

Bank Market Concentration, Relationship Banking and Small Business

Liquidity

Liang Han¹; Song Zhang^{2,*} and Francis J. Greene³

¹Surrey Business School, University of Surrey, Guildford, Surrey, U.K, GU2 7XH, L.Han@surrey.ac.uk; School of Economics and Management, Shihezi University, Shihezi, Xinjiang, China

²Portsmouth Business School, University of Portsmouth, Portsmouth, U.K, PO1 2UP, Song.Zhang@port.ac.uk.

³Birmingham Business School, University of Birmingham, Birmingham, U.K, B15 2TT, F.Greene@bham.ac.uk.

*Corresponding author

Abstract

This paper examines two contrasting interpretations of how bank market concentration (*Market Power Hypothesis*) and banking relationships (*Information Hypothesis*) affect three sources of small firm liquidity (cash, lines of credit and trade credit). Supportive of a market power interpretation, we find that in a highly concentrated banking market, small firms hold less cash, have less access to lines of credit, are more financially constrained, use greater amounts of more expensive trade credit and face higher penalties for trade credit late payment. We also find support for the information hypothesis: relationship banking improves small business liquidity, particularly in a concentrated banking. Our results are robust to different cash, lines of credit and trade credit measures and to alternative empirical approaches.

JEL classification: G14, G21

Key words: bank market concentration, market power, relationship banking, small firm liquidity

Introduction

Unlike the liquidity decisions of large firms, less is understood about the effects of bank concentration and relationship banking on small firm liquidity (Opler et al., 1999; D'Mello et al., 2008). Theoretical ambiguities also persist. Because concentrated banking structures imply market power inefficiencies, Klein (1971) suggests that bank concentration leads to small firms facing greater financial constraints (Beck *et al.*, 2004) and higher capital costs (Rice and Strahan, 2010). We refer to this as the market power hypothesis. Petersen and Rajan (1995), however, also suggest that relationship banking may significantly alter the relationship between bank concentration and the liquidity of informationally opaque small firms. They argue that banks with market power are incentivized to acquire private information and are better able to efficiently internalize the costs of collecting such information than banks in more competitive markets (Cetorelli and Peretto, 2000; Marquez, 2002). Concentrated bank market structures may therefore promote small firm liquidity by providing access to external finance. We refer to this as the information hypothesis.

This raises two central research questions: 1) does bank concentration adversely affect the liquidity of small firms? or 2) Does relationship banking support small firm liquidity so that they are more likely to hold appropriate levels of cash, have greater access to lines of credit and be less prone to using expensive trade credit? These questions are of practical significance to small firms because if they are unduly financially constrained by bank concentration (Beck and Demirgüç-Kunt, 2006), it is likely to impact on their productivity and ability to bring forward new innovations (Storey and Greene, 2010). Equally, there have been long-standing and on-going policy concerns about the role that bank concentration has on small firms both in the United States and in other developed economies (Rice and Strahan, 2010). This reflects concerns about social welfare losses that may arise from bank concentration (Maudos and

Fernández de Guevara, 2007) and concerns that bank concentration may impede the ability of small firms to contribute to economic growth (Ryan et al, 2014; Chong et al, 2013).

The aim of this paper is to provide fresh insights into whether bank concentration has either detrimental or positive impacts on small firm liquidity. Our key contribution is to examine how three key measures of small firm liquidity (cash holdings, lines of credit and trade credit) - both on their own and together - are affected by bank market concentration and relationship banking. We focus on cash holdings because of their importance to small firm profitability, valuations and survival (Mach and Wolken, 2011; Harford et al., 2008). Despite this, to our knowledge, there have only been two earlier studies of small firm cash holdings (Faulkender, 2002; García-Teruel and Martínez-Solano, 2008). Similarly, although credit lines are also a common source of small firm liquidity (Sufi, 2009), prior studies have typically focused on credit line usage by large firms. Finally, while there is widespread recognition that trade credit is a more expensive substitute for lines of credit (Petersen and Rajan, 1994; 1997; Ryan et al, 2014; Cuñat, 2007), prior research has often focused on lending rather than liquidity decisions (Ratti et al., 2008) despite small firms having less access to capital markets. In sum, one contribution of this paper is that it considers how banking concentration and relationship banking impact individually on these three main forms of small firm liquidity.

However, what is particularly novel about this study is that we are the first, to our knowledge, to examine how bank concentration and relationship banking impacts on all these three different forms of liquidity together. Examining these sources together is important because they are often used as substitutes. For example, non-operational cash (unconditional liquidity) is used as a buffer against cash flow shocks while credit lines (conditional liquidity) provide liquidity to support firms seeking to exploit business opportunities (Lins et al., 2010).

Sufi (2009) also shows that firms with low (high) cash flows are less (more) likely to have credit lines. Faulkender (2002) identifies that cash holdings are negatively related to the use of trade credit while Acharya et al., (2013) show that firms with higher risk profiles prefer holding cash rather than using credit lines. Moreover, trade credit is used as a substitute of bank credits, especially for less liquid firms (McGuinness and Hogan, 2014). In sum, therefore, the central novelty of this paper is that we separately and jointly consider the impacts of bank concentration and relationship banking on three main sources of small firm liquidity.

Our results show that when all three forms of liquidity are considered together, small firms in a highly concentrated banking market have less access to lines of credit and use more expensive trade credit. On an individual basis, we also find that small firms hold less cash, are more likely to be financially and liquidity constrained, have less access to lines of credit, use greater amounts of trade credit and face higher penalties if they pay trade credit late. These findings are consistent with a market power interpretation that suggests that bank concentration has a negative impact on small firm liquidity. Nonetheless, we also find that if small firms have built longer banking relationships in concentrated banking markets, they hold more cash, are less likely to be constrained, and have better access to lines of credit. Such results are consistent with the information hypothesis. What, therefore, emerges from our study is support for both market power and information hypotheses, suggesting that these two approaches are not mutually exclusive.

The remainder of the paper is structured as follows: Section 2 reviews the existing theoretical and empirical literature on small business liquidity, bank market concentration and relationship banking. Section 3 presents the data and defines the key measures. Section 4 reports

the main results with additional robustness tests. Section 5 discusses the findings and points to the implications of our study.

1. Bank market concentration and small firm liquidity

Given that about half of all US small firms headquarter in highly concentrated banking markets (Han and Zhang, 2012), there have been concerns about the impact of bank consolidation on US small firms (Rice and Strahan, 2010). This is despite bank market deregulation being introduced in 1990s which effectively removed both inter and intra state branching restrictions. Although this deregulation led to an initial increase in the supply of credit and small firms paying lower prices for their loans, Federal Deposit Insurance Corporation (FDIC) data shows that since the around the start of this century, bank concentration levels have plateaued. Illustrative of this are two statistics from FDIC data between 2004-2013: 1) the average value of bank concentration, expressed in terms of the Herfindahl-Hirschman Index, was 1077 with a standard deviation as low as 76 over this period; and 2) in terms of the Panzar-Rosse H statistic, the long term equilibrium for bank competition over the same period was, on average, 0.52 with a standard deviation of 0.08.

Theoretically, there exist two divergent interpretations of the impact of these stable levels of bank market concentration on small firm liquidity. In terms of the market power hypothesis, Klein (1971) suggests that as competition decreases among banks, market power is increased. The net effect is that lower competition causes greater financial constraints for small firms (Beck and Demirgüç-Kunt, 2006). Moreover, if a concentrated market is dominated by large banks, lenders will rely heavily on hard and quantitative information to make lending decisions (Stein, 2002). As a result, it is difficult for small firms to raise external finance because they lack hard

information, such as collateralizable assets and credit ratings. These effects are also shown in terms of small firm lending. Rice and Strahan (2010) show that in those US States with more open bank branching, small firms were more likely to borrow from banks and borrowed at lower interest rates compared to less open states. Other studies show that loan rates charged in a concentrated market are higher (Degryse and Ongena, 2005); that increases in market power increase small firm financial constraints (Ryan et al., 2014); and new entrants face greater difficulties in accessing credit in a concentrated banking market (Cetorelli and Strahan, 2006). In essence, the market power hypothesis gives rise to predictions that in a concentrated banking market small firm liquidity will be adversely impacted, suggesting that trade credit is used to a greater extent, lines of credit are less available and, subject to the characteristics of the small firm, there will be deviations from the optimal cash holdings of the small firm.

An alternative view of bank concentration, however, is that concentration actually improves small firm liquidity. Central to this is the presence of information asymmetries between the lender and the borrower in terms of adverse selection and moral hazard problems. The advantages of relationship banking may differ depending on the structure of the banking market. One view is that relationship banking is a source of competitive advantage for small banks because their loan officers are better able to reduce bank-small firm information asymmetries. In contrast, staff in large banks may have less access to the 'inside track' on small firm customers, partly because large banks find it difficult to process 'soft' information and partly because the bank prefer a systematic and quantitative transactional approach to small firm finance (Stein, 2002; Berger et al., 2001). Petersen and Rajan (1995) identify that private information acquisition is more easily internalized by lenders in a concentrated market and informationally opaque firms find it easier to raise external finance in a concentrated market than

in a competitive market (Han et al., 2009a). Similarly, the models provided by Dell’Ariccia and Marquez (2004) as well as Berger et al., (2004) suggest that concentrated (monopolistic) power can provide incentives to alleviate asymmetric information issues. This gives rise to predictions that there are favorable benefits from relationship banking in concentrated markets with small firms being less likely to be liquidity constrained, having greater access to lines of credit and being less likely to use trade credit.

In sum, the market power and information approaches suggest alternative predictions for the impact of bank concentration on small firm liquidity. These approaches, however, are not mutually exclusive but reflect that the market power hypothesis is rooted in a concern about market efficiencies while relationship banking is more concerned with the impact of information asymmetries. Nonetheless, no clear resolution has emerged from prior empirical research to identify which of these two perspectives has salience for better understanding small firm liquidity issues.

2. Data and variables

2.1. Data

Our data are the 1998 and 2003 US Survey of Small Business Finances (SSBF98 and SSBF03). These data both survey the finances of for-profit, non-financial, non-farm, and non-subsidary businesses with fewer than 500 employees. In total, we use the pooled 7,801 small firms available to us from both the SSBF98 (3,561 small firms) and SSBF03 (4,240 small firms). Like Vickery (2008) and Rice and Strahan (2010), we control for the possible sample selection bias by using the weights provided in SSBF98 and SSBF03. These data are advantageous for four reasons. First, they provide a representative picture of US small firm finance. Second,

these data are comprehensive. For example, one advantage of these data is that they allow the identification of local banking structures. This is important because Rice and Strahan (2010) show that US small firm-banking relationships are often geographically constrained to localities. Third, besides providing rich data on small firm liquidity, these data are superior to ready-to-use databases which are unrepresentative and lack information on small firm data. Moreover, although individual bank data may also provide valuable information, it is often impossible to make between bank comparisons. Finally, as shown above, one central feature of US banking is that bank concentration have remained stable since the deregulation of the banking industry in the 1990s. One other indication of this is that according to Mach and Wolken (2006), small firms still continue to use commercial banks as their main source of external finance.

2.2. *Dependent variables*

We use three dependent variables. First, to examine cash holdings, we follow Faulkender (2002) and use a cash/sales ratio. We complement this by using – as a robustness check - cash/total assets as an alternative dependent measure of cash holdings (Pinkowitz and Williamson, 2001) (see: Appendix A1). Second, to assess lines of credit, we use total lines of credit/total assets to reflect bank credit line availability (Compello et al, 2011). We complement this by using unused credit lines as a robustness check. This is valuable because it is a measure of financial slack of the business (Houston et al, 2001). For our final dependent variable, we use total trade credit/cost of goods (Cuñat, 2007). Again, this is complemented by using an alternative measure of trade credit - the penalty charges in % if trade credit is paid late. Moreover, to provide further depth to our analysis of these sources of small firm liquidity, we consider the overall effects of banking market structure and relationship banking by assessing

financial (=1 if a firm's applications for loan were rejected over the last three years and/or they are discouraged borrowers; 0 otherwise) and liquidity constraints (=1 if a sample firm does not pay back credit cards in full; 0 otherwise). This is valuable because it controls for the variation of banking market and relationship banking effects on different liquidity instruments.

To investigate the impacts of cash holding, credit lines and trade credit together, we use our three main dependent measures to consider the substitute effects of cash vs. lines of credit; trade credit vs. credit lines; and cash vs. trade credit by building cash to credit lines ratios, cash to trade credit ratios and credit lines to trade credit ratios as the dependent variables.

In Table 1, we report the descriptive statistics. Table 1 shows that the average cash holding by small firms (cash/total assets) is 23%. This is higher than that commonly found in large and publicly traded firms in both the US firms (4.4%, Pinkowitz et al., 2006) and the UK (9.9%, Ozkan and Ozkan, 2004) and reflects, inter alia, greater demands on cash among small firms for investment, for transactions purposes and the limited access to reasonably priced cash alternatives, such as lines of credits. Table 1 also shows that, on average, the cash to sales ratio is 6% and credit lines represent about 18% of small firm assets. Trade credit also accounts for 6% of costs of goods sold. Table 1 further shows, respectively, that 24% and 20% of small firms are liquidity and financially constrained.

[Table 1 around here please]

3.3. *Bank market concentration and relationship banking variables*

Like Vickery (2008) and Petersen and Rajan (1995), we use a categorical measure of the Herfindahl-Hirschman Index (HHI) to measure bank market concentration (a banking market is

competitive if HHI is between 1 and 1000 (HHI competitive=1); moderately concentrated if it is between 1000 and 1800 (HHI moderately concentrated=1); and highly concentrated if it is greater than 1800 (HHI highly concentrated=1)¹. Table 1 shows that only 6% of small firms were located in a competitive banking market, 44% in a moderately concentrated banking market and 50% in a highly concentrated market. Table 1 also shows that the banking market was slightly more competitive in 2003 (7% competitive and 49% highly concentrated) than it was in 1998 (5% competitive and 52% highly concentrated) as a consequence of the 1990s interstate branching deregulation (Rice and Strahan, 2010) but, as we saw earlier, bank concentration has remained broadly stable since this period of time.

In line with the extant literature, we also measure key features of relationship banking: the length of relationship with the primary financial institution (Petersen and Rajan, 1994; Agostino et al, 2011) (average 10 years); number of banking relationships (Hernández-Cánovas and Martínez-Solano, 2007; Iturralde et al, 2010) (average 2.59 relationships); type of the primary financial service provider (Han et al., 2009b) (85% are banks); and physical distance (average 7.15 miles) to the primary financial institution (e.g. Degryse and Ongena, 2005).

3.4. *Control Variables*

Since there is strong evidence that small firm characteristics and macroeconomic conditions impact on small firm liquidity (Faulkender, 2002; García-Teruel and Martínez-Solano, 2008; Ehling and Haushalter, 2012), we control for firm level characteristics² by industry, size

¹ We use this categorical HHI measure because the continuous value of HHI is not available. This is to preserve the confidentiality of the small firms in the SSBF.

² In the preliminary tests, we also considered corporate governance variables (e.g. number of owners, whether firm is owner-managed). We found these factors had no impact (see also Al-Anjjar, 2014). This reflects that 90% of small firms in the sample are owner-managed, 84% are family-owned and 54% have only one owner. This limits the potential for agency problems in terms of cash holdings (Ang, 1991). Therefore, we excluded them from the following tests.

(total assets), organizational type (corporation), industrialized return on assets (industry normalized ROA), current debt (current liability/total assets) and inventory (inventory/total assets) ratios, industry cash flow risk (standard deviation of cash flow to assets in a specific industry; Bates et al., 2011) and a categorical risk rating³ (Dun&BradStreet score). We also control for macroeconomic and local market conditions by prime rate, 1-year lagged regional GDP growth rate and averaged 5-year lagged regional personal income growth rate (Rice and Strahan, 2010; Garc ía-Teruel and Martínez-Solano, 2008).

3.5. *Analytical Strategy*

We analyse our three dependent variables by using Weighted Least Squares regressions to limit sample selection biases. We also focus on interaction effects in terms of the length of time in a banking relationship and bank concentration. We consider relationship duration because this reflects Petersen and Rajan (1994 and 1995) who showed the importance of relationship duration in concentrated banking markets. In terms of cash holdings (see Table 2), we use a stepwise approach that considers control variables (Model 1), banking relationships (Model 2), bank market structure (Model 3) and the interaction terms between banking market structure and relationship banking (Model 4). For lines of credit (Table 3) we examine used credit lines (Models 1 and 2) and take unused credit lines (Models 3 and 4) as a measure of liquidity slack and as a robustness test. To examine trade credit (Table 4), we examine the amount of trade credit (Models 1 and 2) and the penalty charge (%) if paid late (Models 3 and 4).

³The 2003 survey offers risk rating with 6 categories and the 1998 survey has 5 categories. We follow Rice and Strahan (2010:872) and recategorize the 2003 rating to lie between 1-5, with 5 being the most risky and 1 being the least risky.

In Table 5, we measure financial (Models 1 and 2) and liquidity constraints (Models 3 and 4)⁴. Table 6 examines all three sources of liquidity together using three models (Model 1: cash vs. credit lines (cash/(cash+total credit lines); Model 2: trade credits vs. credit lines (trade credit/(trade credit+total credit lines) and Model 3: cash vs. trade credits (cash/(cash+trade credit))). Finally, to test the robustness of our results, we use different sets liquidity measures, winsorisation percentiles (to control for outlier effects) and Tobit models for cash holdings (Appendix 1A).

3. Empirical results

4.1 Cash holdings

Table 2 shows support for both the market power and information hypotheses: Model 3 shows that small firms hold less cash (0.36%) in a highly concentrated banking market than in competitive and moderately concentrated markets. This is equivalent to about \$600 less cash held by an average small firm with \$163,000 assets in a highly concentrated market. Model 4 shows that small firms in a long term relationship with their bank in a concentrated banking market context also increase their cash holdings (0.04%, $p=0.05$). Robustness checks (Appendix 1A) show results that are consistent with these findings: small firms hold less cash in a concentrated banking market; and relationship banking increases cash holding levels in a highly concentrated banking market.

⁴ One advantage of measuring financial and liquidity constraints is that, first, it allows us to assess whether bank market structure and banking relationships have a harmful or beneficial effects on the liquidity of small firms. Second, it controls for the variation of such effects on different types of liquidity.

[Table 2 around here please]

4.2. *Lines of Credit*

Table 3 shows further support for both hypotheses. In terms of marker power, Models 1-4 show that highly concentrated banking reduces both the availability and liquidity ‘slack’ of small firms in terms of credit lines. For example, Model 1 shows total lines of credit are less available in a highly concentrated bank market (-2.10%, $p=0.1$) while Model 3 shows that small firms have lower values for unused lines of credit (-1.4%, $p=0.1$). This is equivalent to about \$3400 less total value of credit lines and \$2350 less unused value of credit lines in a highly concentrated market for an average small firm. These effects are also evident when interaction effects between bank concentration and the length of the banking relationship is considered. Nonetheless, there is also evidence to support the information hypothesis. The interactions in Models 2 and 4 show that if a small firm has a longer banking relationships in a either a moderately or highly concentrated banking market, this alleviates the unfavorable effects of banking concentration since small firms have more total and unused lines of credit. For example, an additional year of relationship banking increases the availability of credit lines in a non-competitive banking market by about 0.3% ($p=0.05$) and the unused value for credit lines by about 0.2% ($p=0.05$).

[Table 3 around here please]

4.3. *Trade Credit*

In Table 4, Model 1 shows that in either a moderately or highly concentrated banking market small firms use more trade credit. When compared to a competitive banking market, this represents about 8% of their costs of goods sold. Model 3 also shows that small firms pay higher penalties on late repayment. This is particularly pronounced in highly concentrated (43.15%, $p=0.01$). This again supports a market power interpretation of bank concentration. In terms of interaction effects, Table 5 reports no support for the information hypothesis.

[Table 4 around here please]

4.4. *Financial and liquidity constraints*

To complement the findings on cash holdings, lines of credit and trade credit, Table 5 considers financial and liquidity constraints. In terms of financial constraints, both Model 1 (without interaction effects) and Model 2 (with interaction effects) show that bank concentration has an unfavorable impact on small firm finance by increasing the probability of being financially constrained (marginal effects of 2.18% ($p=0.1$) and 3.35% ($p=0.1$), respectively). Models 3 and 4 show that compared with concentrated markets, banking market competition reduces the likelihood a small firm being liquidity constrained (marginal effects of -7.69% ($p=0.1$) and -7.26% ($p=0.05$), respectively). Table 5, therefore, provides support for the market power hypothesis. As with earlier, Table 5 also provides support for the information hypothesis. Model 2 shows that in highly concentrated banking contexts, small firms are less likely to be financially constrained if they have developed a longer relationship with their banks with a marginal effect of -0.65% ($p=0.01$). Small firms in concentrated bank markets but with longer

bank relationships are also less likely to be liquidity constrained (Model 4: marginal effects of - 0.42% (p=0.01)).

[Table 5 around here please]

In summary, Tables 2-5 present evidence to support both the market power and information hypotheses. We find that in a concentrated banking market small firms are more likely to have insufficient cash holdings and that they are pushed to use more trade credit which, if these are paid late, leads to them paying higher penalty charges. Moreover, small firms have less available lines of credit lines and unused liquidity slacks. Nonetheless, small firms that have longer relationships with their bank also benefit - particularly in concentrated banking market - in terms of increased cash holdings, greater availability of credit lines and credit slack and a lower probability of being liquidity constrained. Such effects are not evident in competitive banking market (except for the probability of being financially constrained).

4.5 Cash, Lines of Credit and Trade Credit: Alternative Sources of Liquidity

Table 6 presents the results of our comparison of the three sources of small firm liquidity. This is important because the bank concentration effects may vary over different types of liquidity instruments and earlier results show cash, credit lines and trade credits respond differently to bank market concentration. Consistent with earlier results (Tables 2 and 3), Model 1 in Table 6 shows that in a highly concentrated banking market, small firms have a higher cash and (cash + total credit lines) ratio (2.16%, p=0.1) suggesting that the use of credit lines is more sensitive to bank market concentration than cash holdings. Following on from the earlier results

which showed that small firms have less credit lines and use more trade credits (Tables 3 and 4), Model 2 in Table 6 shows that the ratio between trade credits/(trade credits + credit lines) is higher in a highly concentrated market than in a competitive banking market by 4.5% ($p=0.01$). Model 3 shows that the ratio of cash/(cash + trade credits) is lower in a highly concentrated banking market than in other markets by 1.5% ($p=0.05$), suggesting that small firms hold less cash but also have to use more trade credits as an expensive liquidity substitute in a highly concentrated bank market. Table 6 shows little evidence of information effects on the selection of liquidity instruments.

[Table 6 around here please]

4. Discussion and Conclusions

The impact of bank market concentration on small firm finance has been a long term issue in the US. It has remained so because bank concentration levels have been stable since the deregulatory reforms of the late 1990s. Bank market concentration rates have also been a concern in other developed economies, particularly as the financial crisis has shown that in markets where bank concentration is high, small firm access to finance is limited (Ryan et al, 2014; Chong et al, 2013). Much of the evidence for these effects investigates small firm lending. Our contribution has been to examine - for the first time to our knowledge - the impact of bank concentration and relationship banking on three key measures of small firm liquidity (cash holdings, lines of credit and trade credit). Besides investigating these impacts separately, one further novelty has been to consider the joint impacts of these three measures. In doing so, we have provided new insights on the effects of relationship banking and bank market concentration on small firm liquidity. One key result is that in a highly concentrated bank market, small firms

hold less cash and they are more likely to be financially and liquidity constrained than in a competitive bank market. They also have less access to lines of credit, use more expensive trade credit and face higher penalties if they pay trade credit late. Our findings also show that in concentrated bank markets the availability of credit lines is sensitive than cash holdings and small firms opt for trade credits as a substitute to holding cash and using credit lines.

Our findings, therefore, support the market power hypothesis: higher levels of bank market concentration constrain the liquidity position of small firms. For policy makers, this suggests that there is a need to continue to investigate ways of increasing competition among small firm finance providers. One route is to provide pathways for challenger banks to emerge. Another is to continue to develop and support more novel forms of financial assistance such as crowdfunding. Increasing competition is beneficial because competition increases the supply of credit to small firms (Chava, 2013) and helps banks to better diversify their risks (Amore, 2013). Without increased competition, it is likely that small firms in currently highly concentrated banking markets will need to continue to carefully manage their liquidity position if they wish to survive and grow their business (Mach and Wolken, 2011).

Our results, however, also give support to the information hypothesis. One key result is that those small firms in longer term banking relationships gain favorable effects even in concentrated bank markets. These positives include reducing the likelihood of being financially and liquidity constrained, increased cash holdings, and access to more credit lines. These results have implications both for small firms and their banks. For small firms located in a highly concentrated bank markets, our findings suggest the need to develop stronger links with their bank. Moro et al. (2014) identify that Italian small firms that actively and voluntarily disclose information benefit from lower interest rates. Our results support these findings and indicate that

there are benefits from small firms developing closer links with their bank. They also suggest that small firms operating in concentrated bank markets may be better placed by adopting a more monogamous relationship with their bank. Equally, one way of promoting better banking relationships is for banks to adopt more relationship orientated rather than transaction based support to their small firm clients.

The fact that we find support for both the market power and information hypotheses is perhaps not surprising. Each of these theoretical traditions approach small firm liquidity from differing start points and are not mutually exclusive: market power is focused on the efficiency considerations of bank market concentration on the supply of finance while the information hypothesis is focused on the impacts of information asymmetries on small firm liquidity. Our support for both hypotheses, therefore, implies that unbridled bank competition may have leave banks open to ‘free-rider’ issues that make them less willing to acquire private information from informationally opaque small firms. This implies that policy makers have a difficult juggling act in developing banking markets that allow competition to thrive while still allowing banks to develop mutually beneficial relationships with their small firm customers. It also suggests that future research could usefully consider the possible non-monotonical effects of banking market competition on small firms so that future theorizing can further identify the boundary conditions of both the market power and information hypotheses.

We recognize that this paper – like all papers - is subject to some limitations. Despite the comprehensive nature of our data, we would have liked to investigate HHI as a continuous variable. We would also have liked to extend our cross-sectional data by being able to causally evaluate the importance of small firm liquidity decisions on performance. Unfortunately, these data remain confidential. Moreover, although we use weights to inhibit selection bias, our

results may still under-represent very young and very small firms. Nonetheless, we hope that this research encourages other researchers to examine further nuances in the relationship between bank concentration, relationship banking and small firm liquidity. Future research, for example, could extend our research by considering how small firm performance and cash holdings vary with differing bank market conditions. Equally, further research could fruitfully build on what we are not able to do in this paper and consider how bank size and market share influences small firm liquidity. In summary, however, this paper has used large scale comprehensive US data to examine the effects of bank concentration and relationship banking on small firm liquidity. It is a departure from prior research because we have examined cash holdings, lines of credit and trade credit both independently and jointly. Our results provide evidence of market power effects but also demonstrate that small firms can gain benefits from relationship banking. We see that these findings have important implications for policy makers, banks and small firms, particularly as bank market concentration has been – even before the advent of Basel III – a persistent feature of banking in the US and other developed economies.

REFERENCES

- Acharya, VV, Almeida, H and Campello, M (2013) Aggregate risk and the choice between cash and lines of credit. *Journal of Finance* 68(5): 2059-2116.
- Agostino, M, Gagliardi, F and Trivieri, F (2011) Bank competition, lending relationships and firm default risk: An investigation of Italian SMEs. *International Small Business Journal*. 30(8): 907-943.
- Al-Najjar, B (2014) The effect of governance mechanisms on small and medium-sized enterprise cash holdings: evidence from the United Kingdom. *Journal of Small Business Management* forthcoming.
- Amore, MD, Schneider, C. and Zaldokas, A (2013) Credit supply and corporate innovation. *Journal of Financial Economics* 109(3): 835-855
- Ang, JS (1991) Small business uniqueness and the theory of financial management. *Journal of Small Business Finance* 1(1): 1-13.
- Bates, TW, Chang, C, Chi, J (2011) Why has the value of cash increased over time? *Working Paper*, Arizona State University.
- Beck, T, Demirgüç-Kunt, A, Maksimovic, V (2004) Bank competition and access to finance: international evidence. *Journal of Money Credit and Banking* 36(3): 627-648.
- Beck, T and Demirgüç-Kunt, A (2006) Small and medium-size enterprises: access to finance as a growth constraint. *Journal of Banking and Finance* 30(11): 2931-2943.
- Berger, AN, Demirgüç-Kunt, A, Levine, R, et al (2004) Bank concentration and competition: an evolution in the making. *Journal of Money, Credit and Banking* 36(3): 433-451.
- Berger, AN, Klapper, LF and Udell, GF (2001) The ability of banks to lend to informationally opaque small businesses. *Journal of Banking and Finance* 25(12): 2127-2167.
- Cetorelli, N and Peretto, PF (2000). Oligopoly banking and capital accumulation. *Federal Reserve Bank of Chicago Working Paper* No. 2000-12.
- Cetorelli, N and Strahan, PE (2006) Finance as a barrier to entry: bank competition and industry structure in Local U.S. markets. *Journal of Finance* 61(1): 437-461.
- Chava, S, Oettl, A, Subramanian, A and Subramanian, KV (2013) Banking deregulation and innovation. *Journal of Financial Economics* 109(3), 759-774
- Chong, TT, Lu, L and Ongena, S (2013) Does banking competition alleviate or worsen credit constraints faced by small-and medium-sized enterprises? Evidence from China. *Journal of Banking & Finance* 37(9): 3412-3424.
- Campello, M, Giambona, E, Graham, JR and Harvey, CR (2011) Liquidity management and corporate investment during a financial crisis. *Review of Financial Studies* 24(6): 1944-1979.
- Cuñat, V., 2007. Trade credit: suppliers as debt collectors and insurance providers. *Review of Financial Studies* 20(2): 491-527.
- Degryse, H and Ongena, S (2005) Distance, lending relationships and competition. *Journal of Finance* 60(1): 231-266.
- Dell'Ariccia, G and Marquez, R (2004) Information and bank credit allocation. *Journal of Financial Economics* 72(1): 185-214.
- D'Mello, R, Krishnaswami, S and Larkin, PJ (2008) Determinants of corporate cash holdings: evidence from spin-offs. *Journal of Banking and Finance* 32(7): 1209-1220.
- Ehling, P and Haushalter, D (2012) When does cash matter? evidence for private firms. *Working Paper*. No. 6/2011. Centre for Corporate Governance Research.

- Faulkender, MW (2002) Cash holdings among small businesses. *Working Paper*, Washington University in St. Louis.
- García-Teruel, PJ and Martínez-Solano, P (2008) On the determinants of sme cash holdings: evidence from Spain. *Journal of Business Finance and Accounting* 35(1-2): 127-149.
- Han, L, Fraser, S and Storey, DJ (2009a) Are good or bad borrowers discouraged from applying for loans? Evidence from US small business credit markets. *Journal of Banking and Finance* 33(2): 415-424.
- Han, L, Fraser, S and Storey, DJ (2009b) The role of collateral in entrepreneurial finance. *Journal of Business Finance and Accounting* 36(3-4): 424-455.
- Han, L and Zhang, S (2012) Asymmetric information, market conditions and entrepreneurial finance. in Cumming D (ed.) *The Oxford Handbook of Entrepreneurial Finance*. Oxford University Press.
- Harford, J, Sattar, AM and Maxwell, WF (2008) Corporate governance and firm cash holdings in the US. *Journal of Financial Economics* 87(3): 535-555.
- Hernández-Cánovas, G and Martínez-Solano, P (2007) Effect of the number of banking relationships on credit availability: evidence from panel data of Spanish small firms. *Small Business Economics* 28(1): 37-53.
- Houston, JF and James, CM (2001) Do relationships have limits? Banking relationships, financial constraints, and investment. *The Journal of Business* 74(3): 347-374.
- Iturralde, T, Maseda, A and San-Jose, L (2010) Empirical evidence of banking relationships for Spanish SMEs. *International Small Business Journal* 28(3): 274-295.
- Klein, MA (1971) A theory of the banking firm. *Journal of Money, Credit and Banking* 3(2): 205-218.
- Lins, KV, Servaes, H and Tufano, P (2010) What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of Financial Economics* 98(1): 160-176.
- Love, I, Preve, LA and Sarria-Allende, V. (2007) Trade Credit and Bank Credit: Evidence from Recent Financial Crises. *Journal of Financial Economics* 83(2): 453-469.
- Mach, TL and Wolken, JD (2011) Examining the impact of credit access on small firm survivability. *Finance and Economics Discussion Series 2011-35*, Board of Governors of the Federal Reserve System.
- Mach, TL and Wolken, JD (2006) Financial Services Used by Small Businesses: Evidence from the 2003 Survey of Small Business Finances. *Federal Reserve Bulletin*. (Oct. 2006): 167-195.
- Marquez, R (2002). Competition, adverse selection, and information dispersion in the banking industry. *Review of Financial Studies* 15(3): 901-926.
- Maudos, J and de Guevara, JF (2007) The cost of market power in banking: social welfare loss vs. cost inefficiency. *Journal of Banking & Finance* 31(7): 2103-2125.
- McGuinness, G and Hogan, T (2014) Bank credit and trade credit: Evidence from SMEs over the financial crisis. *International Small Business Journal* Forthcoming.
- Moro, A, Fink, M and Kauronen (2014) How do banks assesses entrepreneurial competence? The role of voluntary information disclosure, *International Small Business Journal*. 32(5): 525-544.
- Opler, T, Pinkowitz, L and Stulz, R, et al. (1999) The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52(1): 3-46.
- Ozkan, A & Ozkan, N (2004) Corporate cash holdings: an empirical investigation of UK companies. *Journal of Banking and Finance* 28(9): 2103-2134.

- Petersen, MA and Rajan, RG (1994) The benefits of lending relationships: evidence from small business data. *Journal of Finance* 49(1): 3-37.
- Petersen, MA and Rajan, RG (1995) The effect of credit market competition on lending relationships. *Quarterly Journal of Economics* 110(2): 407-443.
- Petersen, MA and Rajan, RG (1997) Trade credit: theories and evidence. *Review of Financial Studies* 10(3): 661-691.
- Pinkowitz, L and Williamson, R (2001) Bank power and cash holdings: evidence from Japan. *Review of Financial Studies* 14(4): 1059-1082.
- Pinkowitz, L, Stulz, R and Williamson, R (2006) Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis. *Journal of Finance* 61(6): 2725-2751.
- Ratti, RA, Lee, S and Seol, Y (2008) Bank concentration and financial constraints on firm-level investment in Europe. *Journal of Banking & Finance* 32(12): 2684-2694.
- Rice, T and Strahan, PE (2010) Does credit competition affect small-firm finance. *Journal of Finance* 65(3): 861-889.
- Ryan, RM, O'Toole, CM and McCann, F (2014) Does bank market power affect SME financing constraints. *Journal of Banking & Finance* 49(Dec): 495-505.
- SSBF98 and SSBF03. *Survey of Small Business Finances 1998 and 2003*: The Federal Reserve Board. (<http://www.federalreserve.gov/pubs/oss/oss3/nssbftoc.htm>)
- Stein, JC (2002) Information production and capital allocation: decentralized versus hierarchical firms. *Journal of Finance* 57(5): 1891-1921.
- Storey, DJ and Greene, FJ (2010) *Small Business and Entrepreneurship: Financial Times* Harlow: Pearson Education Limited.
- Sufi, A (2009) Bank lines of credit in corporate finance: an empirical analysis. *Review of Financial Studies* 22(3): 1057-1088.
- Vickery, J (2008) How and why do small firms manage interest rate risk. *Journal of Financial Economics* 87(2): 446-470.

Table 1: Variable Definitions and Descriptive Statistics

Variables	Pooled Samples			1998		2003	
	Obs	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Small business liquidity and finance							
cash/total assets ⁽²⁾	7476	0.23	0.28	0.23	0.28	0.23	0.28
cash/total assets ⁽¹⁾	7476	0.21	0.23	0.20	0.23	0.21	0.23
cash/sales ⁽¹⁾	7497	0.06	0.07	0.06	0.07	0.06	0.07
cash/sales ⁽²⁾	7497	0.06	0.07	0.06	0.07	0.06	0.07
total lines of credits to assets ⁽²⁾	7650	0.18	0.34	0.15	0.32	0.21	0.36
unused lines of credit to asset ⁽²⁾	7650	0.10	0.21	0.09	0.19	0.12	0.22
trade credit/cost of goods	7801	0.06	0.10	0.06	0.11	0.04	0.08
Being liquidity constrained (0,1)	3392	0.24	0.43	0.26	0.44	0.22	0.42
Being financially constrained (0,1)	7801	0.20	0.40	0.24	0.43	0.16	0.37
cash / (cash + total lines of credit)	7203	0.68	0.40	0.72	0.39	0.65	0.41
cash / (cash + trade credit ⁽³⁾)	7234	0.66	0.37	0.65	0.38	0.68	0.36
trade credit/(trade credit ⁽³⁾ + total lines of credit)	5267	0.56	0.42	0.61	0.41	0.52	0.42
penalty charges % if trade credit paid late	5260	1.07	2.09	1.18	2.23	0.98	1.98
Banking market condition (HHI)							
HHI competitive (0,1)	7800	0.06	0.24	0.05	0.22	0.07	0.25
HHI moderately concentrated (0,1)	7800	0.44	0.50	0.43	0.49	0.44	0.50
HHI highly concentrated (0,1)	7800	0.50	0.50	0.52	0.50	0.49	0.50
Banking relationship							
length of primary relationship (years)	7600	9.81	9.72	7.99	8.28	11.32	10.54
distance (log miles to primary bank)	7600	1.50	1.37	1.49	1.37	1.51	1.37
bank (0,1)	7600	0.85	0.36	0.86	0.35	0.84	0.37
number of relationships	7801	2.59	1.82	2.36	1.73	2.78	1.87
Firm Characteristics							
log total assets (\$)	7650	11.92	2.52	11.62	2.50	12.17	2.51
corporation (0,1)	7769	0.55	0.50	0.49	0.50	0.60	0.49
risk rating (1 least risky; 5 most risky)	7772	2.86	1.06	2.97	1.04	2.77	1.08
industrialized return on assets (ROA)	7497	-0.05	0.07	-0.08	0.09	-0.02	0.04
current ratio ⁽¹⁾ (current liability/assets)	7648	0.17	0.22	0.18	0.23	0.16	0.21
inventory/assets	7649	0.15	0.23	0.16	0.23	0.14	0.22
industry cash flow risk (std of cash flow to asset ratio)	7801	1.74	0.38	1.82	0.34	1.68	0.39
Other control variables							
prime rate %	7801	6.49	1.95	8.58	0.28	4.73	0.40
regional GDP growth (1 year lagged)%	7801	5.62	1.26	6.13	1.16	5.19	1.18
regional personal income growth (averaged 5 year lagged)%	7801	4.20	0.71	4.92	0.23	3.60	0.28

To control for outlier effects, variables⁽¹⁾ and variables⁽²⁾ are winsorized at 10/90th and 5/95th percentile, respectively. The real value of trade credit is not available from the data. What is available is the % of costs of goods are on trade credit. We therefore follow Love et al. (2007) and use 'trade payables' to measure trade credits in the variables⁽³⁾.

Table 2: Weighted Least Squares regression: Small firm cash holdings (dependent variable - cash/sales)

	1	2	3	4
Constant	0.1179*** (0.0279)	0.1086*** (0.0252)	0.1098*** (0.0252)	0.1124*** (0.0255)
Macroeconomic Characteristics				
Prime rate %	-0.0063* (0.0037)	-0.0058* (0.0031)	-0.0059* (0.0031)	-0.0057* (0.0032)
Regional GDP growth %	0.0000 (0.0013)	-0.0007 (0.0013)	-0.0006 (0.0013)	-0.0634 (0.129)
Regional personal income growth %	0.0055 (0.0059)	0.0068 (0.0061)	0.0073 (0.0060)	0.0069 (0.0061)
Firm Characteristics				
Log Total assets (\$)	0.0018*** (0.0005)	0.0033*** (0.0006)	0.0033*** (0.0006)	0.0033*** (0.0006)
Corporation (0,1)	-0.0173*** (0.0026)	-0.0156*** (0.0028)	-0.0156*** (0.0028)	-0.0157*** (0.0028)
Risk rating (1-5)	-0.0062*** (0.0009)	-0.0058*** (0.001)	-0.0058*** (0.001)	-0.0058*** (0.001)
Industrialized ROA	-0.1374*** (0.0193)	-0.1352*** (0.0208)	-0.1358*** (0.0208)	-0.1349*** (0.0204)
Current ratio	-0.0488*** (0.0048)	-0.045*** (0.0047)	-0.0451*** (0.0047)	-0.0451*** (0.0047)
Inventory/total assets	-0.0422*** (0.0038)	-0.0402*** (0.0044)	-0.0402*** (0.0044)	-0.0400*** (0.0044)
Industry cash flow risk	-0.0122 (0.0074)	-0.0078 (0.0080)	-0.0081 (0.0080)	-0.0081 (0.0080)
Relationship Characteristics				
Length of primary relationship (year)		0.0002 (0.0001)	0.0002 (0.0001)	
Distance (mile)		0.0011 (0.0009)	0.0011 (0.0009)	0.0011 (0.0009)
Bank (0,1)		-0.0051 (0.0036)	-0.0051 (0.0036)	-0.0050 (0.0036)
Number of relationships		-0.0069*** (0.0007)	-0.0069*** (0.0007)	-0.0069*** (0.0007)
Banking Market Characteristics				
HHI competitive (0,1)			-0.0017 (0.0034)	-0.0001 (0.0047)
HHI highly concentrated (0,1)			-0.0036* (0.0020)	-0.0079** (0.0034)
Interaction Terms				
HHI competitive*Length of relationship				-0.0002 (0.0002)
HHI moderately concentrated*Length of relationship				0.0000 (0.0002)
HHI highly concentrated*Length of relationship				0.0004** (0.0002)
Control variables (industry, region and year)	Yes	Yes	Yes	Yes
Obs	7,182	7,051	7,050	7,050
Adj R²	0.0706	0.1012	0.1017	0.1026

The dependent variable is cash/sales winsorized at 10th/90th percentile. The models used are weighted least square (WLS) clustered by the strata provided by SSBF. ***, **, * stand for significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses. Control variables include dummies of industry (SIC-2D), region and year. Results of control variables are not reported but available on request from authors.

Table 3: Weighted Least Squares regression: Small firm total lines of credit and unused lines of credit (dependent variables - total lines of credit / total assets (Models 1 and 2) and lines of credit unused/total assets (Models 3 and 4))

	Total Lines of Credit		Lines of Credit Unused	
	1	2	3	4
Constant	0.0776 (0.0998)	0.1147 (0.1009)	0.0265 (0.0636)	0.0430 (0.0637)
Relationship Characteristics				
Length of primary relationship (year)	0.0007 (0.0005)	-0.0022* (0.0012)	0.0005 (0.0004)	-0.0013 (0.0008)
Other relationship Characters	Yes	Yes	Yes	Yes
Banking Market Characteristics				
HHI competitive (0,1)	0.0006 (0.018)		-0.0065 (0.0103)	
HHI moderately concentrated (0,1)		-0.0344* (0.0201)		-0.0138 (0.0130)
HHI highly concentrated (0,1)	-0.0210* (0.0123)	-0.0466** (0.0199)	-0.0144* (0.0074)	-0.0246* (0.0143)
Interaction Terms				
HHI moderately concentrated*Length of relationship		0.0036** (0.0018)		0.0022** (0.0010)
HHI highly concentrated*Length of relationship		0.0027** (0.0013)		0.0018** (0.0008)
Control variables	Yes	Yes	Yes	Yes
Obs	7,298	7,298	7,298	7,298
Adj R²	0.0503	0.0508	0.0439	0.0444

Models used are WLS clustered by the strata provided by SSBF. ***, **, * stand for significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses. Control variables include year, industry, region, macroeconomic conditions and firm level characteristics. The results for these control variables are not reported here but available from the authors on request.

Table 4: Weighted Least Squares regression: Small firm Trade Credit and Trade Credit Late Payment Penalty (%) (dependent variables - trade credit/cost of goods (Models 1 and 2) and penalty charges in % if trade credit is paid late (Models 3 and 4))

	Trade Credit		% charges if trade credit paid late	
	1	2	3	4
Constant	-0.0897** (0.0342)	-0.0833** (0.0328)	0.9952 (0.9680)	1.0826 (0.9388)
Relationship Characteristics				
Length of primary relationship (year)	-0.0003** (0.0001)	-0.0008* (0.0005)	0.0044 (0.0051)	0.0026 (0.0069)
Other relationship Characters	Yes	Yes	Yes	Yes
Banking Market Characteristics				
HHI moderately concentrated (0,1)	0.0088** (0.0042)	0.0047 (0.0062)	0.2592* (0.1466)	0.1293 (0.1541)
HHI highly concentrated (0,1)	0.0072* (0.0038)	0.0008 (0.0065)	0.4315*** (0.1474)	0.4948*** (0.1881)
Interaction Terms				
HHI moderately concentrated*Length of relationship		0.0004 (0.0005)		0.0136 (0.0085)
HHI highly concentrated*Length of relationship		0.0007 (0.0005)		-0.0067 (0.0096)
Control variables	Yes	Yes	Yes	Yes
Obs	7,298	7,298	5,078	5,078
Adj R²	0.3896	0.3898	0.0139	0.0153

Models used are WLS clustered by the strata provided by SSBF. ***, **, * stand for a significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses. Control variables include year, industry, region, macroeconomic conditions and firm level characteristics. The results for these control variables are not reported here but available from the authors on request.

Table 5: Probit Models: Financial and liquidity constraints (dependent variable – being financially constrained (Models 1 and 2) and liquidity constrained (Models 3 and 4))

	Financial Constraint				Liquidity Constraint			
	1	Marginal effects	2	Marginal effects	3	Marginal effects	4	Marginal effects
Constant	0.0686 (0.4964)		0.0532 (0.4977)		-0.2971 (0.7201)		-0.2957 (0.7323)	
Macroeconomic Characteristics								
Prime rate %	-0.0009 (0.0008)	-2.46%	-0.0009 (0.0008)	-2.49%	-0.0004 (0.0007)	-1.26%	-0.0004 (0.0006)	-1.27%
Regional GDP growth %	-0.0186 (0.0027)	-0.50%	-0.0183 (0.0275)	-0.49%	0.0357 (0.0317)	1.12%	0.0357 (0.0317)	1.13%
Regional personal income growth%	-0.1623** (0.0675)	-4.39%	-0.1650** (0.0673)	-4.47%	0.1052 (0.1400)	3.31%	0.1038 (0.1426)	3.27%
Firm Characteristics								
Ln Total assets (\$)	-0.0965*** (0.0144)	-2.61%	-0.0962*** (0.0144)	-2.61%	-0.1043*** (0.0218)	-3.29%	0.1043*** (0.0218)	-3.28%
Corporation (0,1)	0.0064 (0.0594)	0.17%	0.0076 (0.0598)	0.21%	-0.1928*** (0.0448)	-6.00%	0.1926*** (0.0452)	-6.00%
Risk rating (1-5)	0.3089*** (0.0280)	8.37%	0.3095*** (0.0277)	8.38%	0.2127*** (0.0263)	6.70%	0.2128*** (0.0265)	6.70%
Industrialized ROA	-0.5705 (0.4228)	-15.45%	-0.5742 (0.4243)	-15.54%	-1.2945** (0.5904)	-40.79%	-1.2937** (0.5922)	-40.77%
Current ratio	0.5557*** (0.1048)	15.05%	0.5565*** (0.104)	15.07%	0.6594*** (0.1150)	20.78%	0.6597*** (0.1153)	20.79%
Inventory/total assets	0.1601 (0.1216)	4.33%	0.1589 (0.1218)	4.30%	0.3613** (0.1596)	11.39%	0.3611** (0.1584)	11.38%
Industry cash flow risk	-0.0248 (0.1308)	-0.67%	-0.0239 (0.1305)	-0.65%	-0.2257 (0.2074)	-7.11%	-0.2251 (0.2080)	-7.09%
Relationship Characteristics								
Length of primary relationship (year)	-0.0220*** (0.0031)	-0.60%			-0.0132 (0.0039)	-4.17%		
Distance (mile)	0.0477 (0.0154)	1.29%	0.0477 (0.0155)	1.29%	0.0025 (0.0291)	0.08%	0.0024 (0.0290)	0.08%
Bank (0,1)	0.0285 (0.0782)	0.77%	0.0262 (0.0785)	0.70%	-0.0332 (0.1091)	-1.05%	-0.0334 (0.1088)	-1.05%
Number of relationships	0.1676*** (0.0148)	4.54%	0.1673*** (0.0148)	4.53%	0.1357*** (0.0225)	4.28%	0.1357*** (0.0224)	4.28%
Banking Market Characteristics								
HHI competitive (0,1)	-0.0322 (0.1124)	-0.86%	0.0478 (0.1286)	1.31%	-0.2670* (0.1381)	-7.69%	-0.2504** (0.1205)	-7.26%
HHI highly concentrated (0,1)	0.0803* (0.0492)	2.18%	0.1238* (0.0680)	3.35%	-0.0742 (0.0697)	-2.34%	-0.0693 (0.1059)	-2.18%
Interaction Terms								
HHI competitive*Length of relationship			-0.0294*** (0.0090)	-0.80%			-0.0148 (0.0102)	-0.47%
HHI moderately concentrated*Length of relationship			-0.0184*** (0.0053)	-0.50%			-0.0128** (0.0066)	-0.40%
HHI highly concentrated*Length of relationship			-0.0241*** (0.0040)	-0.65%			0.0134*** (0.0052)	-0.42%
Control variables (industry, region and year)	Yes		Yes		Yes		Yes	
Obs	7,298		7,298		3,172		3,172	
Adj R²	0.1211		0.1213		0.0916		0.0916	

***, **, * stand for significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses. Control variables include dummies of industry (SIC-2D), region and year. Results of control variables are not reported but available on request from authors.

Table 6: Cash, lines of credit and trade credit: alternative sources of liquidity (dependent variables are cash/(cash+total lines of credit) (Model 1), trade credit/(trade credit + total lines of credit) (Model 2) and cash/trade credit (Model 3)).

	Model 1	Model 2	Model 3
	Cash vs. Lines of Credit	Trade credit vs. Lines of Credit	Cash vs. Trade Credit
Constant	1.5278*** (0.1135)	0.6891*** (0.1644)	1.3595*** (0.0935)
Relationship Characteristics			
Length of primary relationship (year)	-0.0003 (0.0005)	-0.0002 (0.0008)	0.0005 (0.0004)
Other relationship Characters	Yes	Yes	Yes
Banking Market Characteristics			
HHI competitive (0,1)	0.0046 (0.0189)	0.0086 (0.0219)	0.0062 (0.0104)
HHI highly concentrated (0,1)	0.0216* (0.0127)	0.0450*** (0.0165)	-0.0150** (0.0058)
Control variables	Yes	Yes	Yes
Obs	6,930	5,099	6,956
Adj R²	0.1337	0.1623	0.5080

Models used are WLS clustered by the strata provided by SSBF. ***, **, * stand for a significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses. Control variables include year, industry, region, macroeconomic conditions and firm level characteristics. The results for these control variables are not reported here but available from the authors on request.

Table 1A: Robustness tests: Cash Holdings

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	Cash/assets	Cash/assets	Cash/sales	Cash/sales	Cash/sales	Cash/sales	Cash/assets	Cash/assets	Cash/assets	Cash/assets
	WLS	WLS	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit
	10/90 th	10/90 th	10/90 th	10/90 th	5/95 th	5/95 th	5/95 th	5/95 th	10/90 th	10/90 th
Constant	0.8904*** (0.0815)	0.8897*** (0.0819)	0.1249*** (0.0344)	0.1290*** (0.0347)	0.1463*** (0.0513)	0.1530*** (0.0517)	1.3195*** (0.0965)	1.3202*** (0.0978)	1.0991*** (0.0930)	1.0997*** (0.0938)
Relationship Characteristics										
Length of primary relationship (year)	0.0007** (0.0003)		0.0003 (0.0002)		0.0004 (0.0003)		0.0011*** (0.0255)		0.0010** (0.0004)	
Other Relationship Characters	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banking Market Characteristics										
HHI competitive (0,1)	0.0011 (0.0119)	-0.0040 (0.0163)	-0.0025 (0.0041)	-0.0005 (0.0060)	-0.0041 (0.0078)	-0.0047 (0.0095)	0.0034 (0.0183)	0.0022 (0.0228)	0.0014 (0.0141)	-0.0015 (0.0195)
HHI highly concentrated (0,1)	-0.0119* (0.0066)	-0.0128 (0.0110)	-0.0062** (0.0026)	-0.0122*** (0.0046)	-0.0067* (0.0039)	-0.0176** (0.0072)	-0.0183** (0.0086)	-0.0198 (0.0149)	-0.0168** (0.0079)	-0.0187 (0.0136)
Interaction Terms										
HHI competitive*Length of relationship		0.0012 (0.0013)		-0.0003 (0.0002)		-0.0001 (0.0003)		0.0012 (0.0012)		0.0012 (0.0014)
HHI moderately concentrated*Length of relationship		0.0006 (0.0005)		-0.0001 (0.0003)		-0.0003 (0.0004)		0.0010 (0.0008)		0.0008 (0.0007)
HHI highly concentrated*Length of relationship		0.0007* (0.0004)		0.0006** (0.0003)		0.0009** (0.0004)		0.0012** (0.0006)		0.0010** (0.0005)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	7,131	7,131	7,050	7,050	7,050	7,050	7,131	7,131	7,131	7,131

***, **, * stand for significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses. Control variables include year, industry, region, macroeconomic conditions and firm level characteristics. The results for these control variables are not reported here but available from the authors on request.