FIN_{rt-1}) and allow for interaction with local credit market characteristics. We first report the results of a specification including FIN_{rt-1} but excluding the interaction term (model (2)) and then report the results including FIN_{rt-1} and the interaction term (model (3)). Model (2) also addresses the possible omitted variable bias in model (1) due to the possibility that local credit markets with characteristics of higher operational proximity, lower concentration ratio and shorter functional distance, might be populated with stronger banks. The estimated results on the specification without the interaction term (model (2)) for the period 2004-2007 and the period 2008-2011 are presented in Table 3 for the measure of FIN (CAPITAL)[24]. The estimated results including the interaction term (model (3)) for the period 2004-2007 and the period 2008-2011 are reported in Table 4.

The results of Table 3 replicate much of Table 2 and the local financial condition variable, FIN_{rt-1}, irrespective of the weight (see appendix) is not significant. Turning to the question of whether the transmission of the financial condition of banks is heterogeneous across local credit markets with different characteristics, we allow for the interaction terms of the locality-specific financial condition of banks with all three variables of the characteristics of the local credit market. The results are reported in Table 4 column (1) and (3).

Examining the result for 2004-2007 first, we find that the locality-specific financial condition of banks is not statistically significant and neither are the interaction terms. For 2008-2011, while the interaction term between the financial condition measure and operational

[24] Results with the alternative measure of FIN (CORE DEPOSITS) is presented in the Appendix but the results are qualitatively equivalent.

proximity, and HHI are not statistically significant, the interaction term with functional distance ($FUNDIS_{rt-1}$) is negative and statistically significant. This indicates that the positive impact of the physical presence of banks with more stable sources of credit on SMEs access to bank finance diminishes with distance from headquarters. Given the finding that the coefficient $FIN_{rt-1} * OPDIS_{rt-1}$ and $FIN_{rt-1} * HHI_{rt-1}$ are not significant for both sub-periods, these two terms are removed and we concentrate our analysis on the impact of functional distance on the heterogeneous transmission of the financial condition of banks across localities. The results of this new specification are reported in the even-numbered columns of Table 4. The results for 2004-2007 show that FIN_{rt-1} and $FIN_{rt-1} * FUNDIS_{rt-1}$ are both insignificant. This result is robust regardless of the indicator of financial condition we use and the weighing procedure we apply (see Appendix). This restates what we have found in the specification with the three interaction terms. First, the variation in the locality-specific financial condition of banks has no impact. Second, distance does not affect the transmission of financial condition of banks, and the degree of credit constraints of local SMEs.

Turning to the results for the period 2008-2011, we find that the interaction term between the locality-specific financial condition FIN and functional distance FUNDIS is negative[25]. However, we also find that the first-order impact of the locality-specific financial condition of banks, is positive and statistically significant (column 4). Thus, branches of banks that are financially stronger were more able to protect themselves from a negative shock to the provision of bank credit, indicating an active internal capital market (Campello, 2002).

To conclude, we find that SMEs encountered less credit constraints if they are located in areas where banks with stronger financial strength have branches. However, such a positive effect is attenuated if those branches are at a further distance from their headquarters.

[25] This result appears regardless of the indicator of financial condition and the weighting procedure applied (see Appendix)

Furthermore, this finding holds in the post-crisis period only. We emphasise that it is not the purpose of this paper to explain the insignificant results for the pre-crisis period given the absence of an internal capital market between branches and their HQ. But rather, we argue that the results reflect the existence of lower frictions for the headquarters to tap external capital markets, to meet the funding needs of branches to *satisfy the local demand for credit*. We rephrase the same line of reasoning to interpret the significant results in the post-crisis period: HQs with stronger financial conditions were in a better position to support their *credit supply schedule* from the general worsening of liquidity in accessing the external capital market in the post-crisis period. Nevertheless, the increased caution towards risk in crisis times lead banks to prioritise funding to areas closer to HQ.

Our results are consistent with the presence of waves across good time and bad time to the extent to which banks operate with longer functional distance (Giannetti and Laeven, 2012a, 2012b). Our results are also consistent with Beck et al., (2017) who find that firms within the vicinity of their relationship banks faced fewer credit constraints during the crisis. A higher functional distance could be seen as an inverse indicator of relationship banking.

A potential concern one may have is that branch characteristics and firms' credit constraints may be determined by omitted variables. In untabulated results, we therefore introduce two-digit-industry and locality dummies to further absorb potential differences in credit demand. Our results are robust to that. Banks could also open branches only in localities where many new firms are expected to enter, leading to the potential of reverse causality. On top of employing lagged values in our analysis, we further note that the correlation between the change in the number of branches and firm creation at the locality level is close to zero.

4.3. "Flight to quality" or "flight to headquarters"?

Having established the finding that the financial condition of banks is heterogeneously propagated across markets with differing functional distance, we go one step further by testing to what extent the result is driven by a "flight to headquarters" rather than a "flight to quality". Our assessment is reported in Table 5.

Columns (1), (3) and (5) study whether banks' financial conditions play an important role for firms of higher quality. In column (1) we added a FIN*TANG asset (i.e., CAPITAL*TANG) to study whether localities with stronger banks treat firms with different degrees of tangible assets differently. We find that the coefficient on the interaction term is insignificant. In columns (2) and (4), we add a FIN*LOW variable, where LOW is identified according to Altman Z-score in (2), and firm size in (4). While the coefficient on the interaction term in column (2) is insignificant, it is negative in column (4). The latter suggests that localities with weak banks seem to fly more to larger firms, which provides some support for the flight to quality. Similar mixed findings apply when we use equal weighting or capture banks' financial conditions by core deposits (Table A4 in the Appendix). All in all our findings do not really support the "flight to quality" idea.

We now investigate whether the "flight to headquarters" affects firms with different characteristics differentially. We ask whether firms with lower likelihood of financial stress are less likely to be influenced by the "flight to headquarter" effect even they are located in a vicinity characterised by branches distant away from their headquarters. Column (2) of Table 5 gives the results where low likelihood of financial stress is defined on the basis of Altman's (1968) z-score, whereas Column (5) present the results where it is defined on the basis of firm size (the natural logarithm of total assets). The interaction term $FIN_{rt-1} * FUNDIS_{rt-1} * high_{ir}$ and $FIN_{rt-1} * FUNDIS_{rt-1} * low_{ir}$ are both negative and significant; they are not significantly different in column (1) and of similar order of magnitude in column (2). Our examination therefore indicates that the impact of longer functional distance on reducing the positive impact of

stronger financial conditions of banks on the credit constraints of SMEs are not smaller for borrowers with low likelihood of financial stress. This suggests that the "flight to headquarters" effect is the main driving force for the heterogeneous propagation of the financial condition of banks across localities at different functional distance.

5. Conclusion

Lack of external financing for SMEs has long been a concern in the UK but has received prominence since the 2008 financial crisis. In this paper we examine the impact of the characteristics of the local credit market in the vicinity of the firm on the variation in SMEs' access to bank finance. Hand collected data on the location of branches of British banks is matched with the location and firm-specific information of SMEs in the manufacturing industry during 2004-2011 - four years leading up to the financial crisis and four years following. Before the crisis, SMEs had greater access to bank credit when the banking system in their vicinity was less concentrated and the operational proximity was higher (i.e., the distance between bank branch and firm was lower). We find that during, and after the financial crisis the distance between bank branches and headquarters played a significant role, suggesting the presence of a "flight to headquarters" effect of banks in rebalancing their loan portfolio across different local markets in the post-crisis period. SMEs located in areas with branches with shorter distances from their headquarters faced a lower degree of credit constraints. SMEs within the vicinity of their banks that are financially stronger also faced a lower degree of credit constraints, an effect that decreases when the functional distance is longer. Finally, SMEs with different degrees of financial stress are similarly exposed to the negative impact of functional distance on the propagation of the financial strength of banks.

Arguably the development of ICT and other fintech related technologies would diminish the impact of geographical distance on the regional provision of bank credit over time.

Indeed, the development of such modes of intermediation is in part a market response to the geographic dimension to bank lending. While in the longer run, ICT and other intelligent funding technologies could help to plug the gaps in the regional supply of bank credit, the UK is not there yet[26]. To the extent that crowdfunding technology is a common trend that is at work across all regions, it does not influence our results as we are exploiting heterogeneity across regions. Also our time window is not too long such that we expect these drivers not to be important in our time period.

Our results have important policy implications. It lends support to the importance of the organizational and financial conditions of local banks for the supply of bank credit towards SMEs. It further highlights the presence of an unstable pattern in regional credit availability over the business cycle. In particular, it suggests a more volatile credit cycle in peripheral areas across good times and crisis times. Compared to the banking system in other developed countries, that have a richer and more varied "financial ecology", the UK banking system is notoriously thin and centralized, exposing more peripheral areas to greater variation in the supply of bank credit. The banking crisis has prompted a policy debate on the development of a geographically decentralized financial system with sizeable and well-embedded regional clusters of institutions and networks. Our research provides support for such policy initiatives.

[26] The Federation of Small Businesses (UK) have been promoting online business banking with the Cooperative Bank for its members since 2013.

Table 1: Definition of variables and summary statistics

Variable Name	Measurement	The whole sample	2004-2007	2008-2011	Difference pre- & post
Dependent variables (t)					
FINMIX	ln((overdraft/(overdraft + trade credit))*100)	3.04 (1.30)	3.05 (1.33)	3.03 (1.27)	-0.012
Independent variables (t-1)					
Firm-specific time varying variables					
LNASSETS	ln(total assets)	15.43 (1.10)	15.33 (1.12)	15.54 (1.06)	0.213***
TANG	Tangible assets/total assets (%)	30.13 (19.66)	30.77 (19.48)	29.44 (19.83)	-1.330***
INTFIN	Operating cash flow/(daily operating cost*duration of cash cycle (CC))(days)	17.54 (997.23)	11.86 (440.78)	23.59 (1359.55)	-0.791**
INTCOV	Profit before interest paid/interest paid (%)	1550.11 (146141.90)	1138.03 (74765.99)	1989.78 (195409.50)	851.746
NETWORTH	Total shareholders' funds/ total assets (%)	25.65 (45.23)	25.26 (38.88)	26.07 (51.14)	0.808
CASHDEBT	Operating cash flow/(short term debt +long term debt) (%)	22.55 (58.29)	21.54 (65.09)	23.63 (50.00)	2.088*
INTANG	Intangible assets/total assets (%)	6.16 (14.24)	5.63 (13.51)	6.71 (14.95)	1.081***
TRADEDEBT	Account receivables/ total sales	0.20 (0.24)	0.22 (0.29)	0.19 (0.17)	-0.037***
Locality-specific time varying variables					
UNEMP	Claimants/Population (16-64) (%)	2.55 (1.24)	2.15 (0.97)	2.94 (1.35)	0.789***
OPDIS	Total number of branches/ the surface area of localities in square kilometres	0.40 (0.91)	0.41 (0.92)	0.39 (0.89)	-0.027
FUNDIS	Ln(Travelling mile away from the headquarters)	4.73 (0.68)	4.70 (0.65)	4.76 (0.70)	0.063***
FUNDIS(1)	Ln(Travelling minutes from the headquarters)	4.99 (0.51)	4.97 (0.49)	5.02 (0.53)	0.055***
HHI	Herfindahl-Hirschman index branch-based	0.18 (0.03)	0.17 (0.03)	0.19 (0.03)	0.017***
CAPITAL	Equity/total assets (%) (equally-weighted)	6.69 (4.05)	7.03 (4.73)	6.36 (3.22)	-0.661***
COREDEP	Deposit/(deposit + short-term borrowing) (%) (equally-weighted)	50.29 (6.48)	53.55 (6.46)	47.06 (4.63)	-1.151***

CAPITAL(1)	Equity/total assets (%) (branch-weighted)	4.78 (1.95)	5.36 (2.39)	4.21 (1.13)	-11.757***
COREDEP(1)	Deposit/(deposit + short-term borrowing) (%) (branch-weighted)	51.37 (8.26)	57.28 (7.25)	45.52 (3.89)	-6.487***
SENPOP	People aged above 65/total population (%)	16.10 (2.73)	15.85 (2.56)	16.34 (2.88)	0.486***
Total NO. observation		9713	4829	4884	-

Daily operating cost=(cost of sale + Interest paid + administration cost)/365; [2]CC=[(inventory/ cost of sale)+(account receivable /total turnover)-(account payable/total turnover)]*365. Numbers in brackets are Std. Dev. * significance at 10%, ** significance at 5%, and *** significance at 1%.

Table 2: Credit constraints and local banking markets

	2004-2007			2008-2011		
	1	2	3	4	5	6
Firm-specific time varying characteristics						
LNASSETS	-0.0011 (0.0242)	-0.001 (0.024)	-0.001 (0.024)	0.066** (0.026)	0.066** (0.026)	0.066** (0.026)
TANG	0.005*** (0.0016)	0.005*** (0.002)	0.005*** (0.002)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
INTFIN	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.001** (0.001)	0.001** (0.001)	0.001** (0.001)
INTCOV	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
NETWORTH	-0.002** (0.0007)	-0.002** (0.001)	-0.002** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
CASHDEBT	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.003*** (0.0009)	-0.003*** (0.001)	-0.003*** (0.001)
INTANG	0.006*** (0.002)	0.006*** (0.002)	0.006*** (0.002)	0.007*** (0.0015)	0.007*** (0.001)	0.007*** (0.001)
TRADEDEBT	0.223 (0.353)	0.223 (0.353)	0.222 (0.353)	0.245 (0.290)	0.245 (0.290)	0.244 (0.290)
Locality-specific time varying economic conditions						
UNEMP	0.174 (0.126)	0.174 (0.129)	0.173 (0.129)	0.004 (0.062)	0.004 (0.063)	0.002 (0.063)
Locality-specific time varying characteristics of credit market						
OPDIS	2.662** (1.326)	2.663** (1.328)	2.664** (1.329)	-0.706 (0.535)	-0.724 (0.557)	-0.660 (0.564)
FUNDIS	0.097 (0.381)	0.096 (0.400)	0.091 (0.405)	-0.756*** (0.261)	-0.776*** (0.283)	-0.739*** (0.270)
HHI	-8.308*** (2.775)	-8.310*** (2.827)	-8.328*** (2.812)	0.538 (1.882)	0.302 (2.170)	0.902 (1.952)
LNTA		0.000 (0.015)			0.117 (0.415)	
LNNOBRA			0.003 (0.030)			-0.281 (0.479)
Number of Obs.	4829			4884		
Prob > F	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000
Adj R-squared	0.0351	0.0349	0.0349	0.0626	0.0624	0.0625
Root MSE	1.3022	1.3023	1.3023	1.2268	1.2269	1.2269

Note: Dependent variable: FINMIX (i.e., ln((overdraft/(overdraft + trade credit))*100). Figures in brackets are robust standard errors clustered at locality level. * significance at 10%, ** significance at 5%, and *** significance at 1%. Constant, year dummies and locality dummies are not reported for the sake of brevity. Column (1) and (4) are the estimated result of model (1) using the traveling time as the measurement of functional distance (FUNDIS). LNTA is the branch-weighted natural log of banks' total assets. LNNOBRA is the branch-weighted natural log of banks' total number of branches. All variables are defined in Table 1.

Table 3: Credit constraints and local banking markets: bank characteristics

	1	2
	2004-2007	2008-2011
	Equally-weighted	Equally-weighted
Firm-specific time varying characteristics		
LNASSETS	-0.0011 (0.0242)	0.0657** (0.0261)
TANG	0.0051*** (0.0016)	0.0056*** (0.0014)
INTFIN	-0.0007 (0.0013)	0.0014** (0.0006)
INTCOV	0.0000 (0.0000)	0.0000** (0.0000)
NETWORTH	-0.0017** (0.0007)	-0.0011 (0.0010)
CASHDEBT	0.0001 (0.0003)	-0.0026*** (0.0009)
INTANG	0.0063*** (0.0018)	0.0071*** (0.0015)
TRADEDEBT	0.2197 (0.3527)	0.2439 (0.2905)
Locality-specific time varying economic conditions		
UNEMP	0.1707 (0.1236)	0.0061 (0.0632)
Locality-specific time varying characteristics of credit market		
OPDIS	2.8044* (1.5097)	-0.8233 (0.6689)
FUNDIS	0.1063 (0.3882)	-0.7441*** (0.2659)
HHI	-7.8518*** (3.0206)	0.4860 (1.9165)
FIN = CAPITAL	0.0057 (0.0116)	0.0126 (0.0412)
Number of Obs.	4829	4884
Prob > F	0.0002	0.0000
Adj R-squared	0.0350	0.0624
Root MSE	1.3023	1.2269

Note: As Table 2

Table 4: The characteristics of local banking markets and the transmission of the financial condition of banks

	1	2	3	4
	2004-2007		2008-2011	
Firm-specific time varying characteristics				
LNASSETS	-0.0012 (0.0242)	-0.0011 (0.0242)	0.0659** (0.0261)	0.0660** (0.0261)
TANG	0.0051*** (0.0016)	0.0051*** (0.0016)	0.0056*** (0.0014)	0.0056*** (0.0014)
INTFIN	-0.0007 (0.0013)	-0.0007 (0.0013)	0.0014** (0.0006)	0.0014** (0.0006)
INTCOV	0.0000 (0.0000)	0.0000 (0.0000)	0.0000** (0.0000)	0.0000** (0.0000)
NETWORTH	-0.0017** (0.0007)	-0.0017** (0.0007)	-0.0011 (0.0010)	-0.0011 (0.0010)
CASHDEBT	0.0001 (0.0003)	0.0001 (0.0003)	-0.0026*** (0.0009)	-0.0026*** (0.0009)
INTANG	0.0063*** (0.0018)	0.0063*** (0.0018)	0.0071*** (0.0015)	0.0071*** (0.0015)
TRADEDEBT	0.2202 (0.3531)	0.2197 (0.3527)	0.2463 (0.2901)	0.2443 (0.2905)
Locality-specific time varying economic conditions				
UNEMP	0.1785 (0.1285)	0.1703 (0.1272)	-0.0076 (0.0633)	-0.0071 (0.0637)
Locality-specific time varying characteristics of credit market				
OPDIS	2.9671* (1.5480)	2.8021* (1.5032)	-0.9212 (0.7153)	-1.2323* (0.6337)
FUNDIS	0.1412 (0.4366)	0.1077 (0.3910)	-0.1536 (0.3485)	-0.4210 (0.3356)
HHI	-7.6539* (4.0644)	-7.8326** (3.1203)	0.4089 (4.0645)	0.6096 (1.9173)
FIN = CAPITAL	0.0225 (0.0780)	0.0065 (0.0653)	0.3011 (0.2269)	0.1217** (0.0522)
FIN*FUNDIS	-0.0039 (0.0136)	-0.0002 (0.0125)	-0.0606** (0.0304)	-0.0273** (0.0117)
FIN*HHI	0.0156 (0.1725)		0.0168 (0.5855)	
FIN*OPDIS	-0.0070 (0.0108)		-0.0245 (0.0197)	
Number of Obs.	4829		4884	
Prob > F	0.0007	0.0003	0.0000	0.0000
Adj R-squared	0.0344	0.0347	0.0623	0.0626
Root MSE	1.3027	1.3024	1.2270	1.2269

Note: As Table 2.

Table 5: The heterogeneous transmission of the financial condition of banks for the period 2008-2011 (borrower heterogeneity – equally weighted measure of FIN)

	1	2	3	4	5	6
Firm-specific time varying characteristics						
LOW		-0.151	-0.0971	0.113	0.109	0.1778
		(0.115)	(0.1692)	(0.112)	(0.180)	(0.1517)
LNASSETS	0.066**	0.061**	0.0615**	0.089***	0.089***	0.0878***
	(0.026)	(0.026)	(0.0258)	(0.031)	(0.031)	(0.0311)
TANG	0.003	0.005***	0.0049***	0.006***	0.006***	0.0055***
	(0.004)	(0.002)	(0.0015)	(0.001)	(0.001)	(0.0014)
INTFIN	0.001**	0.001**	0.0014**	0.001**	0.001**	0.0013**
	(0.001)	(0.001)	(0.0006)	(0.001)	(0.001)	(0.0006)
INTCOV	0.000**	0.000**	0.0000**	0.000**	0.000**	0.0000**
	(0.000)	(0.000)	(0.0000)	(0.000)	(0.000)	(0.0000)
NETWORTH	-0.001	-0.001	-0.0011	-0.001	-0.001	-0.0011
	(0.001)	(0.001)	(0.0010)	(0.001)	(0.001)	(0.0010)
CASHEBT	-0.003***	-0.002***	-0.0025***	-0.003***	-0.003***	-0.0026***
	(0.001)	(0.001)	(0.0009)	(0.001)	(0.001)	(0.0009)
INTANG	0.007***	0.007***	0.0065***	0.007***	0.007***	0.0071***
	(0.001)	(0.002)	(0.0016)	(0.001)	(0.001)	(0.0015)
TRADEDEBT	0.250	0.209	0.2019	0.231	0.231	0.2273
	(0.289)	(0.286)	(0.2868)	(0.290)	(0.290)	(0.2902)
Locality-specific time varying economic conditions						
UNEMP	-0.027	-0.008	-0.0069	-0.013	-0.013	-0.0115
	(0.065)	(0.064)	(0.0636)	(0.064)	(0.064)	(0.0641)
Locality-specific time varying characteristics of credit market						
OPDIS	-1.330**	-1.183*	-1.2033*	-1.237*	-1.238*	-1.2089*
	(0.541)	(0.638)	(0.6345)	(0.641)	(0.633)	(0.6357)
FUNDIS	-0.187	-0.417	-0.4206	-0.409	-0.409	-0.4121
	(0.360)	(0.338)	(0.3368)	(0.331)	(0.330)	(0.3303)
HHI	0.456	0.628	0.6072	0.604	0.605	0.5934
	(1.903)	(1.939)	(1.9257)	(1.878)	(1.879)	(1.8666)
FIN = CAPITAL	0.335*	0.117**	0.1220**	0.151***	0.152***	0.1295**
	(0.177)	(0.054)	(0.0525)	(0.050)	(0.049)	(0.0514)
FIN*TANG	0.001					
	(0.001)					
FIN*FUNDIS	-0.081***	-0.028**		-0.030**	-0.030**	
	(0.028)	(0.012)		(0.012)	(0.013)	
FIN*LOW		0.011		-0.029**	-0.030	
		(0.013)		(0.011)	(0.039)	
FIN*FUNDIS*HIGH			-0.0279**		-0.030***	-0.0247**
			(0.0114)		(0.013)	(0.0121)
FIN*FUNDIS*LOW			-0.0273**		-0.030***	-0.0327***
			(0.0124)		(0.013)	(0.0114)
Number of Obs.	4884	4884	4884	4884	4884	4884
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adj R-squared	0.0628	0.0631	0.0629	0.0638	0.0636	0.0636
Root MSE	1.2267	1.2265	1.2266	1.2261	1.2262	1.2262
t-test for equality of high and low likelihood (p-value)			0.9040		0.979	0.0490**

Notes as in Table 2. LOW (HIGH) is a dummy variable indicating lower (higher) likelihood of financial stress. LOW and HIGH are defined on the basis of Altman's (1968) z-score in columns (2) and (3), and defined on the

basis of natural logarithm of total assets in column (4), (5) and (6). LOW=1 if the firm has a z-score (LNASSET) which is higher than the sample median in 2007, zero otherwise. HIGH=1 if the firm has a z-score (LNASSET) which is lower than the sample median in 2007, zero otherwise. All other variables are defined in Table 1.

Acknowledgements

We are grateful to two anonymous referees for helpful comments in the improvement of this paper. Naturally all remaining errors are ours. This work was supported by a Carnegie Trust Research Grant for Relationship Banking and Competition 2012, and a Flemish Science Foundation Grant (FWO).

References

Alessandrini, P., Presbitero, A.F., & Zazzaro, A., 2009, Banks, distances and firms' financing constraints, ***Review of Finance,*** 13, 261–307.

Altman, E. L., 1968, Financial ratios, discriminant analysis and the prediction of corporate bankruptcy, ***Journal of Finance***, 23, 589−609.

Appleyard, L., 2013, The geographies of access to enterprise finance: The case of the West Midlands, UK, ***Regional Studies,*** 47, 868–879.

Armstrong, A., Davis, E.P., Liadze, I., & Rienzo, C., 2013, An assessment of bank lending to UK SMEs in the wake of the crisis, ***National Institute Economic Review***, 225, R39–51.

Atanasova, C., & Wilson, N., 2004, Disequilibrium in the UK corporate loan market, ***Journal of Banking and Finance,*** 28, 595–614.

Barclay, M.J., & Smith, C.W., 1995, The maturity structure of corporate debt, ***Journal of Finance***, 50, 609–631.

Bastos R., & Pindado J., 2013, Trade credit during a financial crisis: A panel data analysis, ***Journal of Business Research***, 66, 614–620.

Beck, T., Degryse, H., De Haas, R., & Van Horen, N., 2018, When arm's length is too far: Relationship banking over the business cycle, forthcoming in ***Journal of Financial Economics***, 127, 174-196.

Becker, B., 2007, Geographical segmentation of US capital markets, ***Journal of Financial Economics***, 85, 151–178.

Benfratello, L., Schiantarelli, F., & Sembenelli, A., 2008, Banks and innovation: Microeconometric evidence on Italian firms, ***Journal of Financial Economics***, 90, 197–217.

Bernanke, B., 2007, Housing, housing finance, and monetary policy, Speech delivered at the Federal Reserve Bank of Kansas City's Economic Symposium.

Bernanke, B., & Gertler, M., 1995, Inside the black box: The credit channel of monetary policy transmission, ***Journal of Economic Perspectives***, 9, 27−48.

Bernanke, B., Gertler, M., & Gilchrist, S., 1996, The financial accelerator and the flight to quality, ***Review of Economics and Statistics***, 78, 1–15.

Biais, B., & Gollier, C., 1997, Trade credit and credit rationing, ***Review of Financial Studies***, 10, 903–937.

Black, L., Hancock, D., & Passmore W., 2007, Bank core deposits and the mitigation of monetary policy, ***Federal Reserve Board Finance and Economics Discussion Series*** No. 2007–65.

Bonaccorsi di Patti, E., & Sette, E., 2012, Bank balance sheets and the transmission of financial shocks to borrowers: Evidence from the 2007-2008 crisis, ***Bank of Italy Working Paper*** n. 848.

Bougheas, S., Mizen, P., & Yalcin, C., 2006, Access to external finance: Theory and evidence on the impact of monetary policy and firm-specific characteristics, ***Journal of Banking and Finance***, 30, 199–227.

Breedon, T., 2012, Boosting finance options for business, ***Department for Business Innovation and Skills***.

Campello, M., 2002, Internal capital markets in financial conglomerates: Evidence from small bank responses to monetary policy, ***Journal of Finance***, 57, 2773–2805.

Carbo-Valverde, S., Rodríguez-Fernández, F., & Udell, G.F., 2009, Bank market power and SME financing constraints. ***Review of Finance***, 13, 309–340.

Carbo-Valverde, S., Rodriguez-Fernandez, F., & Udell, G.F., 2016, Trade credit, the financial crisis, and firm access to finance, ***Journal of Money, Credit and Banking,*** 48, 113-143.

Cetorelli, N., & Goldberg, L., 2012, Liquidity management of U.S. global banks: Internal capital markets in the great recession, ***Journal of International Economics***, 88, 299–311.

Cohen, A., & Mazzeo, M., 2007, Market structure and competition among retail depository institutions, ***The Review of Economics and Statistics***, 89, 60-74.

Cowling, M., Liu, W., & Ledger, A., 2012, Small business financing in the UK before and after the financial crisis, ***International Small Business Journal***, 30, 778–800.

Cunat, V.M., 2007, Trade credit: Suppliers as debt collectors and insurance providers, ***Review of Financial Studies***, 20, 491-527.

Degryse, H., Laeven, L., & Ongena, S., 2009, The impact of organizational structure and lending technology on banking competition, ***Review of Finance***, 13, 225–259.

Degryse H., & Ongena S., 2005, Distance, lending relationships, and competition, ***Journal of Finance***, 60, 231–266.

De Haan, L., & Sterken, E., 2006, The impact of monetary policy on the financing behaviour of firms in the Euro area and the UK, ***European Journal of Finance***, 12, 401–420.

De Haas, R., & Van Horen, N., 2013, Running for the exit? International bank lending during a financial crisis, ***Review of Financial Studies***, 26, 244-285

Demiroglu, C., James, C., & Kizilaslan, A., 2012, Bank lending standards and access to lines of credit, ***Journal of Money, Credit and Banking***, 44, 1063–1089.

Dewally, M., & Shao, Y., 2014, Liquidity crisis, relationship lending and corporate finance, ***Journal of Banking and Finance***, 39, 223-239

Diamond, D.W., 1984, Financial intermediation and delegated monitoring, ***Review of Economic Studies***, 51, 393-414.

Dow, S., & Montagnoli, A., 2007, The regional transmission of UK monetary policy, ***Regional Studies***, 41, 797–808.

Fabbri, D., & Menichini, A.C., 2010, Trade credit, collateral liquidation and borrowing constraints, ***Journal of Financial Economics***, 96, 413–432.

Franklin J, Rostom M & Thwaites G ., 2015, The banks that said no: banking relationships, credit supply and productivity in the United Kingdom, ***Bank of England Staff Working Paper*** No 557, October

French, S., Leyshon, A., & Signoretta, P., 2008, All gone now: The material, discursive and political erasure of bank and building society branches in Britain, ***Antipode***, 40, 79–101

Freixas, X., & Rochet, J. C., 2008, ***Microeconomics of banking*** (2nd ed.). Cambridge, MA: MIT Press.

Garcia-Appendini, E., & Montoriol-Garriga, J., 2013, Firms as liquidity providers: Evidence from the 2007-2008 financial crisis, ***Journal of Financial Economics***, 109, 272–291.

Giannetti, M., & Laeven, L., 2012a, Flight home, flight abroad, and international credit cycles, ***American Economic Review***: ***Papers and Proceedings,*** 102, 219–224.

Giannetti, M., & Laeven, L., 2012b, The flight home effect: Evidence from the syndicated loan market during financial crises, ***Journal of Financial Economics***, 104, 23–43.

Guariglia, A., & Mateut, S., 2006, Credit channel, trade credit channel, and inventory investment: Evidence from a panel of UK firms, ***Journal of Banking and Finance***, 30, 2835–2856.

Huang, H., Shi, X., & Zhang, S., 2011, Counter-cyclical substitution between trade credit and bank credit, ***Journal of Banking and Finance***, 35, 1859–78.

Ivashina,V., & Scharfstein, D., 2010, Bank lending in the financial crisis of 2008, ***Journal of Financial Economics***, 97, 319–338.

Jiménez, G., Ongena. S., Peydró, J.L., & Saurina, J., 2012, Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications, ***American Economic Review***, 102, 2301–2326.

Jiménez, G., Ongena, S., Peydró, J.L., & Saurina, J., 2014, Hazardous times for monetary policy: What do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking?, ***Econometrica***, 82, 463–505.

Jones, C. S., & Tuzel, S., 2013, Inventory investment and the cost of capital, ***Journal of Financial Economics***, 107, 557-579

Kahle, K. M., & Stulz, R. M., 2013, Access to capital, investment, and the financial crisis, ***Journal of Financial Economics***, 110, 280–299.

Kashyap, A.K., & Stein, J.C., 1995, The Impact of monetary policy on bank balance sheets, ***Carnegie-Rochester Conference Series on Public Policy***, 42, 151-95.

Kashyap, A.K., & Stein, J.C., 2000, What do a million observations on banks say about the transmission of monetary policy?, ***American Economic Review***, 90, 407–428.

Kashyap, A.K., Stein, J.C., & Wilcox, D.W., 1993, Monetary policy and credit conditions: Evidence from the composition of external finance, ***American Economic Review***, 83, 78-98.

Khwaja, A.I., & Mian, A.R., 2008, Tracing the impact of bank liquidity shocks: Evidence from an emerging market, ***American Economic Review***, 98, 1413–1442.

Kohler, M., Britton, E., & Yates, T., 2000, Trade credit and the monetary transmission mechanism, ***Working Paper. Bank of England***.

Kremp, E., & Sevestre, P., 2013, Did the crisis induce credit rationing for French SMEs? ***Journal of Banking and Finance***, 37, 3757-3772.

Lang, W., & Nakamura, L., 1995, 'Flight to quality' in bank lending and economic activity, ***Journal of Monetary Economics***, 36, 145–64.

Mason, C., 2010, Entrepreneurial finance in a regional economy, ***Venture Capital***, 12, 167-172.

Mateut, S., Bougheas, S., & Mizen, P., 2006, Trade credit, bank lending and monetary policy transmission, ***European Economic Review***, 50, 603–629.

Mian, A., & Sufi, A., 2014, What explains the 2007–2009 drop in employment? ***Econometrica***, 82, 2197-2223.

Nilsen, J.H., 2002, Trade credit and the bank lending channel, ***Journal of Money, Credit, and Banking***, 34, 226-253.

Oliner, S., & Rudebusch, G.D., 1996, Monetary policy and credit conditions: Evidence from the composition of external finance: Comment, ***American Economic Review***, 86, 300-309.

Ongena, S., Popov, A., & Udell, G.F., 2013, When the cat's away the mice will play: Does regulation at home affect bank risk-taking abroad? ***Journal of Financial Economics***, 108, 727–750.

Paul, S.Y., & Guermat, C., 2009, Trade credit as short-term finance in the UK, ***CGF working paper*** 10/09, University of West England, Bristol.

Paul, S.Y., & Wilson, N., 2007, Trade credit supply: An empirical investigation of companies' level data, ***Journal of Accounting, Business and Management***, 13, 83-113.

Petersen, M.A., & Rajan, R.G., 1997, Trade credit: Theory and evidence, ***Review of Financial Studies*****,** 10, 661-91.

Pigini, C., Presbitero, A.F., & Zazzaro, A., 2016, State dependence in access to credit, **Journal of Financial Stability**, 27, 17-34.

Popov, A., & Udell, G.F., 2012, Cross-border banking, credit access and the financial crisis, ***Journal of International Economics***, 87, 147–61.

Pratt, D J., 1998, Re-placing money: The evolution of branch banking in Britain, ***Environment and Planning*** A, 30, 2211-2226

Presbitero, A. F., Udell, G. F., & Zazzaro, A., 2014, The home bias and the credit crunch: A regional perspective, ***Journal of Money, Credit and Banking***, 46, 53–86.

Sufi, A., 2009, Bank lines of credit in corporate finance: An empirical analysis, ***Review of Financial Studies***, 22, 1057–1088.

Tsuruta, D., 2014, Bank loan availability and trade credit for small businesses during the financial crisis, ***The Quarterly Review of Economics and Finance*** (in press), DOI: 10.1016/j.qref.2014.09.004

Wilson, N., 2008, An investigation into payment trends and behaviour in the UK: 1997-2007, ***Credit Management Research Centre, Leeds University***, Paper prepared for the Department for Business Enterprise and Regulatory Reform.

Wu, W., Rui, O.M., & Wu, C., 2012, Trade credit, cash holdings, and financial deepening: Evidence from a transitional economy, ***Journal of Banking and Finance***, 36, 2868–2883.

Yang, X., 2011, Trade credit versus bank credit: Evidence from corporate inventory financing, ***The Quarterly Review of Economics and Finance***, 51, 419–434.

Appendix

Extension and robustness tests

We conduct a battery of extensions and additional robustness tests that confirm the veracity of our results. In the first instance we replicate the results of Table 2 in the text by using travel time as a measure of functional distance for the variable FUNDIS. The results remain unchanged as Table A1 shows. Next we replicate the results of Table 3 using COREDEP (see Table 1) as an alternative measure of the bank financial condition FIN. These results are shown in Table A2. Again the mean results remain unchanged. We also weight the measure of FIN by the number of branches in the locality (CAPITAL(1), COREDEP(1)) and find that the results are robust to an alternative weighting scheme (results not shown). The same robustness checks are performed on the specification of Table 4 by using the alternative measure of the bank's financial condition (COREDEP), and the estimates are shown in Table A3. Once again the results are robust both to the alternative measure, and the alternative weighting (not shown). The specification in Table 5 is repeated in Table A4 for the alternative measure of FIN with similar results and checked with the alternative weighting method (not shown). The results are robust.

We drill down into the data to disaggregate the manufacturing sector for industry sub-sector heterogeneity by introducing a vector of dummies, each representing one SIC 2-digit level. The post-crisis period is re-estimated excluding the observations for the year of 2008 to allow for the increase in drawdowns of revolving credit facilities undertaken by low credit quality firms concerned about their access to funding during the peak period of the financial crisis as documented in Ivashina and Scharfstein (2010). The reference date for the crisis year is changed from 2008 to 2007 giving two sub-samples of 2002-2006 and 2007-2011 respectively, taking into account the argument that the warning sign of the financial crisis appeared in early 2007. All the functions were also re-estimated using traveling miles rather than traveling time as the measurement of functional distance. In all, our main results hold[27].

Thus far, the analysis has assumed that the presence of branches of banks in local credit market is exogenous. As suggested by French et al. (2013), the location of branches of British banks and building society during 1995-2012 is conditioned on the demographic variation of the population. Arguably, demographic conditions would also influence the supply of local bank deposits (Cremera et al., 2010) and the demand for bank financial services. Indeed, the empirical

[27] For brevity, the results are not reported. They are available from the authors on request.

analysis of the US bank loan market by Becker (2007) suggests that the proportion of seniors (i.e., 65 years or older) in each locality is positively related to the volume of bank deposits of local banks. The Life-Cycle Hypothesis suggests that seniors consume less, and hold higher levels of bank deposits than other groups both in absolute terms and as a fraction of portfolios. Furthermore the stronger preference of seniors for traditional "bricks and mortar" branches over new technology-driven channel of service provision due to their relatively lower physical outreach and relatively weaker technology skills might generate a stronger demand for the physical presence of branch network at the local area. Banks might be incentivized to maintain a physical presence in areas that have a higher proportion of seniors, being driven by the joint consideration of raising core deposit and selling fee-based bank product and service (Becker, 2007). Branches of UK banks are not subject to the prescription of a common credit to deposit ratio at the local level, the status of local supply of deposit would not necessarily be related to local supply of bank credit. Our supposition is that this would be more likely if the headquarters of branches has constraints in tapping the external capital market (Cremers et al., 2010) and core deposits plays an important role in funding credit supply, as the case at the time of the crisis. Arguably, a stronger and more stable supply of core deposits at the locality level might lead to a higher bargaining power of local branches in the headquarters' internal capital allocation process.

To allow for potential endogeneity in the location of branches and thereby its impact on the characteristics of the local supply of credit, we augment model (2) with the proportion of senior population at locality level and model (3) with the proportion of senior population at locality level and its interaction term with the locality-specific financial condition of banks. These results are shown in Tables A5, A6 and A7 respectively. As seen, our main results survive in all tests. The results are qualitatively the same.

In a further robustness test to deal with potential endogeneity of the characteristics of the local credit market, we fix the characteristics of the local credit market of each locality to their 2003 values for the analysis of the pre-crisis period (i.e. 2004-2007) and the 2007 values for the post-crisis period (i.e. 2008-2011). In effect, the characteristics of the local credit market at year 2003 and at year 2007 are used as instruments for the characteristics of local credit market for pre- and post-financial crisis periods, respectively. We conduct this robustness test on the parsimonious version of model (3). The results are reported in Tables A8 and A9. Again, the pre- and post-2008 results shown in Table 4 of the main text hold.

Table A1: Credit constraints and local banking markets

	2004-2007	2008-2011
Firm-specific time varying characteristics		
LNASSETS	-0.0011 (0.0242)	0.0657** (0.0261)
TANG	0.0051*** (0.0016)	0.0056*** (0.0014)
INTFIN	-0.0007 (0.0013)	0.0014** (0.0006)
INTCOV	0.0000 (0.0000)	0.0000** (0.0000)
NETWORTH	-0.0017** (0.0007)	-0.0011 (0.0010)
CASHDEBT	0.0001 (0.0003)	-0.0026*** (0.0009)
INTANG	0.0063*** (0.0018)	0.0071*** (0.0015)
TRADEDEBT	0.2225 (0.3525)	0.2453 (0.2900)
Locality-specific time varying economic conditions		
UNEMP	0.1745 (0.1255)	0.0020 (0.0624)
Locality-specific time varying characteristics of credit market		
OPDIS	2.6687** (1.3233)	-0.7398 (0.5321)
FUNDIS	0.0769 (0.3122)	-0.5573*** (0.1988)
HHI	-8.2766*** (2.8158)	0.5580 (1.8583)
Number of Obs.	4829	4884
Time span	2004-07	2008-11
Prob > F	0.0001	0.0000
Adj R-squared	0.0351	0.0626
Root MSE	1.3022	1.2268

Note: Dependent variable: FINMIX (i.e., ln((overdraft/(overdraft + trade credit))*100). Figures in brackets are robust standard errors clustered at locality level. * significance at 10%, ** significance at 5%, and *** significance at 1%. Constant, year dummies and locality dummies are not reported for the sake of brevity. Column (1) and (2) are the estimated result of model (1) using traveling miles as the measurement of functional distance (FUNDIS). All variables are defined in Table 1.

Table A2: Credit constraints and local banking markets

	1	2
	2004-2007	2008-2011
	Equally-weighted	Equally-weighted
Firm-specific time varying characteristics		
LNASSETS	-0.0013 (0.0242)	0.0658** (0.0261)
TANG	0.0051*** (0.0016)	0.0056*** (0.0014)
INTFIN	-0.0007 (0.0013)	0.0014** (0.0006)
INTCOV	0.0000 (0.0000)	0.0000** (0.0000)
NETWORTH	-0.0017** (0.0007)	-0.0011 (0.0010)
CASHDEBT	0.0000 (0.0003)	-0.0026*** (0.0009)
INTANG	0.0062*** (0.0018)	0.0071*** (0.0015)
TRADEDEBT	0.2247 (0.3526)	0.2438 (0.2900)
Locality-specific time varying economic conditions		
UNEMP	0.1475 (0.1256)	0.0059 (0.0631)
Locality-specific time varying characteristics of credit market		
OPDIS	2.4448** (1.1775)	-0.7160 (0.5359)
FUNDIS	0.1455 (0.3950)	-0.7658*** (0.2599)
HHI	-8.1300*** (2.7817)	0.5010 (1.8911)
FIN = CORE DEPOSIT	-0.0139 (0.0135)	0.0052 (0.0126)
Number of Obs.	4829	4884
Prob > F	0.0001	0.0000
Adj R-squared	0.0351	0.0625
Root MSE	1.3022	1.2269

Note: As Table 2

Table A3: The characteristics of local banking markets and the transmission of the financial condition of banks

	1	2	3	4
	2004-2007		2008-2011	
Firm-specific time varying characteristics				
LNASSETS	-0.0015 (0.0242)	-0.0012 (0.0242)	0.0661** (0.0261)	0.0663** (0.0261)
TANG	0.0051*** (0.0016)	0.0051*** (0.0016)	0.0055*** (0.0014)	0.0056*** (0.0014)
INTFIN	-0.0007 (0.0013)	-0.0007 (0.0013)	0.0014** (0.0006)	0.0014** (0.0006)
INTCOV	0.0000 (0.0000)	0.0000 (0.0000)	0.0000** (0.0000)	0.0000** (0.0000)
NETWORTH	-0.0017** (0.0007)	-0.0017** (0.0007)	-0.0011 (0.0010)	-0.0011 (0.0010)
CASHDEBT	0.0000 (0.0003)	0.0000 (0.0003)	-0.0026*** (0.0010)	-0.0026*** (0.0010)
INTANG	0.0063*** (0.0019)	0.0062*** (0.0019)	0.0071*** (0.0015)	0.0071*** (0.0015)
TRADEDEBT	0.2249 (0.3521)	0.2248 (0.3526)	0.2437 (0.2898)	0.2402 (0.2897)
Locality-specific time varying economic conditions				
UNEMP	0.1975 (0.1316)	0.1632 (0.1322)	-0.0269 (0.0676)	-0.0297 (0.0654)
Locality-specific time varying characteristics of credit market				
OPDIS	2.2052 (1.6687)	2.6388* (1.3554)	-0.3934 (0.7190)	-1.0241** (0.4957)
FUNDIS	-0.0757 (0.7224)	-0.0209 (0.4850)	0.9807 (0.6428)	0.5669 (0.5651)
HHI	1.6701 (8.2564)	-8.5354*** (2.7850)	-2.9950 (7.9050)	0.3407 (1.8924)
FIN = COREDEP	-0.0228 (0.0545)	-0.0298 (0.0364)	0.1641** (0.0745)	0.1298*** (0.0460)
FIN*FUNDIS	0.0082 (0.0111)	0.0032 (0.0066)	-0.0324*** (0.0118)	-0.0236*** (0.0086)
FIN*HHI	-0.1806 (0.1339)		0.0675 (0.1538)	
FIN*OPDIS	0.0004 (0.0059)		-0.0075 (0.0069)	
Number of Obs.	4829		4884	
Prob > F	0.0000	0.0001	0.0000	0.0000
Adj R-squared	0.034	0.0349	0.0628	0.0630
Root MSE	1.3024	1.3023	1.2267	1.2266

Note: As Table 2

Table A4: The heterogeneous transmission of the financial condition of banks for the period 2008-2011 (borrower heterogeneity – equally weighted)

	1	2	3
Firm-specific time varying characteristics			
LOW		0.3842 (0.2646)	-0.2404 (0.4077)
LNASSETS	0.066** (0.026)	0.0621** (0.0258)	0.0874*** (0.0312)
TANG	0.010 (0.011)	0.0049*** (0.0016)	0.0056*** (0.0014)
INTFIN	0.001** (0.001)	0.0014** (0.0006)	0.0014** (0.0006)
INTCOV	0.000** (0.000)	0.0000** (0.0000)	0.0000** (0.0000)
NETWORTH	-0.001 (0.001)	-0.0011 (0.0010)	-0.0011 (0.0010)
CASHEBT	-0.003*** (0.001)	-0.0025*** (0.0009)	-0.0026*** (0.0010)
INTANG	0.007*** (0.001)	0.0066*** (0.0016)	0.0072*** (0.0015)
TRADEDEBT	0.240 (0.290)	0.2045 (0.2849)	0.2378 (0.2895)
Locality-specific time varying economic conditions			
UNEMP	-0.030 (0.065)	-0.0305 (0.0655)	-0.0304 (0.0649)
Locality-specific time varying characteristics of credit market			
OPDIS	-1.026** (0.492)	-1.0036** (0.4923)	-1.0159** (0.4996)
FUNDIS	0.568 (0.564)	0.5241 (0.5738)	0.5451 (0.5750)
HHI	0.319 (1.896)	0.2854 (1.9054)	0.3289 (1.8810)
FIN = COREDEP	0.133*** (0.045)	0.1276*** (0.0471)	0.1284** (0.0467)
FIN*TANG	-0.000 (0.000)		
FIN*FUNDIS	-0.024*** (0.009)		
FIN*FUNDIS*HIGH		-0.0222** (0.0090)	-0.0238*** (0.0084)
FIN*FUNDIS*LOW		-0.0241*** (0.0086)	-0.0231** (0.0090)
Number of Obs.	4884		
Prob > F	0.0000	0.0000	0.0000
Adj R-squared	0.0628	0.0629	0.0636
Root MSE	1.2267	1.2266	1.2262
t-test for equality of high and low likelihood financial stress (p-value)		0.9040	0.0490**

Note: notes as in Table 2. Furthermore, LOW (HIGH) is a dummy variable indicating lower (higher) likelihood of financial stress. LOW and HIGH are defined on the basis of Altman's (1968) z-score in Column (2) and defined

on the basis of natural logarithm of total assets in column (3). LOW=1 if the firm has a z-score (LNASSET) which is higher than the sample median in 2007, zero otherwise. HIGH=1 if the firm has a z-score (LNASSET) which is lower than the sample median in 2007, zero otherwise. All other variables are defined in Table 1.

Table A5: Credit constraints and local banking market for the period 2008-2011 controlling for the proportion of seniors in population

	1	2	3	4
	FIN=CAPITALIZATION		FIN=COREDEPOSIT	
	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted
Firm-specific time varying characteristics				
LNASSETS	0.0653** (0.0261)	0.0652** (0.0261)	0.0653** (0.0261)	0.0652** (0.0261)
TANG	0.0056*** (0.0014)	0.0056*** (0.0014)	0.0056*** (0.0014)	0.0056*** (0.0014)
INTFIN	0.0014** (0.0006)	0.0014** (0.0006)	0.0014** (0.0006)	0.0014** (0.0006)
INTCOV	0.0000** (0.0000)	0.0000** (0.0000)	0.0000** (0.0000)	0.0000** (0.0000)
NETWORTH	-0.0011 (0.0010)	-0.0011 (0.0010)	-0.0011 (0.0010)	-0.0011 (0.0010)
CASHDEBT	-0.0026*** (0.0009)	-0.0026*** (0.0009)	-0.0026*** (0.0009)	-0.0026*** (0.0009)
INTANG	0.0072*** (0.0015)	0.0072*** (0.0015)	0.0072*** (0.0015)	0.0072*** (0.0015)
TRADEDEBT	0.2388 (0.2911)	0.2398 (0.2909)	0.2386 (0.2904)	0.2400 (0.2908)
Locality-specific time varying economic conditions				
UNEMP	0.0441 (0.0700)	0.0261 (0.0710)	0.0441 (0.0700)	0.0379 (0.0708)
Locality-specific time varying characteristics of credit market				
OPDIS	-1.0221 (0.7273)	-0.7672 (0.6305)	-0.8438 (0.6434)	-0.8139 (0.6375)
FUNDIS	-0.7646*** (0.2697)	-0.8335*** (0.2679)	-0.8000*** (0.2674)	-0.7812*** (0.2785)
HHI	0.8249 (1.8988)	1.0251 (1.8553)	0.8621 (1.8499)	0.8231 (2.0311)
SENPOP	0.1156 (0.0734)	0.1109 (0.0745)	0.1177 (0.0731)	0.1097 (0.0767)
FIN	0.0210 (0.0432)	-0.0622 (0.0767)	0.0080 (0.0126)	-0.0017 (0.0204)
Number of Obs.	4884			
Prob > F	0.0000	0.0000	0.0000	0.0000
Adj R-squared	0.0625	0.0625	0.0625	0.0625
Root MSE	1.2269	1.2269	1.2269	1.2269

Note: All variables are defined in Table 1. Notes as in Table 2.

Table A6: The characteristics of local banking market and the transmission of the financial condition of banks for the period 2008-2011 with controlling for the proportion of seniors in population

	1	2	3	4	5	6	7	8
	FIN=CAPITALIZATION				FIN=COREDEPOSIT			
	Equally-weighted	Equally-weighted	Branch-weighted	Branch-weighted	Equally-weighted	Equally-weighted	Branch-weighted	Branch-weighted
Firm-specific time varying characteristics								
LNASSETS	0.0654**	0.0654**	0.0656**	0.0656**	0.0659**	0.0658**	0.0655**	0.0655**
	(0.0261)	(0.0261)	(0.0260)	(0.0260)	(0.0261)	(0.0260)	(0.0260)	(0.0260)
TANG	0.0056***	0.0056***	0.0056***	0.0056***	0.0056***	0.0056***	0.0056***	0.0056***
	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)
INTFIN	0.0014**	0.0014**	0.0014**	0.0014**	0.0014**	0.0014**	0.0014**	0.0014**
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
INTCOV	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
NETWORTH	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
CASHDEBT	-0.0026***	-0.0026***	-0.0026***	-0.0026***	-0.0026***	-0.0026***	-0.0026***	-0.0026***
	(0.0009)	(0.0009)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
INTANG	0.0072***	0.0072***	0.0072***	0.0072***	0.0071***	0.0071***	0.0072***	0.0072***
	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)
TRADEDEBT	0.2367	0.2371	0.2368	0.2366	0.2340	0.2338	0.2377	0.2364
	(0.2912)	(0.2913)	(0.2910)	(0.2910)	(0.2902)	(0.2901)	(0.2909)	(0.2906)
Locality-specific time varying economic conditions								
UNEMP	0.0426	0.0420	0.0158	0.0166	0.0117	0.0122	-0.0100	-0.0026
	(0.0691)	(0.0695)	(0.0713)	(0.0707)	(0.0708)	(0.0705)	(0.0702)	(0.0712)
Locality-specific time varying characteristics of credit market								
OPDIS	-1.6876**	-1.6776**	-1.6370***	-1.6303***	-1.1932**	-1.1956**	-1.0341*	-1.0211*
	(0.6588)	(0.6553)	(0.5713)	(0.5744)	(0.5972)	(0.5942)	(0.5939)	(0.5815)
FUNDIS	-0.3750	-0.3233	-0.0829	-0.0947	0.6488	0.6238	0.6861	0.4325
	(0.3580)	(0.3586)	(0.3840)	(0.3888)	(0.6514)	(0.6097)	(0.6786)	(0.6469)
HHI	1.0543	1.1429	0.9227	0.9003	0.7645	0.7504	1.5312	1.3491
	(1.8589)	(1.9014)	(1.8870)	(1.8734)	(1.8390)	(1.8253)	(2.0827)	(2.0816)

SENPOP	0.2062* (0.1137)	0.1654* (0.0860)	0.1484 (0.1138)	0.1602** (0.0830)	0.1269 (0.1376)	0.1374* (0.0762)	0.0243 (0.1278)	0.1042 (0.0762)
FIN	0.1981** (0.0766)	0.1767*** (0.0660)	0.4304** (0.2039)	0.4381** (0.1950)	0.1419*** (0.0503)	0.1420*** (0.0503)	0.1407** (0.0683)	0.1377** (0.0682)
FIN*FUNDIS	-0.0304@ (0.0192)	-0.0381** (0.0154)	-0.1016** (0.0406)	-0.0976*** (0.0345)	-0.0259** (0.0109)	-0.0253*** (0.0093)	-0.0309** (0.0136)	-0.0252** (0.0120)
FIN*SENPOP	-0.0035 (0.0059)		0.0014 (0.0085)		0.0002 (0.0018)		0.0016 (0.0020)	
Number of Obs.	4884							
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adj R-squared	0.0627	0.0629	0.0630	0.0632	0.0630	0.0631	0.0627	0.0628
Root MSE	1.2268	1.2267	1.2266	1.2264	1.2266	1.2265	1.2268	1.2267

Note: All variables are defined in Table 1. Notes as in Table 2.

Table A7: The heterogeneous transmission of the financial condition of banks for the period 2008-2011 controlling for the proportion of seniors in population (borrower heterogeneity)

	1	2	3	4	5	6	7	8
	FIN=CAPITALIZATION		FIN=COREDEPOSIT		FIN=CAPITALIZATION		FIN=COREDEPOSIT	
	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted
Firm-specific time varying characteristics								
LOW	-0.0990	0.0542	0.3809	0.2082	0.1702	0.0826	-0.2281	-0.2885
	(0.1682)	(0.1766)	(0.2645)	(0.3387)	(0.1539)	(0.1716)	(0.4084)	(0.4101)
LNASSETS	0.0610**	0.0617**	0.0617**	0.0611**	0.0871***	0.0851***	0.0867***	0.0863***
	(0.0258)	(0.0254)	(0.0257)	(0.0256)	(0.0311)	(0.0319)	(0.0312)	(0.0315)
TANG	0.0049***	0.0049***	0.0049***	0.0050***	0.0056***	0.0056***	0.0056***	0.0056***
	(0.0015)	(0.0015)	(0.0016)	(0.0015)	(0.0014)	(0.0014)	(0.0014)	(0.0014)
INTFIN	0.0014**	0.0014**	0.0014**	0.0014**	0.0013**	0.0013**	0.0014**	0.0014**
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
INTCOV	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
NETWORTH	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011	-0.0011
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
CASHDEBT	-0.0025***	-0.0025***	-0.0025***	-0.0025***	-0.0026***	-0.0026***	-0.0026***	-0.0026***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0010)	(0.0009)
INTANG	0.0066***	0.0065***	0.0067***	0.0066***	0.0072***	0.0072***	0.0072***	0.0072***
	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0015)	(0.0015)	(0.0015)	(0.0015)
TRADEDEBT	0.1960	0.1934	0.1990	0.1984	0.2211	0.2270	0.2316	0.2357
	(0.2875)	(0.2866)	(0.2853)	(0.2865)	(0.2909)	(0.2907)	(0.2899)	(0.2901)
Locality-specific time varying economic conditions								
UNEMP	0.0409	0.0166	0.0095	-0.0037	0.0341	0.0177	0.0108	-0.0046
	(0.0694)	(0.0707)	(0.0706)	(0.0713)	(0.0703)	(0.0708)	(0.0706)	(0.0710)
Locality-specific time varying characteristics of credit market								
OPDIS	-1.6376**	-1.6276***	-1.1673**	-0.9829*	-1.6215**	-1.5629***	-1.1835*	-1.0093*
	(0.6591)	(0.5693)	(0.5890)	(0.5793)	(0.6609)	(0.5689)	(0.6040)	(0.5899)

FUNDIS	-0.3249 (0.3594)	-0.1014 (0.3881)	0.5787 (0.6167)	0.3941 (0.6564)	-0.3220 (0.3528)	-0.1071 (0.3868)	0.6014 (0.6209)	0.4017 (0.6642)
HHI	1.1294 (1.9110)	0.8248 (1.8796)	0.6765 (1.8400)	1.2952 (2.1090)	1.0862 (1.8582)	0.8696 (1.8652)	0.7277 (1.8180)	1.3416 (2.0443)
SENPOP	0.1614* (0.0858)	0.1542* (0.0821)	0.1309* (0.0757)	0.1010 (0.0755)	0.1530* (0.0863)	0.1598* (0.0827)	0.1343* (0.0775)	0.0995 (0.0774)
FIN	0.1758*** (0.0659)	0.4371** (0.1955)	0.1393*** (0.0513)	0.1344* (0.0692)	0.1801*** (0.0653)	0.4270** (0.1929)	0.1404*** (0.0514)	0.1354* (0.0691)
FIN*FUNDIS								
FIN*FUNDIS*HIGH	-0.0384** (0.0151)	-0.0940*** (0.0349)	-0.0238** (0.0097)	-0.0240* (0.0125)	-0.0347** (0.0162)	-0.0917*** (0.0345)	-0.0254*** (0.0091)	-0.0254** (0.0119)
FIN*FUNDIS*LOW	-0.0377** (0.0159)	-0.1003*** (0.0346)	-0.0258*** (0.0093)	-0.0253** (0.0120)	-0.0424*** (0.0148)	-0.0987*** (0.0342)	-0.0248** (0.0098)	-0.0244* (0.0126)
Number of Obs.	4884							
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adj R-squared	0.0632	0.0637	0.0642	0.0634	0.0639	0.0634	0.0632	0.0629
Root MSE	1.2265	1.2261	1.2258	1.2263	1.2260	1.2263	1.2264	1.2266
t-test on equality HIGH and LOW likelihood financial stress (p-value)	0.8860	0.3930	0.0930*	0.4260	0.0640*	0.3380	0.6930	0.5910

Note: All variables are defined in Table 1.

Table A8: The characteristics of local banking market and the transmission of the financial condition of banks

	1	2	3	4	5	6	7	8
	2004-2007				2008-2011			
	FIN=CAPITALIZATION		FIN=COREDEPOSIT		FIN=CAPITALIZATION		FIN=COREDEPOSIT	
	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted
Firm-specific time varying characteristics								
LNASSETS	-0.013	-0.013	-0.014	-0.013	0.073	0.073***	0.073***	0.073***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)***	(0.026)	(0.026)	(0.026)
TANG	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
INTFIN	-0.003	-0.003	-0.003	-0.003	0.001**	0.001**	0.001**	0.001**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
INTCOV	0.000**	0.000**	0.000**	0.000**	0.000***	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NETWORTH	-0.002**	-0.002**	-0.002**	-0.002**	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CASHDEBT	0.000	0.000	0.000	0.000	-0.003***	-0.004***	-0.004***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
INTANG	0.006***	0.006***	0.006***	0.006***	0.007***	0.007***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
TRADEDEBT	0.201	0.206	0.207	0.206	0.301	0.297	0.294	0.296
	(0.424)	(0.424)	(0.425)	(0.425)	(0.309)	(0.309)	(0.308)	(0.308)
Locality-specific time varying economic conditions								
UNEMP	0.092	0.129	0.068	0.070	-0.038	-0.049	-0.056	-0.066
	(0.132)	(0.136)	(0.131)	(0.129)	(0.062)	(0.061)	(0.061)	(0.066)
Locality-specific time varying characteristics of credit market								
FIN	0.044	-0.017	0.012	0.021	0.266**	0.497**	0.150***	0.137*
	(0.067)	(0.057)	(0.041)	(0.023)	(0.112)	(0.220)	(0.055)	(0.072)
FIN*FUNDIS	-0.007	0.012	-0.004	-0.004	-0.060**	-0.104**	-0.028***	-0.027**
	(0.013)	(0.013)	(0.007)	(0.004)	(0.026)	(0.041)	(0.011)	(0.013)

Number of Obs.	4478				4698			
Prob > F	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
R-squared	0.068	0.069	0.068	0.068	0.094	0.094	0.094	0.094
Adj R-squared	0.039	0.039	0.039	0.039	0.067	0.067	0.067	0.067
Root MSE	1.300	1.299	1.300	1.300	1.230	1.230	1.230	1.230

The above table reports the results from the regression: $$\ln Y_{irt} = \alpha + \alpha_1 X_{irt-1} + \alpha_2 ECN_{rt-1} + \beta_1 LOCALBANK_r + \beta_4 FIN_{rt-1} + \beta_5 FIN_{rt-1} * FUNDIS_r + \lambda_r + \upsilon_t + \varepsilon_{irt}$$

Where the characteristics of local banking market are fixed as their value at year 2003 and 2007 for the period 2004-2007 and 2008-2011, respectively. The first-order impact of characteristics of local banking market is absorbed by the locality dummies, and cannot be estimated. All variables are defined in Table 1.

Table A9: The heterogeneous transmission of the financial condition of banks for the period 2008-2011 (borrower heterogeneity)

	LOW and HIGH are defined on the basis of natural logarithm of total assets				LOW and HIGH are defined on the basis of the basis of Altman's (1968) z-score			
	FIN=CAPITALIZATION		FIN=COREDEPOSIT		FIN=CAPITALIZATION		FIN=COREDEPOSIT	
	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted	Equally-weighted	Branch-weighted
Firm-specific time varying characteristics								
LOW	0.164	0.080	-0.264	-0.301	-0.114	0.051	0.405	0.253
	(0.150)	(0.176)	(0.413)	(0.425)	(0.172)	(0.186)	(0.294)	(0.370)
LNASSETS	0.104***	0.101***	0.103***	0.102***	0.069***	0.070***	0.070***	0.069***
	(0.032)	(0.033)	(0.032)	(0.032)	(0.026)	(0.025)	(0.025)	(0.025)
TANG	0.005***	0.005***	0.006***	0.006***	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
INTFIN	0.001**	0.001**	0.001**	0.001**	0.001**	0.001**	0.001**	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
INTCOV	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NETWORTH	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CASHDEBT	-0.004***	-0.004***	-0.004***	-0.004***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
INTANG	0.007***	0.007***	0.007***	0.007***	0.006***	0.006***	0.006***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
TRADEDEBT	0.271	0.280	0.285	0.288	0.270	0.258	0.269	0.268
	(0.309)	(0.307)	(0.308)	(0.307)	(0.304)	(0.304)	(0.302)	(0.304)
Locality-specific time varying economic conditions								
UNEMP	-0.043	-0.050	-0.058	-0.068	-0.038	-0.048	-0.058	-0.067
	(0.063)	(0.062)	(0.061)	(0.066)	(0.062)	(0.062)	(0.062)	(0.066)
Locality-specific time varying characteristics of credit market								
FIN	0.275**	0.489**	0.149***	0.137*	0.267**	0.496**	0.147***	0.133***
	(0.108)	(0.215)	(0.055)	(0.073)	(0.110)	(0.221)	(0.055)	(0.073)
FIN*FUNDIS*HIGH	-0.058**	-0.099**	-0.028***	-0.027**	-0.061**	-0.101**	-0.026**	-0.025*
	(0.026)	(0.041)	(0.010)	(0.013)	(0.024)	(0.042)	(0.011)	(0.013)

FIN*FUNDIS*LOW	-0.066*** (0.025)	-0.107*** (0.041)	-0.027** (0.011)	-0.026* (0.014)	-0.060** (0.027)	-0.106*** (0.041)	-0.028*** (0.010)	-0.027** (0.013)
Number of Obs.	4698							
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.096	0.095	0.095	0.094	0.094	0.095	0.095	0.094
Adj R-squared	0.068	0.068	0.068	0.067	0.067	0.067	0.068	0.067
Root MSE	1.229	1.230	1.230	1.230	1.230	1.230	1.229	1.230
t-test on equality high and low likelihood financial stress (p-value)	0.034**	0.297	0.672	0.621	0.727	0.488	0.129	0.425

The above table reports the estimated results of the regression:

$$\ln Y_{irt} = \alpha + \alpha_0 Z_{ir} + \alpha_1 X_{irt-1} + \alpha_2 ECN_{rt-1} + \beta_1 LOCALBANK_r + \beta_4 FIN_{rt-1} + \beta_6 FIN_{rt-1} * FUNDIS_r * Z_{ir} + \beta_7 FIN_{rt-1} * FUNDIS_r * (1 - Z_{ir}) + \lambda_r + \upsilon_t + \varepsilon_{irt}$$

where the characteristics of local banking market are fixed as their value at year 2003 and 2007 for the period 2004-2007 and 2008-2011, respectively. The weight used to construct the locality-specific financial condition of banks is indicated in the third row. LOW (HIGH) is a dummy variable indicating lower (higher) likelihood of financial stress and is defined on the basis of the basis of Altman's (1968) z-score and the natural logarithm of total assets (as indicated in the top row), respectively. LOW=1 if the firm has a z-score (LNASSET) which is higher than the sample median in 2007, zero otherwise. HIGH=1 if the firm has a z-score (LNASSET) which is lower than the sample median in 2007, zero otherwise. Constant, year and locality dummies are included in the estimation, but not reported for the sake of brevity. The first-order impact of characteristics of local banking market is absorbed by the locality dummies, and cannot be estimated. All variables are defined in Table 1.