The role of Fintech in the bank-firm human relationship

Francesco Fasano[a]
University of Calabria
(Italy)

Maurizio La Rocca[b]
University of Calabria
(Italy)

Abstract

Noteworthy contributions highlighted that local financial development matters for corporate financial policies, as the geographical proximity between the firm and the bank branch alleviates asymmetric information problems and increases the use of bank debt. The advent of new digital technologies in the information collection process could open new horizons and change the role of local banking institutions in the near future. This study, using a large panel sample of Italian SMEs from 2011 to 2019, investigates whether the rapid increase of FinTech instruments during the last decade shapes the influence of local financial development on SMEs debt decisions. The findings interestingly suggest that FinTech mitigates the effect of local banking markets on SMEs indebtedness level. However, despite the arrival on the scene of FinTech, local financial development is still extremely relevant and the bank-firm close human ties remain important in debt contract negotiations.

Keywords: Local Financial Development, FinTech, SMEs, Bank Debt, Information Asymmetries.

[a]Francesco Fasano, PostDoc Research Fellow and Adjunct Professor at University of Calabria, Department of Business Administration and Law, Campus of Arcavacata, 87036 Rende (CS), Italy, telephone number +39 348 9773895 email: francesco.fasano@unical.it

[b] Corresponding author: Maurizio La Rocca, Associate Professor at University of Calabria, Department of Business Administration and Law, Campus of Arcavacata, 87036 Rende (CS), Italy, telephone number +39 366 1111222 email: maurizio.larocca@unical.it

1. Introduction

The future of banking is influenced by the rapid development of digitization that has revolutionized the financial services industry (Puschmann 2017). The use of new technologies has changed the banking business worldwide and the 'financial technology' (FinTech) became essential in the banking relationship (Romānova and Kudinska 2016). Recently, banks increased their investment in IT, which accounts for 15–20% of their total costs (Gopalan et al. 2012). FinTech has become a challenge, but also an opportunity as it provides more flexibility, better functionality in some areas and aggregation of banking services (Romānova and Kudinska, 2016). These recent tendencies stimulated a growing academic interest in this field, generating a rapid increase of papers studying the relationship between bank and FinTech. A recent paper of Thakor (2020) reviews the existing literature on FinTech and its interaction with banking. The author points out that there is still much that "we do not know" about the bank-FinTech relationship. An important issue in this strand of research regards the role that FinTech plays in the information collection procedure of banks (Jakšič and Marinc 2019). Indeed, credit contracts are almost exclusively based on information (Puschmann 2017) and the information-gathering process has been historically based on personal repeated contacts between the firm and its bank branch (Diamond 1984). The mitigation of bank-firm information asymmetries is the essence of the banking relationship (Greenbaum et al. 2016) and builds its grounds on the human interactions that allow the bank to acquire soft[1] information about the company, thereby facilitating loan provision. Indeed, the face-to-face meetings between the banker and the entrepreneur simplify the screening and the monitoring activities, reducing the information gap. This is particularly important to informational opaque firms, typically small and medium sized enterprises (SMEs) that have limited access to external finance because of their asymmetric information problems (Beck et al. 2005; Petersen and Rajan 2002; Berger and Udell 1998).

The extant financial literature quantifies the bank-firm physical proximity in terms of bank branches concentration that is a traditional dimension of local financial development. The contribution of Guiso et al. (2004) is the forerunner paper studying local financial development and suggests that the density of bank branches is positively related to corporate growth. This work has been enormously influential and inspired a large body of literature in this field. For instance, La Rocca et al. (2010) employ the same indicator of local financial development as in Guiso et al. (2004), finding that well-developed local banking markets alleviates asymmetric information problems and increases SMEs use of bank debt. Hence, SMEs benefit from the closeness of loan officers, who can rapidly assess their credit worthiness (Pollard 2003; Alessandrini et al. 2009; La Rocca et al. 2010; Deloof and La Rocca 2015; Deloof et al. 2019; Fasano and Deloof 2021).

In this banking context, where information has an extraordinary value, the advent of new digital technologies in the information collection procedures has opened up a whole new frontier that could revolutionize the way through which local financial development affects firms' growth in the coming years. Indeed, FinTech could play a breakthrough role in the bank-firm

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[1] According to Petersen (2004) 'soft' information "is difficult to completely summarize in a numeric score.", while "hard information is quantitative, easy to store and transmit in impersonal ways, and its content is independent of the collection process."

relationship, as the digitization represents an interesting new opportunity to improve the approach adopted by banks to collect information. Indeed, FinTech provides advanced automation of the information gathering process. As evidenced by Jakšič and Marinc (2019), this renovation does not mean that the bank should abolish the close personal interaction with the entrepreneur, but rather should get this opportunity to overcome some weaknesses in the information collection activity. Non-quantifiable soft information is difficult to obtain in impersonal ways (Liberti and Petersen 2017; Petersen 2004) such as FinTech. However, bank could take advantage from FinTech in order to reduce the 'distance' from the firm when it is logistically difficult to have a live personal interaction. With this regard, an advanced method of collecting quantifiable hard information based on the artificial intelligence exploited by FinTech could strengthen the bank-firm relationship by integrating and not replacing the human ties that are inevitably characterized by bounded rationality (Jakšič and Marinc 2019).

On this basis, the present work studies whether the explosive increase of FinTech instruments during the last decade shapes the influence of local financial development on SMEs financial policies. The results highlight that FinTech mitigates the effect of local financial development on SMEs use of debt. The intensification of innovative FinTech services reduces the impact of bank branches proximity on SMEs level of indebtedness. However, this moderating effect does not seem to influence lending strategies of cooperative bank branches, whose decisions are mainly based on soft information rather than hard information.

We also find that despite FinTech is rapidly spreading around the banking world, the local financial sector is still highly important. SMEs are still in need of human bankers and personal contacts that cannot be fully substituted by FinTech. The discretion of a banker can hardly be substituted by FinTech and is particularly important to informational opaque SMEs. Thus, a key implication of our evidences is that the importance of bank branches concentration is changing, for which in the near future banking institutions should rethink their business models in the light of the ongoing growth of digitization. A new idea of bank-firm digital proximity could complement the benefits due to the geographical proximity. Also the recent coronavirus pandemic changed firm approach towards banks, as entrepreneur appreciate online service anywhere accessible. This and the constant IT expansion should induce Governments to support banks during the online transition in order to strengthen the bank-firm relationship. As soft information still matters, another important implication of our research is that banks should try to use FinTech instruments also to acquire soft information or to codify (non only hard, but also) soft information same. Artificial intelligence and machine learning techniques could also support the strategic and qualitative decisions of banks, with a consequent strong positive impact on the bank-firm relationship

The reminder of the manuscript is structured as follow. Paragraph two depicts the Italian context. Paragraph three reports the literature review and the hypotheses development. Paragraph four focuses on data, methodology, and variables. Paragraph five reports the results and Paragraph six concludes, also providing some implications.

2. The Italian context

Following the approach of Guiso et al. (2004), La Rocca et al. (2010) and others, we study local financial development in Italy, which is a country in which there are relevant differences in the banking development across provinces. These differences make Italy a perfect context of analysis. Italy is a bank-based economy like many other European countries, such as France, Germany and Spain. From 1936, the competition and the establishment of new bank branches was limited by the existing legislation and Italian banks were under the state control. In 1990, a new regulation allowed the consolidation and the sale of state-held banks. Most of Italian banks operate nationwide. In 2019, 76% of the total number of bank branches in Italy were from national banks, while cooperative banks ("Banche di Credito Cooperativo", BCC) accounted for 18% of the total bank branches. Bank debt is the single most used source of financing for SMEs in Italy[2], where banking markets play a very minor role in corporate finance. With respect to corporate governance, Italian firms are in general actively managed by their owners, and there is not a marked separation between ownership and control (Giacomelli and Trento 2005). Most Italian firms are SMEs family owned and operate in mature industries. These features make local financial development, in terms of bank branches proximity, important for Italian SMEs. Therefore, banking institutions have a key role for Italian SMEs debt policies, even in an integrated financial market. This growth is particularly important in the southern provinces that are economically more underdeveloped compared to northern ones. Considering all these arguments and in the light of former contributions, we can conclude that the Italian setting is a worthwhile case study to investigate local financial development. Moreover, the characteristics of Italian SMEs are very similar to those of most European companies of the same size, as the EU established a common definition of SMEs among its countries. Thus, this allows for the generalizability of our results.

3. Literature review and hypotheses development

3.1 Literature review

The Financial Stability Board defines FinTech as the "technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services." However, it does not exist a unique definition of FinTech (Thakor 2020), as it is a developing force which refers to a broad set of technological financial innovations (Schueffel 2016). Indeed, Fintech phenomenon has allowed finance and technology to meet each other in several respects (e.g. blockchain, crowdfunding, peer-to-peer lending, internet banking, mobile payments, cryptocurrencies, robo-advisory, insurTech etc.).

With the regard to the role of FinTech in the banking industry, the disruptive advent of digitalization encouraged many researches to deepen the understanding of the FinTech

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[2] Source: CRIF special report on Italian SMEs capital structure available at https://www.crifratings.com/media/1421/special-report_-pmi_struttura-finanziaria-delle-pmi-italiane_ita_15122016_final.pdf

phenomenon in this particular sector. For instance, Jakšič and Marinč (2015) recognise four areas in which FinTech mainly impacts on banks: improved communication, decision-making, automation, and empowerment of bank customers. Navaretti et al. (2018) and Vives (2017) point out that FinTech is changing the business model of banking institutions. More in general, the banking world is wondering whether FinTech can completely substitute banks (Boot 2017). Recently, Hodula (2021) and Cole at al. (2019) highlight that the current literature does not provide a unique answer concerning the role of fintech as complement or substitute for bank finance. The work of Thakor (2020) reviews the existing literature on FinTech and banking. The author observes that FinTech run three phases: from 1866 to 1967 when is started the rapid transmission of financial information through for instance the telegraph. From 1967 to 2008 when the electronic payments were introduced and from 2008 to the present where the use of IT technologies rapidly increased. He also argues that FinTech is difficult to quantify, as above mentioned there are different definitions of FinTech.

Within the literature studying the bank-FinTech relationship, some works observed that new digital procedures generates economies of scale in the processing of banking services (Li and Marinč 2018; Boot 2016). Such advantages lie in the fact that internet banking allows to implement banking activities without geographic limitations (Khedmatgozar and Shahnazi 2018).

Another important stream of research in this field investigates how the hard non codifiable information obtained through FinTech could change the role of loan officers who base lending decisions on soft information collected via direct personal contacts (Uchida et al. 2012). Simiarly, Cerqueiro et al. (2011) suggest that the discretion of a banker depends on soft information. Some works suggest that personal interactions are still important even in a digital banking world (Ferri and Murro 2015; Marinč 2013; Grunert and Norden 2012). Thus, it seems that soft information still matters, especially for SMEs that face more asymmetric information problems (Berger and Udell 1998). Personal contact between the entrepreneur and the bank are more frequent when the bank branch and the firm closely operate. Indeed firms benefit from a well-developed local financial system (Guiso et al. 2004; Kendall 2012). Guiso et al. (2004), based on the Italian context, suggest that local financial development in terms of bank branches concentration significantly matters for corporate growth, despite the globalisation of financial markets. The authors observe that this applies only for informational opaque SMEs, whose asymmetric information problems make local financial development particularly important for them (Pollard 2003; Beck et al. 2005; Alessandrini et al. 2009). The close relationship between the SME and the bank due to the physical proximity reduces the asymmetric information gap (Petersen and Rajan 2002) and, consequently, financial constraints in lending activities. Starting from the contribution of Guiso et al. (2004), the financial literature studied the relationship between local financial development and corporate financial policies of SMEs. Noteworthy articles find that the development of banking markets positively influences the use of debt (Palacín-Sánchez and Di Pietro 2016; La Rocca et al. 2010; González and González, 2008; Utrero-González 2007), cash holdings (Fasano and Deloof 2021) and trade credit (Deloof and La Rocca 2015). Alessandrini et al. (2009) carry out a study based on the same context as in Guiso et al. (2004), observing that the geographic distance between the firm and the bank reduces the amount of debt used by SMEs. La Rocca et al. (2010) similarly evidence that higher levels of local financial development in terms of bank branch density favours credit provision to SMEs. The same results are observed in Spain, where exactly as in Italy the differences in the level of debt of SMEs lie in the differences in the local financial institutions (Palacín-

Sánchez and Di Pietro 2016; González and González 2008; Utrero-González, 2007). Therefore more developed banking institutions facilitate the acquisition of soft information on SMEs (Howorth and Moro 2006), reducing information asymmetries and increasing the access to bank finance.

In this context, the new internet banking increases the efficiency of information gathering process of banks, but decreases the banker-entrepreneur human interaction. This could influence the collection of soft information. Indeed, as highlighted by the extant literature, banking consolidation and the financial technology reduce credit availability, especially for SMEs (Sapienza 2002, Degryse and Ongena 2005, Berger and Frame 2007). It therefore appears important to investigate how FinTech influences the effect of local financial development on SMEs financial choices.

3.2 Hypotheses development

Asymmetric information is the situation in which one of two parts is better informed than the other. Asymmetric information problems arise in the presence of adverse selection and moral hazard. Adverse selection occurs when one part does not know the qualities of the counterpart before the contract is closed. Moral hazard takes place after the contract is closed, when one of the two parts cannot acquire enough information about the counterpart.

Information asymmetry due to adverse selection and moral hazard problems is a major concern in financial markets (Gan and Riddiough 2008; Nier and Baumann 2003; Myers and Majluf 1984; Stiglitz and Weiss 1981; Leland and Pyle 1977). Personal contacts between the bank and the firm found the banking relationship (Diamond 1984) and mitigate information asymmetries (Greenbaum et al. 2016). Repeated personal interactions allow the bank to acquire soft information that is at the core of credit provision (Boot 2000) and is difficult to codify.

In a world of information imbalance, the existing literature, starting from the work of Guiso et al. (2004), interestingly observed that the close proximity the bank branch and the firm increases personal contacts, reduces asymmetric information problems and has a positive effect on firm financial policies, especially for SMEs (Deloof and La Rocca 2015; La Rocca et al. 2010; Beck et al. 2005; Pollard 2003; Petersen and Rajan 2002). In particular, La Rocca et al. (2010) find that local financial development increases the use of debt by SMEs.

In this context, the new FinTech that transformed the information collection process of banks (Jakšič and Marinc 2019) could influence the role of local financial development. FinTech diminishes information asymmetries (Cappa et al. 2020) as the hard information (e.g. balance sheets or collateral guarantees) can be standardized and digitally analysed through machine learning techniques. For these reasons, in recent years banks have increasingly used hard information in their credit evaluations (Liberti and Petersen 2019). Nowadays, internet-based banking plays a relevant role in reducing information asymmetries in banking. Online platforms allow to provide banking services at a distance (Khedmatgozar and Shahnazi, 2018), avoiding logistical limitations. Indeed, it is possible to obtain firm-level much valuable information through mobile and online banking platforms. The technological services provided by banks directly match the bank with the entrepreneur, providing information about the firm credit worthiness and its financial needs.

However, internet banking could reduce face-to-face interactions. De Young et al. (2007) suggest that the distance between the bank and the firms makes it considerably more difficult for banks to collect valuable information and increases the probability of default. Moreover, internet banking provides hard and standardized information that is often not sufficient to guarantee loan provisions, especially for SMEs suffering from asymmetric information problems.

In the light of this reasoning, it seems of interest to wonder what the growth of hard standard information implies for the human relationship that takes place in the bank branches rooms and, consequently, on the amount of bank debt used by SMEs. Jakšič and Marinc (2019) rise a question: "Is online and mobile banking disrupting the role of a bank branch network - a core access channel for relationship banking?". This interesting question introduces an important interrogation in the bank-FinTech relationship: "does bank branches concentration still matters to firms?"

Advances in digital technology kicked off a huge integration of financial markets (Lucey et al. 2018). The advent of FinTech led banks to resize their branches and increase the use of electronic channels (Nuesch et al. 2015). This resulted in a drastic decrease in the number of bank branches in Italy during the last few years. However, despite FinTech makes bank products and services easily accessible over larger distances through online and mobile banking (Martins et al. 2014; Khedmatgozar and Shahnazi 2018), bank branches maintain their importance. Indeed, some papers suggest that internet banking performs as a complementary channel to traditional bank branches activities rather than as its substitute (Onay and Ozsoz 2013; De Young et al. 2007; Hernando and Nieto 2007). Moreover, FinTech, being based on hard quantifiable information, cannot resolve all asymmetric information problems arising when SMEs ask for a bank loan, because soft information that is a relationship-based information can difficulty be digitalized. With this regard, Ferri and Murro (2015) interestingly point out that financial constraints of informational opaque firms are wider when loan decisions are based on technology typically created through hard information. In a similar vein, Berger and Frame (2007) suggest that lending decisions based on credit scoring reduces SMEs access to bank debt.

As a result, the banking business model is moving toward a hybrid bank-firm interaction (Nuesch et al. 2015) based on combined digital and face-to-face acquired information that complement each other. This implies that FinTech cannot substitute the personal relationships that occur during physical branch visits, but could complement it. Therefore, we expect that FinTech changes, but does not annihilate, the relevance of bank branches density on firms' use of bank debt, for which we hypothesize:

H. 1 – FinTech reduces the effect of local financial development on SMEs bank debt.

In Italy "Banche di Credito Cooperativo" (BCC) are cooperative banks that play an important role, as above mentioned they represent 18% of total bank branches in Italy in 2019. BCCs are owned by cooperative members who typically also are bank customers. By definition, they are local banks, given their legal obligation to operate in limited territorial areas (Alessandrini et al. 2009; Stefani et al. 2016). This characteristic makes them geographically close to SMEs. By operating in the local community and being owned by members of the local community, they

may find it easier to acquire soft information via personal relationships with entrepreneurs, unlike national banks that operate at a greater distance (Howorth and Moro 2006; Bolton et al. 2016). Thus, lending decisions of national banks will be more based on hard and standardized information obtained through FinTech channels and less on the personal relationship (Howorth and Moro 2006). Differently, cooperative banks that operate on a much smaller scale are probably less in need of FinTech instruments to screen and monitor their customers, for which we expect that

H. 2 – FinTech does not reduce the effect of local financial development on SMEs bank debt for BCC bank branches.

4 Research design: data, methodology, and variables

4.2 Data

The study is based on a large sample of nonfinancial Italian SMEs that are selected according the European Commission definition in terms of employees (fewer than 250 persons), annual turnover (lower than EUR 50 million) and annual balance sheet total (not exceeding EUR 43 million). The period is from 2011 to 2019. We use an unbalanced panel dataset collected from the Amadeus database of Orbis from Bureau van Dijk that has the most extensive database of financial and business information for SMEs across Europe. Moreover, using Orbis harmonizes the financial and business information to allow accurate comparison of firms across countries. We eliminated SMEs operating in financial industries (NACE[3] codes 64, 65, 66, 68, 77) as well as firms with NACE codes 84 to 90 (public administration; education; human health and social work; and creative, arts, and entertainment), NACE code 94 (membership organisations) and NACE codes 97–98 (activities of households as employers, undifferentiated goods- and services-producing by households for own use).

Restrictions on the data were imposed as follows: first, we selected all firms with accounting information available over the sample period. Then, we left out economically meaningless observations with respect to accounting information and observations whose sales value was zero. To limit the potential influence of outliers, we winsorized all the firm-specific variables at the 1st and 99th percentiles (*Bank Debt, Cash Holdings, Working Capital, Size, Tangibility, Intangibles, Age, Firm Growth*) before performing regressions. Thus, we obtain a sample of 1,458,450 firm-year observations over the 2011–2019 period. We also use data from other sources. Data on the density of bank branches and FinTech in the bank market per province come from the Bank of Italy. Data on real gross domestic product (GDP) and population per province are collected from the Italian National Institute of Statistics (ISTAT).

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[3] NACE is the European statistical classification of economic activities. NACE groups organizations according to their business activities. Statistics produced based on NACE are comparable at the European level.

4.3 Methodology

We studied the effect of local financial development on SMEs debt using as main model the panel-data analysis in order to eliminate the unobservable heterogeneity. Moreover, we run several robustness test. First, following the approach of Deloof and La Rocca (2015), we employ the ordinary least squares econometric technique with clustered standard errors (OLS cluster) in order to account for multiple dimensions at the same time (Cameron et al. 2008). Then, we perform additional tests in search of robustness of the findings. Second, as additional robustness exam, we perform the Placebo test to make sure that the high number of observations does not lead to false statistically significant results. Thus, we studied the following empirical model:

Debt = f (Total Bank Branch Density, control variables), cluster(province) cluster(firm)

While for the second hypothesis we used the variable measuring the density of cooperative bank branches instead of the variable measuring the total density of Italian bank branches.

5.3 Variables definition

The dependent variables measuring SME financial policies is *Bank Debt* that is a proxy for the amount of bank debt used by SMEs. Following the capital structure literature (e.g., Rajan & Zingales 1995), we calculate the level of indebtedness as the ratio of long-term and short-term interest-bearing bank debt scaled by total assets. As first independent variable, following the approach of Fasano and Deloof (2021), La Rocca et al. (2010), Guiso et al. (2004) and others, we measure local financial development considering the number of national, cooperative and foreign bank branches scaled to 1,000 inhabitants in the province. Prior studies use this variable as it explains the dimension of the bank branches concentration at the local (provincial) level. As our indicator of local financial development is provided at the provincial level, we used calculated the variable *FinTech* using by the same source, i.e. the Bank of Italy, and considering the indicator at the provincial level. More in detail, the variable *FinTech* is measured as the total number of online and mobile internet banking services used by bank customers per province scaled to 1,000 inhabitants in the province.

Table 1 synthetizes the variables description.

*** Table 1 about here ***

We also include a number of firm-specific variables that may influence the effects studied. *Cash Holdings* is the ratio of cash and cash equivalents scaled by total assets (Ozkan and Ozkan 2004). This variable is important as cash is a substitute of bank debt and according to the pecking order theory, firms with a surplus of cash will use less debt. *ROA* is the ratio of earnings before interest and taxes (EBIT) to total assets and measures profitability. *Size* is calculated as the natural logarithm of total assets. More profitable and larger firms typically have an easier

access to bank debt. *Tangibility* is the ratio of tangible fixed assets scaled to total assets. Tangible assets may increase firms' financial capacity as they are used as collateral. *Age* is calculated as the natural logarithm of year minus year of incorporation. Older firms have a long history that reduces information asymmetries and increases the use of debt. *Firm Growth* is calculated as sales in year (t) minus sales in year (t-1). Growing SMEs generally require more financial resources. We also control for a provincial characteristic that may affect the results. *GDP Growth* is measured as the growth in real GDP at the provincial level from year (t-1) to year (t). *South* is a dummy that that equals one if the firm is located in the southern part of Italy and zero otherwise. This variable is important as previous studies on financial development in Italy (Guiso et al. 2004) have shown relevant differences between the northern and the southern parts of the country.

5 Empirical results

5.1 Descriptive statistics and correlations

Table 3 shows the descriptive statistics for the variables. It presents mean, standard deviation, minimum value, 25th, 50th (median), 75th percentiles and maximum value for all the variables.

*** Table 3 about here ***

Descriptive Statistics show that our dependent variable play a very important role in the financing of Italian SMEs, as on average debt represents 14 % of total assets. Moreover, the standard deviation of the variable *Bank Debt* (0.540) indicates a large variability of the dependent variable across the SMEs in our Italian sample. Table 3 shows that there is substantial variation also with respect to local financial development, while the values for the control variables are in line with the existing financial literature contributions. Table 4 reports the correlation matrix of the variables.

*** Table 4 about here ***

All the correlations different from 0.00 are statistically significant at the 0.01 level. Additionally, we tested possible multicollinearity among the independent variables by using the variance inflation factors (VIFs) that estimate how much the variance in the regression coefficients is inflated due to multicollinearity. The maximum VIF in the model is 2.48 (mean of 1.42) that is far below the generally accepted cut-off of 10 (or, more prudently, 5) for regression models (Kutner et al. 2004). Therefore, no bias was detected in the significance of the results.

5.2 Local financial development and SMEs financial policies: the moderating role of FinTech

This section reports the main results of the paper. Before launching our regressions, we first run the Hausman test, which specifies whether fixed or random effects panel model should be used. The null hypothesis of the test is that the preferred model is random effects. As the p-value of the Hausman test is equal to 0.000, we reject the null hypothesis and conclude that fixed effects model better fits our data. Additionally, we run a parm test to further assess whether time fixed effects are needed. The test suggests that dummies for all years are equal to 0, for which time fixed effects are needed. Then, we perform our regressions investigating through a moderation analysis whether the level of FinTech development at the provincial level moderates the effect of local financial markets on SMEs use of debt. The main model results are reported in Table 5.

*** Table 5 about here ***

The positive and statistically significant coefficients of the variable *Total Branch Density* (in column 1) reveal that local financial development considered individually increase SMEs indebtedness level. The coefficient of the variable *FinTech* (in column 2) is not statistically significant, indicating that the amount of internet banking services used by SMEs does not individually affect the quantity of debt issued. Therefore, it is important to include in our regressions the interaction term (column 3) that is the moderating variable based on the variable *Total Branch Density* multiplied by the variable *FinTech*. Results reveal that the marginal impact of local financial development varies according to different levels of FinTech. To better highlight such marginal impact, it is useful to consider a graph that shows the partial effect of the local financial sector on SMEs use of debt conditional for high or low levels of the variable *FinTech*. Therefore, for a better understanding of the results, we report the following Figure 1[4].

Figure 1 - Marginal effect of local financial development on SMEs debt conditioned by FinTech
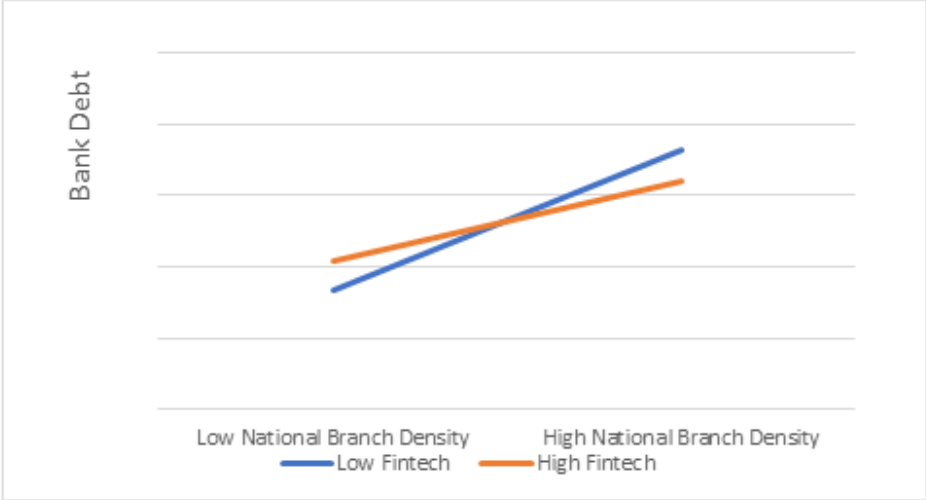
[4] Figures 1 is based on the Jeremy-Dawson graphs. For further information, see www.jeremydawson.co.uk/slopes.htm

Table 6 and Figure 1 evidence that the role of bank branches concentration on SME financial decisions is different in magnitude according to different levels of FinTech. In particular, the interaction term, which we measure at the 95% confidence interval in regressions, is negative and statistically significant, indicating that the positive effect of local financial development on SME financial policies tends to decrease as the level of FinTech development rises. Therefore, new financial technologies moderates the influence of local financial markets and our first hypothesis is confirmed.

Column 1 shows a first important results of this article, suggesting that local financial development still matters even ten years after the work of La Rocca et al. (2010) and little less than twenty years after the milestone contribution of Guiso et al. (2004). Second, results interestingly reveal that the increasing availability of hard information due to the development of FinTech reduces information asymmetries and favours loan provisions (column 2). Moreover, our moderation study demonstrates that new financial technologies reduce the bank-firm distance, impacting on the role of bank branches concentration. It seems that when firms use online and mobile internet banking, the presence of close personal bank-firm relationship matter less. *Vice versa*, when firms rely less on FinTech instruments, the density of bank branches in local provincial contexts is most relevant. Though local financial development and FinTech provide information of a different nature (soft and hard), both of them reduce information asymmetries. This explains their substitution effect. However, FinTech cannot entirely substitute the interaction with the human banker, for which – as evidenced by the result – local financial development still matters. The human ties between the bank and its customers still remain the core access channel to bank borrowing. Therefore, FinTech supports and accompanies the personal banking relationships rather than eliminate it. The findings are in line with those of Campbell and Frei (2010), according to whom internet banking increases the relevance of bank branches concentration, despite it mitigates personal relationships.

5.3 Local financial development and SMEs financial policies: the moderating role of FinTech for BCC bank branches

Table 6 investigates whether the effect of the geographical density of cooperative bank branches on SMEs use of debt and the moderating role of FinTech. The moderating interaction term is calculated as the variable BCC Branch Density multiplied by the variable FinTech.

*** Table 6 about here ***

Results of Table 6 indicate that when considering only cooperative banks branches, FinTech does not moderate the relationship between local financial development and debt, corroborating our hypothesis 2. This is interesting, but not surprising. Indeed, the findings confirm that cooperative banks that by nature operate locally, have a robust special close relationship with local entrepreneurs. This physical closeness reduces banks' need to acquire further information through FinTech channels. The existing strong relationship does not much need to be reinforced through hard information, as firms has already earned a solid reputation obtained via personal

relationships. The following Figure 2 graphically shows that when the density of cooperative bank branches increases, the effect of the local financial sector on SME debt follows the same path both when FinTech is high and low. It confirms that the lending decisions of local banks are mainly based on soft information, supporting the findings of Howorth and Moro (2006).

Figure 2 - Marginal effect of local financial development on SMEs debt conditioned by FinTech for BCC bank branches
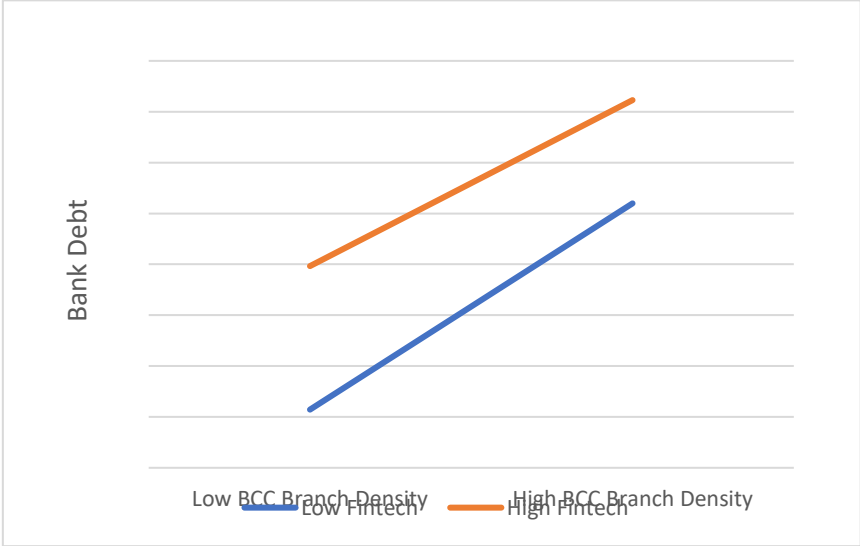
5.4 Robustness tests

5.4.1 OLS cluster technique

As first robustness test we run the OLS cluster technique[5]. This approach is important as it allows controlling for observations that are correlated under two dimensions (province and firm-level). OLS cluster regressions correct the standard errors for the possible dependence of the residuals within clusters. Results are reported in Table 7.

*** Table 7 about here ***

Results confirm that also when performing the OLS cluster approach, the effect local financial institutions on SMEs debt is conditioned by FinTech. When firms use new FinTech channels, the relevance of local branches proximity is lower.

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[5] We used the Mitchell Petersen's Stata routine to cluster standard errors by two dimensions (available at https://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm).

5.4.2 Placebo test

As final robustness test, we run the placebo test. The sample has a very high number of observations which could affect the statistical significance of the findings (Athey and Imbens 2017). To make sure that this number does not lead to false statistically significant results we applied a placebo test, in which 200 times I randomly assigned a Branch Density to each firm of the sample, and each time re-estimated the regression with the independent variable re-shuffled. We expect that in this setting Branch Density does not significantly influence SMEs' use of debt. When we run the placebo test 200 times, we find that the estimated coefficients of Branch Density are not statistically significant at the 10% level in more than 90% of the cases[6]. Hence, the results of placebo tests confirm the robustness of the findings, which are thus not influenced by chance.

6   Conclusion and implications

FinTech is one of the technologies that is transforming the banking sector and has received a lot of attention from scholar and practitioners all over the world. FinTech allows banks to provide services more efficiently than in the past and to acquire a huge amount of information about firms. This revolution integrates the work of human bankers in the process of mitigating information asymmetry problems, such as adverse selection and moral hazard problems. Therefore, hard codifiable information provided by FinTech could change the role of the bank branches network in the future. In this context, the present paper scrutinizes whether and to which extent FinTech moderates the effect of local financial development, measured in terms of bank branches density, on the amount of debt used by Ita7lian SMEs. The findings, supported by robustness tests, suggest that both local financial development and FinTech have a positive effect on SMEs debt policies. However, the effect of local financial development decreases as the level of FinTech rises, suggesting that new financial technologies mitigate the influence of local banking institutions. It seems that when banks can obtain information from FinTech channels, the bank-entrepreneur personal relationship decreases its relevance. On the contrary, when firms use less internet banking channels, the proximity between the firm and the bank branches is more important. Nevertheless, our evidences indicate that bank branches concentration is still important even in a digital environment. Indeed, while internet banking provides standard quantifiable information about borrowers, human interactions allow to acquire 'soft' qualitative information that are at the core of the decision process. Therefore, despite FinTech is changing the bank-customer relationship, it is unlikely that digital technologies will replace personal contacts in the long-run. Differently, it is likely that FinTech and face-to-face connections will coexist. But how FinTech and personal relationship interact each other? Human bankers adapt their discretional decisions also on the basis of the quantitative information provided by FinTech. At the same time, FinTech should make huge

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[6] The results of the 200 Placebo test regressions are available upon request.

steps forward. A further advance of FinTech could be the developments artificial intelligence techniques to better support loan officers' strategic and qualitative decisions. Technological research could lead to the use of FinTech in order to exploit machine learning techniques for applications that guide the banks not only towards the correct quantitative choices, but also providing support for strategic/qualitative decisions, with a consequent strong positive impact on the bank-firm relationship. This will create a unique new banking business model where digitalization represents an opportunity to reduce the discretion of decisions based on 'soft' information. This will also reduce errors in the loan assessment and, consequently, financial constraints. The hope is to further help the decisions of bankers without abolish the personal interface that is at the core of the banking relationship.

Moreover, the growth of FinTech generated turbulences in the banking markets. Governments should consider this trend and implement proper regulations that make FinTech an opportunity. Governments should regulate FinTech development in the right direction. In particular, FinTech should be used in order to reduce asymmetric information problems. Bankers should not use hard information as an obstacle to loan provisions. It is precisely when hard information suggests not to grant a loan that the personal close ties show their relevance. It is thus important that FinTech does not substitutes banks in their most important key functions, as close relationships in banking are still essentials and the importance the geographic distance is still important in lending decisions.

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Table 1 – Variables descriptions.

Dependent variable	Calculation
Bank Debt	(Long-Term Bank Debt + Short-Term Bank Debt) / Total Assets
Explanatory variables	
Branch Density	(Total Bank Branches at provincial level $\times$ 1000) / Population at provincial level
BCC Branch Density	(Total Cooperative Bank Branches at provincial level $\times$ 1000) / Population at provincial level
FinTech	(Total number of bank customers using online and mobile internet banking services $\times$ 1000) / Population at provincial level
Cash Holdings	Cash & cash equivalents / total assets
ROA	EBIT / Total Assets
Working Capital	(Working Capital) / Total Assets
Size	ln(total assets)
Tangibility	Tangible Assets / Total Assets
Intangibles	Intangible Assets / Total Assets
Age	ln(Age)
Firm Growth	(Sales $_t$ – Sales $_{t-1}$) / Sales $_{t-1}$
GDP Growth	[(real GDP at provincial level)$_t$ – (real GDP at provincial level)$_{t-1}$] / (real GDP at provincial level)$_{t-1}$
South	Dummy equal to one for firms based in the southern part of Italy

Table 2 - Descriptive Statistics for the sample.

	mean	sd	min	p25	Median	p75	max
Bank Debt	0.140	0.541	0.000	0.000	0.011	0.240	601.172
Total Branch Density	0.500	0.171	0.151	0.363	0.496	0.629	1.050
FinTech	0.519	0.180	0.078	0.389	0.518	0.641	1.164
Cash Holding	0.128	0.168	0.000	0.012	0.060	0.182	2.900
ROA	0.061	0.136	-0.527	0.015	0.047	0.104	0.537
Working Capital	0.265	0.404	-71.233	0.028	0.230	0.460	84.271
Size	6.758	1.549	2.141	5.722	6.744	7.804	10.314
Tangibility	0.238	0.253	0.000	0.043	0.144	0.362	5.494
Intangibles	0.035	0.084	0.000	0.000	0.004	0.027	1.345
Age	2.414	0.992	0.000	1.792	2.565	3.219	4.949
Firm Growth	0.722	3.557	-0.989	-0.188	0.004	0.314	28.135
GDP Growth	0.000	0.017	-0.175	0.000	0.000	0.000	0.213
South	0.234	0.424	0.000	0.000	0.000	0.000	1.000

Table 3 – Correlation matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	Bank Debt	1.00												
(2)	Total Branch Density	0.07	1.00											
(3)	FinTech	-0.01	0.39	1.00										
(4)	Cash Holding	-0.10	-0.07	-0.00	1.00									
(5)	ROA	-0.05	0.04	0.02	0.23	1.00								
(6)	Working Capital	0.03	0.07	-0.02	-0.20	-0.00	1.00							
(7)	Size	0.09	0.21	0.13	-0.25	-0.04	0.08	1.00						
(8)	Tangibility	0.08	0.08	-0.06	-0.23	-0.10	-0.21	0.21	1.00					
(9)	Intangibles	0.02	0.00	-0.00	-0.09	-0.10	-0.08	-0.06	-0.05	1.00				
(10)	Age	0.06	0.15	0.12	-0.11	-0.09	0.11	0.54	0.18	-0.10	1.00			
(11)	Firm Growth	0.02	0.04	-0.08	-0.02	0.04	0.01	0.07	-0.01	-0.00	-0.07	1.00		
(12)	GDP Growth	0.01	0.08	0.06	-0.03	-0.00	0.03	0.08	0.00	-0.00	0.12	0.17	1.00	
(13)	South	-0.04	-0.66	-0.62	0.04	-0.03	-0.04	-0.18	-0.01	-0.01	-0.16	0.00	-0.10	1.00

Notes: Industry dummies are not reported. Correlations different from 0.00 are statistically significant at the 0.01 level.

Table 4 - Local financial development and SMEs debt, the moderating role of FinTech. Main Model: panel fixed effects

Estimation technique:	(1) Panel FE	(2) Panel FE	(3) Panel FE
Dependent Variable	Bank Debt	Bank Debt	Bank Debt
Total Branch Density	0.112*** (0.017)		0.201*** (0.009)
FinTech		-0.002 (0.004)	0.040*** (0.006)
Total Branch Density * FinTech (interaction)			-0.074*** (0.006)
Cash Holdings	-0.226*** (0.024)	-0.226*** (0.031)	-0.226*** (0.024)
ROA	-0.098*** (0.014)	-0.095*** (0.014)	-0.098*** (0.014)
Working Capital	-0.025 (0.030)	-0.027 (0.030)	-0.027 (0.030)
Size	0.005 (0.026)	0.000 (0.027)	0.000 (0.027)
Tangibility	0.104*** (0.012)	0.110*** (0.012)	0.111*** (0.012)
Intangibles	0.038* (0.021)	0.054*** (0.021)	0.054*** (0.021)
Age	0.032* (0.017)	0.038** (0.018)	0.036** (0.018)
Firm Growth	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
GDP Growth	-0.045 (0.041)	-0.030 (0.044)	0.000 (0.039)
South	-0.001 (0.001)	-0.026*** (0.001)	0.002*** (0.001)
Adj. R2	0.025	0.024	0.025
Observations	1,458,450	1,458,450	1,458,450

Notes: Industry and year fixed effects are the controls. The *p*-values in parentheses are based on standard errors clustered by provinces and firms. The superscripts denote significance as follows: $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. Standard errors in parentheses

Table 6 Local financial development and SMEs financial policies:
The moderating role of FinTech for BCC Bank Branches

Estimation technique:	(1)	(2)	(3)
	Panel FE	Panel FE	Panel FE
Dependent Variable	Bank Debt	Bank Debt	Bank Debt
BCC Branch Density	0.132***		0.156***
	(0.004)		(0.011)
FinTech		0.007***	0.007***
		(0.001)	(0.001)
BCC Branch Density * FinTech (interaction)			-0.013***
			(0.004)
Cash Holdings	-0.098***	-0.095***	-0.098***
	(0.014)	(0.014)	(0.014)
ROA	-0.226***	-0.226***	-0.226***
	(0.016)	(0.016)	(0.016)
Working Capital	0.009	0.010	0.009
	(0.021)	(0.021)	(0.021)
Size	0.017***	0.017***	0.017***
	(0.002)	(0.002)	(0.002)
Tangibility	0.086***	0.089***	0.087***
	(0.011)	(0.011)	(0.011)
Intangibles	0.121***	0.120***	0.120***
	(0.011)	(0.011)	(0.011)
Age	0.009***	0.009***	0.009***
	(0.003)	(0.003)	(0.003)
Firm Growth	0.040	0.039	0.040
	(0.001)	(0.002)	(0.001)
GDP Growth	-0.024	-0.034	-0.025
	(0.052)	(0.049)	(0.051)
South	0.005	-0.034	-0.034
	(0.033)	(0.040)	(0.040)
Adj. R2	0.024	0.024	0.024
Observations	1,458,450	1,458,450	1,458,450

Notes: Industry and year fixed effects are the controls. The *p*-values in parentheses are based on standard errors clustered by provinces and firms. The superscripts denote significance as follows: $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$. Standard errors in parentheses

Table 7 - Local financial development and SMEs debt: the moderating role of FinTech Robustness test: OLS cluster

Estimation technique:	(1) OLS Cluster	(2) OLS Cluster	(3) OLS Cluster
Dependent Variable	Bank Debt	Bank Debt	Bank Debt
Total Branch Density	0.099*** (0.009)		0.154*** (0.022)
FinTech		0.007 (0.003)	0.012** (0.005)
Total Branch Density * FinTech (interaction)			-0.024*** (0.009)
Cash Holdings	-0.226*** (0.024)	-0.226*** (0.031)	-0.226*** (0.024)
ROA	-0.098*** (0.014)	-0.095*** (0.014)	-0.098*** (0.014)
Working Capital	0.009 (0.021)	0.010 (0.026)	0.009 (0.021)
Size	0.016*** (0.002)	0.017*** (0.002)	0.016*** (0.002)
Tangibility	0.086*** (0.011)	0.089*** (0.019)	0.086*** (0.011)
Intangibles	0.119*** (0.014)	0.120*** (0.022)	0.119*** (0.014)
Age	0.008*** (0.003)	0.009*** (0.003)	0.008*** (0.003)
Firm Growth	0.039 (0.001)	0.038 (0.001)	0.038 (0.001)
GDP Growth	-0.024 (0.052)	-0.034 (0.049)	-0.025 (0.051)
South	-0.001 (0.001)	-0.026*** (0.001)	0.002*** (0.001)
Adj. R2	0.025	0.024	0.025
Observations	1,458,450	1,458,450	1,458,450

Notes: Industry and year fixed effects are the controls. The *p*-values in parentheses are based on standard errors clustered by provinces and firms. The superscripts denote significance as follows: *$p< 0.10$, **$p< 0.05$, ***$p< 0.01$. Standard errors in parentheses