

Local financial development and the trade credit policy of Italian SMEs

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Abstract We investigate the relation between local financial development and trade credit in an integrated financial market. Our results suggest that trade credit complements the formal finance of small- and medium-sized enterprises (SMEs) at the local level. Provincial banking development in Italy increases the provision of trade credit by SMEs and stimulates the redistribution of loans via trade credit. However, cooperative banking reduces the use of trade credit at the local level. Evidence shows that lower levels of provincial banking development are linked with a stronger decline in trade credit at the start of the global financial crisis. We also find that SMEs in provinces with industrial districts use more trade credit. Our results confirm that local differences in banking development and the trade credit policy of SMEs within countries matter, adding to earlier findings that the provision of trade credit is complementary to the development of financial institutions at the country level.

Keywords Trade credit · Local financial development · SME finance · Cooperative banks · Global financial crisis

JEL Classifications G21 · G32 · L26 · P13 · R12

1 Introduction

A growing literature finds that local financial development still matters in a globalized world with integrated financial markets, especially for small- and medium-sized enterprises (SMEs). Local financial development is positively related to growth (Guiso et al. 2004a; Gagliardi 2009). It enhances the probability of individuals starting their own businesses, favors the entry of new firms, and increases competition (Guiso et al. 2004a). Local banking development, which is the main dimension of local financial development, stimulates product innovation and research and development expenditures (Benfratello et al. 2008), reduces financial constraints (Alessandrini et al. 2009), and increases the use of debt (La Rocca et al. 2010). Furthermore, the structure of the local banking industry affects the provision of credit (Petersen and Rajan 1995; Bonaccorsi di Patti and Gobbi 2001). While these findings suggest that local financial development is important, no study has yet considered the role of trade credit in local financial development. This is surprising, since trade credit

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plays an important role in corporate finance, especially in countries where formal financial institutions are underdeveloped. Firms with better access to credit redistribute capital via trade credit to customers that are financially weaker, acting as agents for financial institutions and channelling short-term funds from the financial institutions to their best use (e.g., McMillan and Woodruff 1999; Demirgüç-Kunt and Maksimovic 2001; Fisman and Love 2003; Choi and Kim 2005; Love et al. 2007; Carbó-Valverde et al. 2013; Garcia-Appendini and Montoriol-Garriga 2013). Demirgüç-Kunt and Maksimovic (2001) find that the use of trade credit by firms within a country is positively related to the size of the national banking system, which suggests that the provision of trade credit complements a country's financial institution development.

In this study, we provide a unique contribution to the literature by investigating the relation between local banking development and the trade credit policies of SMEs in Italy. We focus on SMEs because trade credit plays an important role in SMEs' finance policies (e.g., Hernández-Cánovas and Martínez-Solano 2007; Ogawa et al. 2013; Martínez-Sola et al. 2014) and their finance policies are affected by local conditions (e.g., La Rocca et al. 2010). The focus on the local level in a single country allows us to exploit within-country variation in financial development, thereby reducing the risk of omitted variable bias and implicitly controlling for differences in formal institutions. Following other studies on local financial development, we study Italy, which provides an ideal setting (e.g., Bonaccorsi di Patti and Gobbi 2001; Guiso et al. 2004a; Benfratello et al. 2008; Alessandrini et al. 2009; La Rocca et al. 2010). While Italy has been unified for the last 150 years, financial development across provinces and regions varies widely. Furthermore, trade credit is a very important source of finance for Italian firms (e.g., Agostino and Trivieri 2014). During 2003–2009, accounts payable constituted, on average, 19.6 % of total assets, while accounts receivable constituted 29.2 %.¹

Our focus is on local banking development, since the Italian financial system is a bank-based system in which stock markets play a very limited role. Local banking development in Italian provinces facilitates access to bank loans and reduces finance constraints

for firms in the province (Alessandrini et al. 2009; La Rocca et al. 2010), and firms with better access to credit have been found to redistribute capital via trade credit to customers that are financially weaker (e.g., McMillan and Woodruff 1999; Demirgüç-Kunt and Maksimovic 2001; Fisman and Love 2003; Cull et al. 2009; Ogawa et al. 2013). We therefore expect that firms will provide more trade credit to their customers when they are located in a province with a more developed banking sector. Our results suggest that trade credit indeed reinforces the effect of local banking development on corporate finance: SMEs located in provinces with a more developed banking system provide more trade credit to their customers. To a lesser extent, they also receive more trade credit from their suppliers, resulting in higher net trade credit investments.

We also consider the degree of localism in the banking sector. The Italian banking system is characterized by an abundance of small local banks that are typically cooperative banks operating in restricted territorial areas (e.g., Alessandrini and Zazzaro 1999; Alessandrini et al. 2009). Local cooperative banks may have competitive advantages over nationwide banks, since the latter are characterized by organizational complexity and may face more severe information problems due to the greater distance between their headquarters and local branches (Berger et al. 2005). The lending decisions of national banks are typically based on hard information, while local cooperative banks make use of soft information collected directly and indirectly via personal relationships and continuous contact with local firms (e.g., Howorth and Moro 2006). It has been argued that suppliers provide credit to their customers because the soft information generated in a repeated trading relationship gives them a significant advantage over banks in providing credit (e.g., Biais and Gollier 1997; Petersen and Rajan 1997). If both the trade credit decisions and credit decisions of local cooperative banks are based on soft information, trade credit and cooperative bank loans could actually be substitutes. Consistent with this view, we find that a high proportion of cooperative bank branches in a province is associated with a less positive relation between local banking development and trade credit.

A potential problem with our findings is that the observed effect of local banking development and cooperative branch density on trade credit may reflect

¹ Source: Bank for the Accounts of Companies Harmonised, available at <http://www.bachesd.banque-france.fr>.

omitted factors that affect both local banking development and trade credit. We address this issue in two ways. First, we control for a number of local characteristics that might be correlated with local financial development: industrial districts, social capital, local crime, payment delinquency, and the north–south divide in Italy. We further deal with potential endogeneity problems by estimating two-stage least squares (2SLS) regressions. Following Guiso et al. (2004a), we use measures of the local supply of credit in 1936 as instruments of local banking development in the 2000s.

In a next step, we investigate whether local banking development affects the redistribution of loans via trade credit (Petersen and Rajan 1997; Love et al. 2007; Cull et al. 2009). If local banking development facilitates the provision of trade credit, we expect that firms located in a province with a more developed banking system redistribute a larger part of the bank credit they receive by providing more trade credit to their customers and/or paying their suppliers faster. If cooperative banks reduce the need for trade credit, a higher proportion of cooperative bank branches in a province might reduce the effect of local banking development on the redistribution of bank credit via trade credit. Both predictions are confirmed by our results.

Finally, we consider the impact of the financial crisis of 2008, which may have significantly affected the trade credit policy of Italian SMEs. Studies have found that more liquid firms and firms with better access to finance provide more trade credit during a crisis (Love et al. 2007; Carbó-Valverde et al. 2013; Garcia-Appendini and Montoriol-Garriga 2013). Our results suggest that the use of trade credit by Italian firms significantly declined in 2008 and 2009, compared with previous years. Firms in provinces with a less developed banking system experienced a sharper decline in the use of trade credit in 2008. However, we do not find any significant effect of banking development on the use of trade credit in 2009. By 2009, the financial crisis may have eroded the advantage of being located in a province with a higher bank branch density.

The remainder of the study is structured as follows. Section 2 discusses how local banking development and cooperative banking may affect the trade credit policies of Italian SMEs. Section 3 discusses the data

and variables used in this study. Section 4 reports the empirical findings, and Sect. 5 concludes the study.

2 Trade credit, local banking development, and cooperative banks

2.1 Local banking development

A number of studies have found that in institutional environments where access to formal finance is limited, firms with better access to credit redistribute capital via trade credit to customers that are financially weaker (e.g., McMillan and Woodruff 1999; Demirgüç-Kunt and Maksimovic 2001; Fisman and Love 2003; Cull et al. 2009). Since local banking development in Italian provinces facilitates access to bank loans and reduces finance constraints for firms in the province (Alessandrini et al. 2009; La Rocca et al. 2010), these findings lead us to expect that suppliers will provide more trade credit to their customers and will therefore have more trade receivables on their balance sheet if they are located in a province with a more developed banking sector. We therefore hypothesize the following:

H1 Local banking development is positively related to trade receivables.

With respect to trade payables, the effect of local banking development is not clear a priori. In provinces with a developed banking sector, potential borrowers have better access to capital (Alessandrini et al. 2009) and therefore have less need for trade credit as a substitute source of financing (Demirgüç-Kunt and Maksimovic 2001). Under these assumptions, a more developed local banking system will *reduce* the demand for trade payables. On the other hand, a more developed banking sector in the province will facilitate the provision of trade credit by the suppliers of the firm if these are located in the same province as the firm. Local banking development will therefore make it easier for firms to access trade financing. If local banking development increases the supply of trade credit by local suppliers, this will lead to a positive relation between local banking development and the trade payables of local customers. The net effect of local banking development on trade payables will therefore depend on which effect dominates: the

reduced demand for trade credit or the increased supply of trade credit. This leads to the following hypotheses:

H2a Local banking development is negatively related to trade payables if the negative demand effect dominates.

H2b Local banking development is positively related to trade payables if the positive supply effect dominates.

Irrespective of whether the positive supply effect or the negative demand effect of local banking development on trade payables dominates, we expect that local banking development will increase trade receivables more than trade payables, thereby increasing *net* trade credit, that is, the difference between the amount of trade credit provided to customers and the amount of trade credit received from suppliers. We therefore predict a positive relation between local banking development and the net trade credit position of local firms, as follows:

H3 Local banking development is positively related to net trade credit.

2.2 Cooperative banks

The impact of local banking development may depend on the type of banks operating in a province. The Italian banking system has always been characterized by an abundance of small local banks. Typically cooperative, these banks operate in restricted territorial areas. Only a limited number of large banks operate nationwide. This system is due to an institutional framework that, in the past, restricted the geographic mobility of banks and the structure of the Italian industry (e.g., Alessandrini and Zazzaro 1999; Alessandrini et al. 2009). Local cooperative banks may have competitive advantages over nationwide banks, since the latter are characterized by organizational complexity and may face more severe information problems due to the greater distance between their headquarters and local branches (Berger et al. 2005). A local bank operating in the local community, whose employees belong to the local community, and that may be owned and/or managed by local community members will have a more direct and in-depth knowledge of local firms. The local bank takes part in the life of the local community, thereby acquiring

information that is not available to banks that operate at a distance (e.g., Angelini et al. 1998). The lending decisions of national banks will typically be based on hard information (the evaluation of financial statements, the provision of collateral, and credit scoring), which is independent of the quality of the relation between the banker and the firm (e.g., Howorth and Moro 2006). Local banks, on the other hand, make use of soft information collected directly and indirectly via personal relationships and continuous contact with local firms.² Even if national banks have local branches to supplement hard data on borrowers with relevant soft information collected locally, local banks are expected to have an informational advantage over national banks in the provision of loans to local firms due to the proximity of local banks' headquarters (Bolton et al. 2013). The distance between bank headquarters and the local branch of a national bank is expected to negatively affect the transmission of information within banks, because bank headquarters are less able to interpret the information from distant branch loan managers than information from closer ones.

It has been argued that suppliers provide credit to their customers because the soft information generated in a repeated trading relationship gives them a significant advantage over banks in providing credit (e.g., Biais and Gollier 1997; Petersen and Rajan 1997). The size and timing of a buyer's orders and the buyer's ability to take advantage of early payment discounts help the supplier in assessing the condition of the customer's business and creditworthiness. If the credit decisions of local cooperative banks are based on soft information, their loans could actually be a substitute for trade credit. On the other hand, financing by national banks is less likely to be a substitute for trade credit, since it relies more on hard information. We therefore expect that a high proportion of cooperative bank branches in a province reduces the need for trade credit, which leads to the following hypothesis:

H4 A high proportion of cooperative bank branches in a province is associated with a less positive relation between local banking development and trade credit.

² For example, Howorth and Moro (2006) find that local entrepreneurs in Northern Italy choose local banks because their own suppliers are happy with the bank manager and local banks obtain information about their clients from other customers.

In a recent study, Berger et al. (2014) find that small businesses in the USA are not more likely to have a local bank as their main bank relationship than a nonlocal bank. This indicates that technological progress and deregulation in the USA have eroded the comparative advantage of local banks in serving small businesses. Therefore, one cannot rule out that the comparative advantage of local banks has largely disappeared in Italy as well. If this is true, we expect H4 not to be confirmed.

2.3 The effect of the global financial crisis

We also consider the impact of the global financial crisis, which hit the Italian economy hard and led to a significant reduction in the supply of credit by financial institutions to Italian firms (Panetta and Signoretti 2010; Presbitero et al. 2014). How did the financial crisis affect the relationship between local financial development and trade credit? A number of authors (e.g., Petersen and Rajan 1997; Cuiat 2007) have argued that suppliers will support customers that experience temporary financial difficulties because suppliers have an interest in their customers' survival. If the customer fails, the supplier loses a valuable long-term relationship. A number of studies have found that trade credit may allow firms to absorb negative liquidity shocks during a financial crisis. Love et al. (2007) find that firms that were financially vulnerable to crisis sharply cut the amount of credit they extended to customers and increased their reliance on credit from suppliers during the 1997 Asian crisis. In the recent financial crisis, more liquid firms and firms that were less dependent on external finance in the USA provided more trade credit during the first phase of the crisis (Garcia-Appendini and Montoriol-Garriga 2013). Carbó-Valverde et al. (2013) find that while Spanish SMEs depend more on trade credit to fund their capital expenditures if they are more financially constrained, this effect became stronger during the recent financial crisis. Italian SMEs located in provinces with a more developed banking system may have found it easier to provide trade credit during the global financial crisis. While the crisis is likely to have had a negative effect on trade credit, this effect may have been weaker in provinces with a higher branch density, provided that the availability of bank credit was higher in such provinces. However, it is unlikely such an effect

persisted for very long, since the financial crisis led to a long-term contraction in bank credit. Indeed, Love et al. (2007) argue that while trade terms can be extended temporarily in the short run during a financial crisis, such terms cannot fully compensate for the long-term contraction in bank credit. We therefore hypothesize that local banking development was positively related to the use of trade credit at the start of the crisis, but it seems unlikely that this effect persisted for long:

H5 At the start of the financial crisis, local banking development reduced its negative effect on trade credit.

The crisis effect on trade credit might also have depended on the degree of cooperative banking in the local banking market. It has already been pointed out that cooperative banks that provide loans based on soft information may reduce the need for trade credit. Presbitero et al. (2014) find that, after the bankruptcy of Lehman Brothers, Italian manufacturing firms located in Italian provinces with a large share of branches owned by locally managed banks were less affected by credit constraints. Bolton et al. (2013) find that Italian firms relying on 'relationship-banks,' that is, banks with headquarters located in the same province as the firm's headquarters, were better able to withstand the crisis than firms relying on 'transaction-banks.' We therefore expect that a higher degree of cooperative banking in a province may have reduced the demand for trade credit by local firms during the crisis.

H6 A high proportion of cooperative bank branches in a province reduced the demand for trade credit at the start of the financial crisis.

3 Data and variables

3.1 Data

Our dataset is derived from several sources. Data on economic development, population, and crime rates in the 103 Italian provinces are from the Italian National Institute of Statistics (ISTAT), while data on local financial development are from the Bank of Italy. Firm-specific data come from the Amadeus database of Bureau van Dijk. This database contains the financial statements of privately held and publicly

traded European firms, including more than 1 million Italian firms. We use the European Commission's definition of SMEs to identify them. This definition is based on three criteria. First, the number of employees must be less than 250. Second, the annual turnover may not exceed 50 million euros or the annual balance sheet total may not exceed 43 million euros. Third, the firm must be independent. More specifically, firms may not have a shareholder with an equity stake of 25 % or more—except for equity stakes of families, employees, or directors (European Commission, 2003). We also exclude microenterprises from our sample, that is, firms that employ fewer than 10 persons and whose annual turnover or annual balance sheet total does not exceed 2 million euros. For each firm, the selection is based on the last year with available data during 2003–2009. After removing some observations with missing data for the variables of interest, the unbalanced panel set includes 90,545 firm-year observations for 14,662 SMEs during 2003–2009.

3.2 Trade credit and local banking development

We consider three measures of trade credit policy. As a measure of the supply of trade credit by firms, *Receivables* is trade receivables over total assets. To measure trade credit demand, *Payables* is defined as trade payables over total assets. The variable *Net trade credit* is *Receivables* minus *Payables* and reflects the net investment of firms in trade credit.³

Our main measure of banking development in provinces is branch density, that is, the number of bank branches per thousand inhabitants in the province. This variable has been widely used as a measure of local banking development (e.g., Bonaccorsi di Patti and Gobbi 2001; Degryse and Ongena 2005; Benfratello et al. 2008; Alessandrini et al. 2009). The physical or operational proximity between the borrower and its lending office allows banks to supplement hard data on borrowers with relevant soft information collected locally. Soft information

improves the quality of screening and monitoring borrowers, making these actions less costly, and facilitating relationship lending (e.g., Petersen and Rajan 1994). Furthermore, there is great dispersion in branch density across Italian provinces (Benfratello et al. 2008). Bonaccorsi di Patti and Gobbi (2001) find that provinces with a high number of bank branches relative to their population have greater bank credit. Alessandrini et al. (2009) present evidence that a higher branch density in Italian provinces reduces the financing constraints of firms, while Benfratello et al. (2008) find that branch density affects innovation and research and development expenses.⁴

Following Alessandrini et al. (2009) and Benfratello et al. (2008), we measure the degree of localism in the banking sector of a province by considering the number of branches held by credit cooperative banks in the province: *Coop branch density* is the number of cooperative bank branches per 1,000 inhabitants in the province.

3.3 Control variables: local characteristics

We include a number of proxies for local characteristics that might be correlated with local financial development as control variables. Industrial districts are an important feature of the industrial structure in Italy (e.g., Di Giacinto et al. 2012). Becattini (1992) defines industrial districts as social–territorial entities characterized by the active presence of both a community of people and a population of SMEs in a single naturally and historically bounded area. Industrial districts typically have numerous SMEs that specialize in a very limited number of phases in the production process of one industry and related industries. Repeated transactions between the same firms and individuals create interdependence and trust and reduce asymmetric information. Dei Ottati (2003) argues that, within industrial districts, firms with access to bank loans typically provide credit to their subcontractors that lack such access. These firms also have close relations with their banks, based on repeated personal relationship transactions. The combination of close relations with bank managers and

³ We scale our trade credit variables by total assets rather than by sales or cost of goods sold, and we investigate the role of trade credit as a financing tool. To verify that the scaling choice does not affect our conclusions, we also scale receivables by sales and payables by the cost of goods sold. The results for these alternative measures of trade credit are discussed in Sect. 4.5.

⁴ To confirm that the measurement of local banking development does not affect our conclusions, we use alternative measures of local banking development. The results for these other measures are discussed in Sect. 4.5.

subcontractors allows firms to on-lend the funds received as a bank loan to subcontractors on the basis of trust. Therefore, firms located in an industrial district are expected to provide more trade credit and make greater use of trade credit than other firms. *Ceteris paribus*, trade credit will be more important for firms located in a province with a higher industrial district density. We measure *Industrial district density* by the number of manufacturing workers in industrial districts divided by the total number of manufacturing workers at the province level, with industrial districts defined by ISTAT. The ISTAT definition of an industrial district is the outcome of a multi-step algorithm and is based on 1991 census data and taken from De Arcangelis and Ferri (2005).

Local financial development is also related to local social capital (Guiso et al. 2004b) and local crime (Bonaccorsi di Patti 2009). Financial contracts require trust, which is enhanced by social capital and is negatively affected by crime. However, trade credit also requires trust (Fisman and Love 2003). An observed positive relation between banking development and the use of trade credit may therefore be affected by the degree of social capital and/or crime in a province. In line with Guiso et al. (2004b), we measure *social capital* by the average voter turnout at the province level for referenda in 2003, 2005, 2006, and 2009. Our crime rate measure concerns *extortion crimes* based on the average number of extortion crimes reported by police to the judicial authority per 100,000 inhabitants at the province level over the period considered. We focus on extortion crimes because such crimes are likely to affect trust in business relations.⁵

Since prior studies on financial development in Italy have found significant differences between Northern, Central, and Southern Italy (Angelini et al. 1998; Ferri and Messori 2000; Alessandrini et al. 2009), we also include North and South dummies in all regressions to ensure that any effect of local banking development is not driven by the north–central–south divide. Following Guiso et al. (2004a), we set the dummy *North* equal to one for all observations in provinces north of Firenze and the dummy *South* equal to one for all observations in provinces south of Rome and zero otherwise.

⁵ We find similar results if we use total crime rates.

3.4 Control variables: economic conditions

The credit standard applied by banks to firms changes overtime, depending on economic conditions (Love et al. 2007). The effect of the economic cycle on bank lending is likely to be stronger for SMEs than for large firms, because banks typically constrain small firms more than they do large firms when they reduce credit. If bank credit and trade credit are substitutes, a tightening of bank credit standards applied to SMEs could lead to an increase in their use of trade credit. If bank credit and trade credit are complements, we expect a tightening of bank credit standards to reduce the use of trade credit. To capture this effect, we include the variable *bank credit standards*, which measures changes in banks' credit standards for approving loans or credit lines to SMEs overtime. This measure is based on the Bank Lending Survey of the European Central Bank (see <https://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html>). Each quarter, the bank lending survey asks senior loan officers of banks in Italy and in other European countries whether banks' credit standards as applied to the approval of loans or credit lines to enterprises have changed over the past 3 months. We use the difference between the percentage of SMEs that answered this question with 'tightened considerably' or 'tightened somewhat' and the percentage that answered 'eased considerably' or 'eased somewhat.' For each year, our bank credit standards variable is the average of net percentages reported at the end of each quarter of the year. A higher value implies a *tightening* of bank credit standards. Additionally, we include *annual GDP growth* as a measure of macroeconomic conditions in Italy.

3.5 Control variables: firm characteristics

We take into account firm characteristics that have been found in the trade credit literature to affect trade credit (e.g., Deloof and Jegers 1996; Petersen and Rajan 1997; Ge and Qiu 2007; Giannetti et al. 2011). We include firm size and firm age as proxies for firm creditworthiness (e.g., Petersen and Rajan 1997). Larger and older firms, which have easier access to credit, will find it easier to extend trade credit to their customers. They will also find it easier to obtain trade credit from their suppliers. The variable *Firm size* is measured by total assets (expressed in thousands of

euros). The variable *Firm age* is the number of years since the firm's incorporation. As a measure of internal cash, we also include *cash flow/assets*, which is earnings before interest, taxes, depreciation, and amortization over total assets. Firms with more internal cash and higher profits will be able to extend more credit to their customers and will therefore have more receivables on their balance sheet. The effect of cash flow on trade payables is not clear a priori. It could be argued that firms generating more cash flow will find it easier to obtain credit from their suppliers, resulting in a positive relation between cash flow/assets and payables. On the other hand, more internal cash reduces the need for trade credit, which may lead to a negative relation between cash flow/assets and payables.

We also consider firm growth as a determinant of trade credit. A supplier may be more willing than a financial institution to provide credit to a growing firm that currently has low profits if the supplier can capture future profitable business from the firm. This implies a positive relation between firm growth and payables. With respect to trade receivables, a firm may extend more trade credit to its customers to stimulate growth. We measure firm growth by *sales growth*, which is the year-over-year percentage growth rate in sales.

We additionally include *sales/assets*, which is sales over total assets, and *gross profit margin*, which is earnings before interest and taxes over sales, as determinants of receivables and net trade credit. Petersen and Rajan (1997) argue that the larger a firm's gross profit margin, the greater its incentive to sell and to finance an additional unit with trade credit if necessary. Finally, we include *cogs/assets*, which is the cost of goods sold over total assets, and *ST-debt/assets*, which is short-term debt over total assets, as determinants of payables. Access to short-term debt could reduce the need for trade credit, leading to a negative relation between short-term debt and payables. However, in an environment where creditors face the risk of diversion of cash by debtors, trade credit and banks could be complements of each other because the availability of trade credit increases the amount that banks are willing to lend to constrained firms

(Burkart and Ellingsen 2004). All regressions also include one-digit NACE industry dummies.

3.6 Descriptive statistics and correlations

Table 1 presents descriptive statistics on the characteristics of 103 Italian provinces (panel A) and firm characteristics for 90,545 firm-year observations (panel B) during 2003–2009. Descriptive statistics for local banking development are reported for 2009, which is the last year in our sample. While local banking development is measured on a yearly basis in our sample, it changes little over the sample period. Panel A of Table 1 shows substantial variation in local banking development. For example, for 2009, the average number of bank branches per 1,000 inhabitants is 1.987 and ranges between 0.022 (Nuoro) and 5.695 (Rome). Panel B shows that trade credit plays a very important role in the financing of Italian SMEs; on average, 25.7 % of a firm's assets are financed with trade credit, while trade receivables constitute 31.9 % of total assets. Net trade credit investments comprise 6.1 % of total assets, on average.

Panel A of Fig. 1 shows the changes in banks' credit standards for approving loans or credit lines to SMEs. An increase implies a tightening of credit standards. Not surprisingly, the financial crisis led to a substantial tightening of credit standards, especially in the third and fourth quarters of 2008. By the last quarter of 2009, credit standards were relaxed somewhat. The financial crisis is also apparent in Panel B of Fig. 1, showing a substantial decline in Italian gross domestic product (GDP) in 2008 and especially in 2009.

Table 2 reports the Pearson correlation coefficients between trade credit, local banking development, and other local characteristics for the full sample of 90,545 observations. There is a significant positive correlation between local banking development and the use of trade credit, which provides a first indication that, at the local level, trade credit is a complement of rather than a substitute for formal finance. Not surprisingly, our measures of local banking development are also strongly correlated with one another. Branch density is also strongly positively correlated with industrial district density and social capital.

Table 1 Descriptive statistics

| | Mean | Median | SD | Min. | Max. |
|--|-------|--------|--------|--------|---------|
| <i>Panel A: Province characteristics (103 provinces)</i> | | | | | |
| Branch density (2009) | 0.938 | 0.598 | 1.027 | 0.022 | 5.695 |
| Coop branch density (2009) | 0.110 | 0.049 | 0.153 | 0.000 | 0.762 |
| Industrial district density | 0.298 | 0.110 | 0.362 | 0.000 | 1.000 |
| Social capital | 0.325 | 0.320 | 0.067 | 0.200 | 0.480 |
| Extortion crimes | 9.605 | 8.809 | 4.386 | 2.508 | 26.080 |
| <i>Panel B: Firm characteristics (90,545 firm-year observations)</i> | | | | | |
| Receivables | 0.319 | 0.315 | 0.229 | 0.000 | 0.996 |
| Payables | 0.257 | 0.238 | 0.191 | 0.000 | 2.335 |
| Net trade credit | 0.061 | 0.047 | 0.211 | -2.081 | 0.991 |
| Firm age | 22 | 20 | 15 | 1 | 126 |
| Firm size | 8,198 | 5,253 | 10,840 | 3 | 644,047 |
| Cash flow/assets | 0.093 | 0.079 | 0.074 | -0.085 | 0.386 |
| Sales growth | 0.097 | 0.044 | 0.361 | -0.999 | 2.438 |
| Sales/assets | 1.378 | 1.245 | 0.738 | 0.000 | 4.472 |
| Gross profit margin | 0.047 | 0.038 | 0.061 | -0.182 | 0.290 |
| COGS/assets | 1.089 | 0.935 | 0.720 | 0.002 | 4.191 |
| ST-debt/assets | 0.145 | 0.095 | 0.158 | 0 | 2.655 |

Branch density is the number of bank branches per 1,000 inhabitants in the province; coop branch density is the number of cooperative bank branches over the population (1,000 inhabitants) in the province; industrial district density is the number of manufacturing workers in industrial districts divided by the total number of manufacturing workers in the province; social capital is the average voter turnout at the province level for referenda in 2003, 2005, 2006, and 2009; extortion crimes is the average number of extortion crimes reported by police to the judicial authority per 100,000 inhabitants; receivables is trade receivables over total assets; payables is trade payables over total assets; net trade credit is trade receivables minus trade payables, over total assets; firm age is the number of years since the firm's incorporation; firm size is total assets (in thousands of euros); cash flow/assets is ebitda over total assets; sales growth is the year-over-year sales growth rate; sales/assets is sales over total assets; gross profit margin is ebit over sales; cogs/assets is the cost of goods sold over total assets; and ST-debt/assets is ST-debt over total assets

4 Results

4.1 Trade credit and local banking development

First, we investigate the relation between trade credit and local banking development. Table 3 reports regression results based on ordinary least squares with standard errors clustered at the firm level. Since the local banking development measures (the variables of interest in our analysis) vary only at the provincial level, we additionally correct the standard errors for possible dependence of the residuals within provincial clusters.⁶ At this stage, we do not consider firm fixed

effects because the level of local banking development changes very little over the period considered in this study.

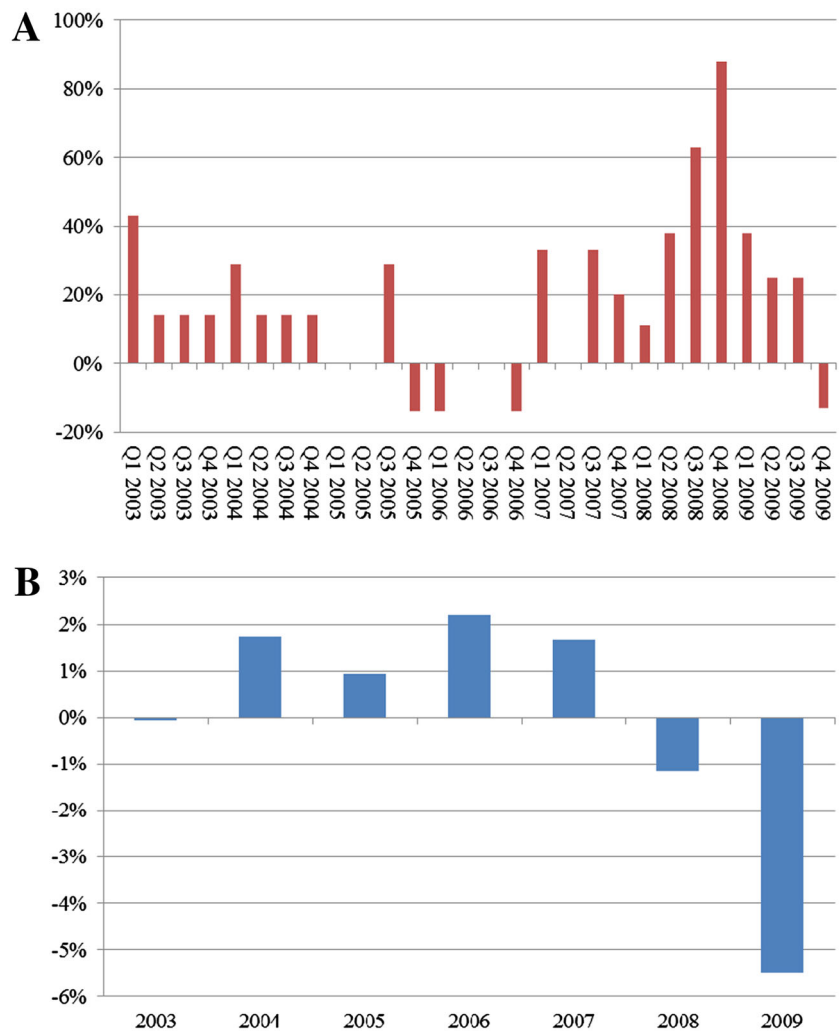
The results of regression 1 (trade receivables), regression 2 (trade payables), and regression 3 (net trade credit) support the argument that local bank development facilitates the provision of trade credit. Firms located in a province with a higher density of bank branches provide significantly more trade credit to their customers (H1) and have larger net investments in trade credit (H3). With respect to trade payables, we find that firms finance a larger portion of their assets with trade credit if they are located in a province with a more developed banking sector, confirming H2b that a more developed banking sector allows these firms to obtain more credit from their suppliers.

In regressions 4–6, we take into account the degree of localism in the province's bank system by including

⁶ We employ Mitchell Petersen's Stata routine to cluster standard errors by two dimensions (see http://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm).

Fig. 1 Economic indicators for Italy, 2003–2009.

a Changes in banks' credit standards for approving loans or credit lines to SMEs. **b** Annual GDP growth. Changes in banks' credit standards for approving loans or credit lines to enterprises changed?' in the ECB Bank Lending Survey (<https://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html>). It gives the net percentage difference between Italian SMEs answering 'tightened considerably' or 'tightened somewhat' versus those answering 'eased considerably' or 'eased somewhat.' The source of the annual GDP growth data is the World Bank



Coop branch density, which is defined as cooperative bank branches per 1,000 inhabitants in the province, equals the proportion of coop bank branches in the province times the (total) branch density. The coop branch density coefficient therefore reflects the proportion of cooperative bank branches in the province and affects the relation between branch density and trade credit. A positive coefficient implies that cooperative banking reinforces the effect of local banking development on trade credit, while a negative coefficient means that cooperative banking reduces the effect of local banking development. Consistent with H4, we find that a higher proportion of cooperative banks in the local banking system significantly reduces the positive effect that branch density generally exerts on trade credit. These results confirm the

view that loans by cooperative banks are a substitute for trade credit because the credit decisions of both suppliers and cooperative banks are based on soft information.

With respect to local characteristics, the results in Table 3 suggest that industrial district density has a significant positive impact on both receivables and payables. The coefficients of our social capital and extortion crimes measures, on the other hand, are never significant, indicating that trade credit is not affected by provincial differences in trust or crime. The North and South dummy coefficients suggest that, compared with firms in Central and Southern Italy, Northern Italian firms receive less trade credit from their suppliers. We also find that a tightening of banks' credit standards leads to a reduction in the use of trade

Table 2 Pearson correlations (90,545 firm-year observations, 2003–2009)

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|--------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|-------|
| 1. Receivables | 1.000 | | | | | | | |
| 2. Payables | 0.507 | 1.000 | | | | | | |
| 3. Net trade credit | 0.625 | -0.356 | 1.000 | | | | | |
| 4. Branch density | 0.080 | 0.045 | 0.046 | 1.000 | | | | |
| 5. Coop branch density | 0.028 | 0.006 | 0.025 | 0.622 | 1.000 | | | |
| 6. Industrial district density | 0.023 | -0.008 | 0.032 | 0.569 | -0.265 | 1.000 | | |
| 7. Social capital | 0.058 | 0.008 | 0.056 | 0.356 | 0.191 | 0.071 | 1.000 | |
| 8. Extortion crimes | 0.006 | 0.037 | -0.027 | -0.008 | -0.197 | -0.374 | -0.182 | 1.000 |

All variables are defined as before. Bold denotes significance at the 5 % level

credit by SMEs: In all regressions, the bank credit standards coefficient is negative and significant at the 1 % level. Furthermore, the use of trade credit is negatively related to GDP growth, indicating that economic contractions delay the payment of trade credit.

The results for the firm characteristics are generally in line with the findings in the trade credit literature. Trade receivables and payables are positively related to sales and the cost of goods sold, as well as to firm size. More profitable firms extend more credit to their customers but obtain less credit from suppliers. High-growth firms use more trade credit to finance their new investments in current assets, resulting in a negative relation between trade payables and sales growth (Cuñat 2007). Sales growth is negatively related to trade receivables, a finding that is consistent with the argument that firms with poor sales growth use trade credit as a mechanism to boost their sales by extending more credit to their customers. Both trade receivables and payables are negatively related to firm age. This result, which has also been found in other studies on SMEs (e.g., Niskanen and Niskanen 2006; Garcia-Teruel and Martinez-Solano 2010), contradicts our expectation that firms that are more creditworthy will make greater use of trade credit. Younger firms (with weaker reputations) may need to use more trade credit to guarantee their products, but may need to rely more on trade financing because they have less access to formal finance.

Finally, the positive relation between debt/assets and payables suggests that debt and trade credit tend to be complements rather than substitutes for the firms in our sample. This is consistent with the theory of

Burkart and Ellingsen (2004) that in an environment where creditors face a risk of diversion of cash by debtors, trade credit and bank credit will be complements of each other because the availability of trade credit increases the amount that banks are willing to lend to constrained firms.

4.2 Endogeneity of local banking development

A potential problem with the findings is that the observed positive effect that local banking development and cooperative branch density have on trade credit may actually reflect omitted factors that affect both local banking development and trade credit, such as local economic development. Furthermore, the amount of trade not only depends on the willingness of suppliers to provide credit, but may also be affected by the fact that customers struggle with paying invoices regularly. This aspect is particularly relevant in Italy, where delinquency on payments is quite frequent, even when the debtor eventually pays.⁷ If payables and receivables increase because of delinquency, this implies that greater amounts of trade credit in a province are the result of a dysfunctional business system that is not able to deal effectively with delinquency. Banks might increase their operations in provinces where there is higher delinquency since they can spot more business opportunities there.

To ascertain the effect that local banking development has on trade credit, we use exogenous

⁷ See, for example, the Atradius Payment Practices Barometer, available at <http://global.atradius.com/paymentpractice/list/paymentpractices.html>.

Table 3 Trade credit and local financial development

| Dependent variable | 1. Receivables | 2. Payables | 3. Net trade credit | 4. Receivables | 5. Payables | 6. Net trade credit |
|---------------------------------|----------------------|----------------------|------------------------|----------------------|----------------------|------------------------|
| Branch density | 0.011*** (0.000) | 0.007*** (0.000) | 0.004** (0.027) | 0.018*** (0.000) | 0.011*** (0.000) | 0.008*** (0.000) |
| Coop branch density | | | | -0.090*** (0.000) | -0.039*** (0.000) | -0.051*** (0.000) |
| <i>Province characteristics</i> | | | | | | |
| Industrial district density | 0.014* (0.097) | 0.008 (0.197) | 0.004 (0.493) | 0.025*** (0.001) | 0.013** (0.022) | 0.010 (0.115) |
| Social capital | 0.065 (0.349) | -0.020 (0.563) | 0.078 (0.123) | 0.040 (0.394) | -0.031 (0.267) | 0.064 (0.116) |
| Extortion crimes | 0.000 (0.826) | 0.000 (0.764) | -0.000 (0.869) | -0.000 (0.507) | -0.000 (0.811) | -0.000 (0.380) |
| North | 0.003 (0.748) | -0.012** (0.027) | 0.016** (0.010) | 0.005 (0.293) | -0.010** (0.014) | 0.017*** (0.001) |
| South | -0.004 (0.748) | 0.010 (0.296) | -0.014 (0.134) | -0.002 (0.875) | 0.011 (0.238) | -0.012 (0.143) |
| <i>Economic indicators</i> | | | | | | |
| Bank credit standards | -0.004*** (0.000) | -0.003*** (0.000) | -0.001*** (0.000) | -0.004*** (0.000) | -0.003*** (0.000) | -0.001*** (0.000) |
| Annual GDP growth | -0.009*** (0.000) | -0.003*** (0.000) | -0.006*** (0.000) | -0.010*** (0.000) | -0.004*** (0.000) | -0.006*** (0.000) |
| <i>Firm characteristics</i> | | | | | | |
| Ln(firm size) | 0.021*** (0.000) | 0.014*** (0.000) | -0.001 (0.489) | 0.021*** (0.000) | 0.013*** (0.000) | -0.002 (0.450) |
| Ln(firm age) | -0.005* (0.097) | -0.020*** (0.000) | 0.018*** (0.000) | -0.005* (0.071) | -0.020*** (0.000) | 0.018*** (0.000) |
| Cash flow/assets | 0.052 (0.130) | -0.193*** (0.000) | 0.289*** (0.000) | 0.055 (0.100) | -0.193*** (0.000) | 0.291*** (0.000) |
| Sales growth | -0.003 (0.257) | 0.021*** (0.000) | -0.026*** (0.000) | -0.003 (0.243) | 0.021*** (0.000) | -0.026*** (0.000) |
| Sales/assets | 0.060*** (0.000) | | -0.040*** (0.000) | 0.060*** (0.000) | | -0.041*** (0.000) |
| Gross profit margin | -0.043 (0.278) | | 0.121*** (0.000) | -0.046 (0.237) | | 0.120*** (0.000) |
| COGS/assets | | 0.108*** (0.000) | | | 0.108*** (0.000) | |
| ST-debt/assets | | 0.069*** (0.000) | | | 0.068*** (0.000) | |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 90,545 | 90,545 | 90,545 | 90,545 | 90,545 | 90,545 |
| R ² | 0.084 | 0.231 | 0.079 | 0.087 | 0.232 | 0.080 |

All variables are defined as before, except North, which is a dummy equal to one if the firm is located in Northern Italy, and South, which is a dummy equal to one if the firm is located in Southern Italy. All regressions include industry and year fixed effects (FE). Reported coefficients are estimated using ordinary least squares, with p values in parentheses based on standard errors clustered by firms and provinces. The superscripts ***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

determinants of the degree of banking development as instruments in 2SLS regressions. In line with Guiso et al. (2004a), we use measures of the local supply of credit in 1936 as determinants of local banking development in the 2000s. While local banking structures in 1936 were largely determined by factors unrelated to local economic development, a new banking law in 1936 severely constrained the growth of the banking system. Since this law affected some types of banks more than others and the type of banks in the system differed across regions, the law created significant local differences in banking development that may persist to the present day. Consistent with this argument, Guiso et al. (2004a) find that local banking development in 1936 is strongly correlated with local banking development in the 1990s, but it is only weakly correlated with contemporary local economic development.⁸ First, we identify four measures of banking development in 1936 that significantly affect local banking development in 2003–2009: the number of bank branches and banks in the province, the total number of banche popolari in the province, and the number of bank branches over the population in the region in which a firm is located.⁹ For our sample, these variables alone explain 67 % of the variation in branch density and 35 % of the variation in coop branch density, which is in line with the results of Guiso et al. (2004a).

To further minimize the risk that our results are driven by banks moving to provinces with higher payment delinquency, we add the average bankruptcy rate of firms in a province over 2003–2007 as a measure of payment delinquency.¹⁰ Provinces with a higher bankruptcy rate are possibly areas where it is harder for firms to be paid on time. Furthermore, payment delinquency is likely to be correlated with our control variable social capital and extortion crimes.

⁸ Data on provincial banking development in 1936 were kindly provided by Luigi Guiso.

⁹ The 20 regions of Italy are the first-level administrative divisions of the state. Since data on provincial populations in 1936 are unavailable, this measure cannot be calculated at the provincial level. Similarly, measures based on GDP cannot be obtained because local GDP data in 1936 are not available.

¹⁰ The years 2008 and 2009 are not included because ISTAT provides data on bankruptcies at the province level only until 2007.

Regressions 7–9 of Table 4 are based on 2SLS estimation. The results fully confirm our previous findings: Local banking development positively affects trade but cooperative banking has a negative effect.¹¹ As expected, the bankruptcy rate in a province is positively related to the use of trade credit. However, the coefficient is never statistically significant. In the previous regressions, we took differences between Northern, Central, and Southern Italy into account by including North and South dummies in all our regressions. To further ascertain that our results are not driven by the north–central–south divide, we re-estimate our basic regressions using data only from firms in Northern Italy. The results, which are reported in regressions 10–12 of Table 4, again confirm the effect of local banking development on trade credit policy.

4.3 Trade credit as a redistribution tool

Next, we investigate whether local banking development affects the redistribution of loans via trade credit. The redistribution view of trade credit holds that firms with better access to bank financing redistribute some of the loans they obtain from banks to less advantaged (but creditworthy) firms in the form of trade credit (Petersen and Rajan 1997; Love et al. 2007). SMEs located in provinces with a more developed banking system can be expected to have better access to bank credit and are therefore more likely to redistribute bank loans by adjusting their trade credit policy. These SMEs could either provide more credit to their customers and/or take less credit from their own suppliers, resulting in an increase in net trade credit. Conversely, less need to redistribute bank loans via trade credit is expected in provinces where cooperative banking is more important.

We test these hypotheses by including in the regressions *debt/assets* (debt over total assets) and interactions between this variable and the branch density variables as determinants of trade credit policy. A positive coefficient is expected for the *debt/assets* × *branch density* interaction variable, while a negative coefficient is expected for the *debt/*

¹¹ The results in Table 4 are based on fewer observations than the previous results because there were fewer provinces in 1936 than there are today; observations for provinces that did not yet exist in 1936 are left out of the sample.

Table 4 2SLS instrumental variables

| Sample Dependent variable | 7. Whole Receivables | 8. Whole Payables | 9. Whole Net trade credit | 10. Northern Italy Receivables | 11. Northern Italy Payables | 12. Northern Italy Net trade credit |
|---------------------------------|----------------------------|-------------------------|---------------------------------|--------------------------------------|-----------------------------------|---|
| Branch density | 0.021*** (0.000) | 0.012*** (0.001) | 0.009** (0.022) | 0.029*** (0.000) | 0.016*** (0.000) | 0.013*** (0.002) |
| Coop branch density | -0.136*** (0.000) | -0.053** (0.037) | -0.080** (0.016) | -0.150*** (0.001) | -0.080*** (0.003) | -0.067** (0.042) |
| <i>Province characteristics</i> | | | | | | |
| Bankruptcy rate | 0.004 (0.635) | 0.002 (0.779) | 0.003 (0.646) | -0.007 (0.543) | -0.007 (0.355) | 0.001 (0.914) |
| Industrial district density | 0.030*** (0.001) | 0.015** (0.021) | 0.013 (0.134) | 0.049*** (0.000) | 0.028*** (0.000) | 0.018* (0.077) |
| Social capital | 0.054 (0.501) | -0.030 (0.500) | 0.080 (0.215) | -0.058 (0.544) | -0.044 (0.440) | -0.014 (0.827) |
| Extortion crimes | -0.001* (0.090) | -0.000 (0.490) | -0.001 (0.105) | -0.000 (0.963) | 0.000 (0.629) | -0.001 (0.370) |
| North | 0.009 (0.221) | -0.009* (0.079) | 0.020*** (0.009) | | | |
| South | 0.002 (0.899) | 0.013 (0.188) | -0.011 (0.271) | | | |
| <i>Economic indicators</i> | | | | | | |
| Bank credit standards | -0.005*** (0.000) | -0.003*** (0.000) | -0.002*** (0.000) | -0.005*** (0.000) | -0.003*** (0.000) | -0.002*** (0.000) |
| Annual GDP growth | -0.011*** (0.000) | -0.004*** (0.000) | -0.007*** (0.000) | -0.011*** (0.000) | -0.005*** (0.000) | -0.007*** (0.000) |
| <i>Firm characteristics</i> | | | | | | |
| Ln(firm size) | 0.021*** (0.000) | 0.013*** (0.000) | -0.001 (0.500) | 0.020*** (0.000) | 0.014*** (0.000) | -0.004 (0.183) |
| Ln(firm age) | -0.005* (0.077) | -0.020*** (0.000) | 0.018*** (0.000) | -0.007* (0.059) | -0.015*** (0.000) | 0.012*** (0.003) |
| Cash flow/assets | 0.061* (0.076) | -0.193*** (0.000) | 0.293*** (0.000) | 0.076* (0.069) | -0.173*** (0.000) | 0.285*** (0.000) |
| Sales growth | -0.002 (0.351) | 0.022*** (0.000) | -0.026*** (0.000) | -0.003 (0.328) | 0.024*** (0.000) | -0.029*** (0.000) |
| Sales/assets | 0.060*** (0.000) | | -0.040*** (0.000) | 0.071*** (0.000) | | -0.032*** (0.000) |
| Gross profit margin | -0.052 (0.195) | | 0.118*** (0.000) | -0.081* (0.083) | | 0.101** (0.014) |
| COGS/assets | | 0.107*** (0.000) | | | 0.110*** (0.000) | |
| ST-debt/assets | | 0.068*** (0.000) | | | 0.074*** (0.000) | |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 86,606 | 86,606 | 86,606 | 62,124 | 62,124 | 62,124 |
| R ² | 0.087 | 0.232 | 0.080 | 0.102 | 0.241 | 0.057 |

Instruments include the number of bank branches in 1936, the number of banks and the number of *banche popolari* in the firm's province, and the 1936 branch density in the firm's region. All variables are defined as before, except the bankruptcy rate, which is the bankruptcy rate in provinces averaged over 2003–2007. The *p* values in parentheses are based on robust standard errors clustered by provinces. The superscripts ***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

Table 5 Trade credit as a redistribution tool

| Debt Dependent variable | 13. ST-debt Receivables | 14. ST-debt Payables | 15. ST-debt Net trade credit | 16. LT-debt Receivables | 17. LT-debt Payables | 18. LT-debt Net trade credit |
|--|-------------------------------|----------------------------|------------------------------------|-------------------------------|----------------------------|------------------------------------|
| Debt/assets \times branch density | 0.049*** (0.000) | 0.010 (0.170) | 0.039*** (0.000) | 0.005 (0.483) | 0.004 (0.590) | 0.001 (0.790) |
| Debt/assets \times coop branch density | -0.347*** (0.000) | -0.061 (0.354) | -0.285*** (0.002) | -0.177** (0.028) | -0.121 (0.135) | -0.054 (0.121) |
| Debt/assets \times industrial district density | 0.122*** (0.002) | 0.072** (0.047) | 0.050 (0.175) | 0.095*** (0.002) | 0.099*** (0.000) | -0.004 (0.860) |
| Debt/assets | 0.423*** (0.000) | 0.197*** (0.000) | 0.226*** (0.000) | 0.088*** (0.000) | 0.042** (0.035) | 0.047*** (0.009) |
| Economic indicators | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 90,545 | 90,545 | 90,545 | 90,545 | 90,545 | 90,545 |
| Number of firms | 14,662 | 14,662 | 14,662 | 14,662 | 14,662 | 14,662 |
| Within R^2 | 0.248 | 0.143 | 0.085 | 0.139 | 0.114 | 0.039 |

All regressions include firm fixed effects and the same economic indicators and firm characteristics as in Table 3. All variables are defined as before. The p values in parentheses are based on robust standard errors clustered by provinces. The superscripts *** and ** denote significance at the 1 and 5 % levels, respectively

assets \times coop branch density interaction variable. We also include the interaction between *debt/assets* and *industrial district density*, since the results in Tables 3 and 4 suggest that this variable is significantly related to the trade credit policies of Italian SMEs. Because the focus of this analysis is not local banking development per se but, rather, the extent to which local banking development facilitates the redistribution of debt via trade credit, we estimate, following Cull et al. (2009), fixed effects regressions that control for all time-invariant determinants of trade credit policy. The estimation results are reported in Table 5, and p values are based on heteroscedasticity-robust standard errors clustered at the provincial level.

We first consider the effect of short-term debt on trade credit in regressions 13–15. The coefficient of *debt/assets* is significantly positive in all three regressions. Firms with more short-term debt provide more (net) trade credit to their customers, ceteris paribus. To a lesser extent, they also receive more trade credit from their suppliers, resulting in a net increase in trade credit investments. Does this effect depend on local financial development? The results for the interaction terms in regressions 13 (receivables) and 15 (net trade

credit) confirm that this is indeed the case: Firms in provinces with a higher branch density and a lower cooperative branch density on-lend a larger proportion of their debt via trade credit. The statistically insignificant coefficients of the *debt/assets \times branch density* and *debt assets \times coop branch density* interaction variables in regression 14 indicate that the positive relation between short-term debt and payables that we already observed in Tables 3 and 4 does not depend on local banking development.

When we consider long-term debt (LT-debt) in regressions 16–18, it becomes clear that the observed effect of debt on the provision of trade credit is driven by short-term debt. Long-term debt has no significant effect on trade credit, indicating that firms use short-term debt rather than long-term debt to trade receivables, which is consistent with the argument that firms match the maturity of their assets and liabilities to reduce risk (e.g., Morris 1976). Finally, it is interesting to note the significant positive effect of industrial district density on the redistribution of both short-term and long-term debt via trade credit. Firms in industrial districts seem to be more likely to redistribute debt via trade credit.

Table 6 Impact of the global financial crisis

| Dependent variable | 19. Receivables | 20. Payables | 21. Net trade credit |
|---|----------------------|----------------------|----------------------------|
| Year 2009 × branch density | 0.001 (0.606) | 0.002 (0.333) | −0.001 (0.459) |
| Year 2008 × branch density | 0.003*** (0.001) | 0.003** (0.037) | 0.001 (0.634) |
| Year 2009 × coop branch density | 0.012 (0.331) | 0.006 (0.621) | 0.003 (0.750) |
| Year 2008 × coop branch density | −0.012* (0.095) | −0.007 (0.467) | −0.007 (0.370) |
| Year 2009 × industrial district density | −0.001 (0.767) | 0.001 (0.888) | −0.001 (0.875) |
| Year 2008 × industrial district density | 0.001 (0.690) | −0.004 (0.269) | 0.005 (0.160) |
| Year 2009 | −0.068*** (0.000) | −0.064*** (0.000) | 0.006* (0.067) |
| Year 2008 | −0.047*** (0.000) | −0.047*** (0.000) | 0.005* (0.074) |
| Firm characteristics | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Observations | 90,545 | 90,545 | 90,545 |
| Number of firms | 14,662 | 14,662 | 14,662 |
| Within R^2 | 0.084 | 0.111 | 0.034 |

In this table Year 2007, Year 2008, and Year 2009 are year dummies. All regressions include firm fixed effects and the same firm characteristics as in Table 3. All variables are defined as before. The p values in parentheses are based on robust standard errors clustered by provinces. The superscripts ***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

4.4 Impact of the global financial crisis

The global financial crisis hit the Italian economy hard and led to a significant reduction in the supply of credit by financial institutions to Italian firms (Panetta and Signoretti 2010; Presbitero et al. 2014). Italian SMEs located in provinces with a more developed banking system may have found it easier to provide trade credit during the global financial crisis, but it is unlikely such an effect persisted for very long, since the financial crisis led to a long-term contraction in bank credit. The effect of local banking development during the crisis is tested in Table 6. The variables *Branch density* and

coop branch density are interacted with year dummies for 2008 and 2009. While these years constitute only the start of a crisis that hit Italy hard in later years, Fig. 1 illustrates that the crisis led to a strong tightening of bank credit standards in 2008 and 2009 and to a large decline of GDP in 2009.

We also consider the effect of *industrial district density*, and, as in Table 5, the results are based on fixed effects estimation with robust standard errors taking into account clustering by provinces. The results suggest that the use of trade credit by Italian SMEs significantly declined in 2008 and 2009, relative to the previous years. We do find that firms in provinces with a more developed banking system experienced a smaller decline in both the provision of trade credit (regression 19) and the use of trade credit (regression 20) in 2008. However, this effect seems to have disappeared by 2009. By 2009, the financial crisis may have eroded the advantage of being located in a province with a higher bank branch density (Love et al. 2007). Both results confirm H5 that local banking development reduced the effect of the financial crisis on trade credit, but only at the start of the crisis. We also find a negative effect of coop branch density on trade credit in 2008 (H6), but this effect is only statistically significant (at the 10 % level) for receivables. We do not find any significant time effects for industrial district density.

4.5 Alternative measures of trade credit and local financial development

Since we investigate the role of trade credit as a financing tool, we scaled our trade credit variables by total assets rather than by sales or the cost of goods sold. To confirm that the scaling choice does not affect our conclusions, in panel A of Table 7, we report results for *receivables on sales (days)*, which is $365 \times (\text{receivables}/\text{sales})$ (regression 22); *payables on COGS (days)*, which is $365 \times (\text{payables}/\text{cost of goods sold})$ (regression 23); and *receivables on sales (days) minus payables on the cost of goods (days)* (regression 23). The control variables are the same province characteristics as before, as well as firm age, firm size measured by sales instead of total assets, EBITDA over sales, sales growth, year fixed effects, and industry fixed effects. For brevity, Table 5 reports only the coefficients and significance levels for the local financial development measures. The results in

Table 7 Alternative measures

| Dependent variable | 22. Receivables on sales (days) | 23. Payables on COGS (days) | 24. Receivables on sales minus payables on COGS (days) | | | |
|--------------------------|---------------------------------------|-----------------------------------|--|--|--|--|
| Branch density | 4.996*** (0.000) | 2.882*** (0.001) | 2.263*** (0.000) | | | |
| Coop branch density | -22.953*** (0.000) | -10.025*** (0.007) | -12.638*** (0.000) | | | |
| Province characteristics | Yes | Yes | Yes | | | |
| Economic indicators | Yes | Yes | Yes | | | |
| Firm characteristics | Yes | Yes | Yes | | | |
| Industry FE | Yes | Yes | Yes | | | |
| Year FE | Yes | Yes | Yes | | | |
| Observations | 90,545 | 90,545 | 90,545 | | | |
| R^2 | 0.076 | 0.072 | 0.031 | | | |

| Dependent variable | 25. Receivables | 26. Payables | 27. Net trade credit | 28. Receivables | 29. Payables | 30. Net trade credit |
|--|---------------------|---------------------|-------------------------|---------------------|---------------------|-------------------------|
| <i>Panel B: Alternative local financial development measures</i> | | | | | | |
| Loans/GDP | 0.023*** (0.000) | 0.010*** (0.000) | 0.013*** (0.000) | | | |
| Loans/deposits | | | | 0.006 (0.236) | -0.004 (0.263) | 0.009*** (0.004) |
| Deposits/GDP | | | | 0.073*** (0.000) | 0.048*** (0.000) | 0.029*** (0.001) |
| Province characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic indicators | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm characteristics | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 90,545 | 90,545 | 90,545 | 90,545 | 90,545 | 90,545 |
| R^2 | 0.084 | 0.229 | 0.080 | 0.084 | 0.230 | 0.080 |

In this table, Receivables on sales (days) is $365 \times (\text{receivables/sales})$, Payables on COGS (days) is $365 \times (\text{payables/cost of goods sold})$, loans/GDP is the ratio of loans provided by banks to GDP in the province, loans/deposits is the ratio of loans provided by banks to deposits collected by banks in the province, and deposits/GDP is the ratio of deposits collect by banks to GDP in the province. Reported coefficients are estimated using ordinary least squares, with p values in parentheses based on standard errors clustered by firms and provinces. The superscripts ***, **, and * denote significance at the 1, 5, and 10 % levels, respectively

panel A fully confirm our earlier findings. A change in branch density of two standard deviations increases the time it takes firms to collect their sales by approximately 10 days, while it increases the time it takes a firm to pay for its cost of goods sold by 6 days. A change in two standard deviations in cooperative branch density increases the number of days it takes a firm to collect its sales by seven, while it increases the

time it takes a firm to pay for its cost of goods sold by 3 days.

We also use alternative measures of local banking development: *Loans/GDP* is the ratio of loans provided by banks to the GDP in the province. This measure captures the credit allocation by banks in the province. We also consider *deposits/GDP*, which is the ratio of deposits collected by banks to the GDP in

the province and measures the resources available to the financial sector in the province for lending. The variable *Loans/deposits* is the ratio of loans provided by banks to deposits collected by banks in the province. It measures the extent to which banks use savings in a province to provide credit in the province. These variables are often used to measure the financial development of countries (e.g., Beck and Demirgüç-Kunt 2009).¹² The control variables are the same as before. The results for *loans/GDP* in Panel B of Table 7 (regressions 25–27) fully confirm our results for branch density. The effect of local banking development could be due to differences in the availability of deposits between provinces but may also be affected by the extent to which banks use savings to provide credit in the province. Indeed, it has been argued that savings have been drained out by the banks in the peripheral provinces of Italy, slowing down bank economic development of the province (Alessandrini and Zazzaro 1999). In regressions 28–30, we therefore distinguish between *deposits/GDP*, which is the ratio of deposits collected by banks in the province to the GDP in the province, and *loans/deposits*, which is the ratio of loans provided by banks in the province to deposits collected by banks in the province. The results suggest that both the deposits available in the province and the extent to which these deposits are lent within the province matter; both variables significantly affect trade receivables (regression 28) and net trade credit (regression 30). On the other hand, while the ratio of deposits to the GDP is significantly and positively related to trade payables, the ratio of loans to deposits does not seem to affect trade payables (regression 29).

5 Conclusion

In this study, we find that trade credit plays a significant role in local financial development by enforcing the positive effect of local bank development on the availability of finance to SMEs. SMEs located in Italian provinces with a more developed local banking system provide more trade credit to their

customers. To a lesser extent, these SMEs also receive more trade credit from their suppliers. Our results confirm that local differences in banking development and trade credit policy *within* countries matter, adding to earlier findings that the provision of trade credit is complementary to the development of financial institutions at the country level (Demirgüç-Kunt and Maksimovic 2001). From a methodological point of view, focusing on the local rather than national level allows for within-country variation to be exploited, thereby reducing the risk of omitted variable bias and implicitly controlling for differences in formal institutions. This study also contributes to the literature on cooperative banking by demonstrating that local cooperative banking, which is based on soft information, reduces the use of trade credit by SMEs.

Our results also suggest that more debt leads to more trade credit if a firm is located in a province with a more developed banking system or a province with less cooperative banking. While SMEs in provinces with a more developed banking sector provided more trade credit at the start of the global financial crisis in 2008, we find that this effect had disappeared by 2009. This is consistent with the argument of Love et al. (2007) that trade terms cannot fully compensate for the long-term contraction in bank credit. Overall, our results suggest that, even in a globalized world, local financial development still matters for SMEs and trade credit plays an important role by allowing SMEs with better access to credit to redistribute capital via trade credit.

A limitation of our study is that we do not know where the supplier's customers are located. The redistribution effect of trade credit can be expected to be stronger if suppliers and customers are located in provinces with a substantial difference in local banking development, but our data do not allow us to test this. Our findings also raise the question of the extent to which differences in local financial development affect the trade credit policy of firms in countries other than Italy. Furthermore, it would be interesting to investigate the relative importance of local financial development versus national financial development for the financing policies of SMEs.

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¹² When we measure local banking development by deposits over the population, loans over the population, or corporate loans over the GDP, the results are very similar to those reported in the paper.

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