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LOCAL FINANCIAL DEVELOPMENT, ACCESS TO CREDIT AND SMES' PERFORMANCE: EVIDENCE FROM BANGLADESH

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Abstract

This paper tests whether local financial development matters for SMEs' growth performance. We develop a theoretical model framework based on banks' and firms' profit-maximizing behavior that critically hinges upon credit default risk ratio. We argue that an expansion of branch network would increase competition among banks to find good borrowers, which will likely to reduce credit default risk of banks. Our empirical analysis based on the theoretical framework confirms that decreasing credit default risk would decrease interest rates and therefore increases the demand for loans. Thus, bank branch growth has positive and significant impact on firms output growth and productivity. For the empirical analysis, we have used 3 groups of data of Bangladesh including i. firm level data; ii. financial development data; and iii. subdistrict level geographical data. The main policy implication of this paper is that local financial development, particularly bank branch network expansion at subdistrict level could ease access to finance and thereby improve performances of SMEs in developing countries.

Keywords: small and medium enterprise (SME), local financial development, bank branch network, firm performance, Bangladesh

JEL Classification: O16, L25

Contents

1. INTRODUCTION

Small and medium enterprises (SMEs) are considered as an engine of growth. These firms constitute a major part of industries and contribute to the largest share of employment in both developing and emerging countries. However, their growth and operations are largely hampered due to their lower access to formal credit. There are various reasons as to why SMEs struggle to get access to formal credit. Market imperfections, asymmetry of information, institutional deficiencies and lower level of financial development are some of the supply side constraints that restrict SMEs from accessing external finance (Ceterolli and Gambera 2001; Beck and Demirgüç-Kunt 2006; Beck et al. 2006; Yoshino and Taghizadeh-Hesary 2015).

A recent trend of analysis focuses on how local financial development and financial inclusion strategies [1] could ease SMEs' access to credit constraints. Using the commune-level presence of bank branches from Morocco, Fafchamps and Schündeln (2013) show that local financial development helps firms' growth through credit channels. Jayaratne and Strahan (1996) use cross-state variation in bank regulation within the US to study the link between financial development and growth, mainly over the 1970s and 1980s. Some other papers also highlighted the importance of financial development at levels below the national level for SMEs' performances (Guiso et al., 2004; Dehejia and Lleras-Muney, 2006). In these papers, financial development is mainly assessed through the development of bank branch networks.

How do SMEs benefit from local financial development? Usually banks charge relatively higher lending interest rates to SMEs compared to larger firms, taking into account the high default risks associated with the asymmetry of information existing between the lenders and SMEs (Yoshino and Taghizadeh-Hesary 2014). The higher default risk of SMEs is also associated with opaqueness.[2] From the bank competition hypothesis, the degree of bank density might matter for SME financing. A higher number of bank branches in an area might create competition among banks to find borrowers, which might force banks to lower the lending rates to attract borrowers, and such a competitive pressure also forces banks to relax collateral requirements, which gives firms easier access to credit (Berger and Udell, 1998; Berger et al. 2004; Voordecker 2006). Such a competition might also increase the risk of loan defaults due to an asymmetry of information about borrowers. However, locational advantage might help in building a relationship between banks and customers, which could reduce default risks. Further, if a bank branch is located at a nearby place, this enables firms to carry cash safely and to have access to different credit instruments (Yoshino and Morgan 2016). So, local financial development, defined by branch network expansion, is expected to facilitate access to credit to firms in a positive way and thereby contribute to their performances. Furthermore, an expansion of bank branch network in an area is expected to provide the firms a better access to various financial services, such as overdraft (OD) facilities, trade or cash credit (TC or CC), financial obligation against deposits (FOD) etc. that help them to improve their performances

[1] Using the global F index database, Demirguc-Kunt et al. (2014) indicate that the number of people worldwide having an account grew by 700 million between 2011 and 2014. About 62% of the world's adult population has an account with a rise from 51% in 2011. During the three years between 2011 and 2014, a 20% decrease in unbanked adults was observed.

[2] Opaqueness refers to the inability to pay back due to a lack of viable projects and/or the unwillingness to pay due to moral hazard, which is one of the highly cited reasons behind SMEs' lower level of access to finance (De La Torre, Martínez Pería and Schmukler 2010).

Against this backdrop, we develop a theoretical model framework based on banks' and firms' profit-maximizing behavior that critically hinges upon the credit default risk ratio. We argue that expansion of branch networks increases the quality of information about the borrowers, particularly good borrowers that helps reduce the credit default risk of banks. Our empirical analysis based on the theoretical framework confirms that a decreasing credit default risk would decrease interest rates and therefore increases the demand for loans. Thus, bank branch growth has a positive and significant impact on firms' output growth, productivity, employment, profitability, and so on. For the empirical analysis, we combine both financial development measures and subdistrict characteristics to the firm level data from a recent survey of 1200 manufacturing SMEs conducted in 2013. We perform the analysis at the lowest administrative unit (sub-district) level, which is called *thana* (in some cases *Upazila*). The size of a *thana* is on average 146 square kilometers.

Our analysis proceeds with the estimation of loan demand and supply functions. While from the supply side perspective, a higher interest spread that includes a default risk ratio (premium) significantly increases the supply of loans, the default risk ratio itself has negative and significant impact on the demand for SME loans. Therefore, the equilibrium reinforces the extent of the default risk ratio (premium), which is an important policy variable while processing an SME loan. Here, the policy objective is how to reduce the default risk of SME loans in order to facilitate access to finance for SMEs. The higher the number of bank branches, the better will be their monitoring of SMEs' performance. Hence, this will reduce the asymmetry of information, resulting in a lower default risk of bank loans, as more loans will go to SMEs with higher creditworthiness, and fewer loans will go to risky SMEs. We test this hypothesis empirically by applying the identification and estimation strategies similar to that of Fafchamps and Schundeln (2013). We find that the growth of bank branches significantly improves the performance of good-performing SMEs in need of external finance. Thus, local financial development helps SMEs gain easy access to credit and thereby improves their performances.

The paper is organized as follows. We begin in Section 2 by describing the current status of SMEs and financial development in Bangladesh. Section 3 reviews literature concerning financial development and firm growth. Section 4 discusses the theoretical model and checks the robustness of the model by estimating the loan demand and supply function. Section 5 discusses empirical estimation strategy, the data and variables. Section 6 discusses the results of econometric analysis and Section 7 concludes the paper.

2. AN OVERVIEW OF SMES AND FINANCIAL DEVELOPMENT IN BANGLADESH

SMEs are quite predominant in the industrial structure of Bangladesh, comprising over 97% of all economic units and the manufacturing units grow at a rate of 8.2% (The Economic Census, Bangladesh Bureau of Statistics (BBS) 2013). SMEs have been an important source of employment in Bangladesh. The sector employs about 24 million people, of whom 23% are engaged in manufacturing SMEs. The share of SMEs in total manufacturing employment is 41% and manufacturing value added is about 53%, which warrants greater attention to be paid to SMEs. Specifically, the shares of micro, small and medium enterprises in manufacturing employment are 7.8%, 16.2% and 6.5% respectively, with their contribution to manufacturing gross value added at 5.9%, 23.7% and 23.3%, respectively (Bakht and Basher 2014).

Though there are no available official statistics on SMEs' contribution to GDP, a recent Asian Development Bank (ADB) (2015) study estimated that the contribution of SMEs to GDP is about 25%.

Like other developing countries, the commonly perceived and also perhaps generally encountered difficulties of operation of the SMEs in Bangladesh include a lack of institutional credit, non-availability of working capital, low levels of technology, low productivity, and lack of marketing facilities and market access problems. In addition, unreliable power and gas supply, infrastructure deficiencies, compliance issues, and stiff competition both in domestic and international markets seem to have been the key bottlenecks for the development of SMEs (Islam, Zohir and Hossain 2011).

Table 1: Status of Financial Development in Bangladesh

Year	Number of ATM Machines per 1,000 sq.km.	ATM per 100,000 Adults	Branches per 1,000 sq.km.	Borrower per 1,000 Adults	% Adults Having a Bank Account**
2004	0.88	0.13	48.81	85.00	24.91
2006	2.54	0.34	50.8	88.49	26.01
2008	6.27	0.82	53.39	84.73	26.91
2010	16.29	2.05	59.06	85.19	32.47
2012	32.40	3.92	64.75	85.10	53.22
2014	48.08	5.61	70.42	74.29	52.00
2016	69.29	7.78	75.17	73.03	59.57
2017	73.15	8.07	77.73	–	–

Year	Deposit a/c per 1,000 Adults	Loan a/c per 1,000 Adults	Deposit to GDP Ratio	Loan to GDP Ratio
2004	341.06	88.54	35.78	28.37
2006	361.48	91.63	39.18	32.02
2008	387.90	86.67	41.51	33.18
2010	472.31	88.49	46.89	39.1
2012	560.27	90.60	51.22	41.5
2014	627.01	86.60	53.03	40.28
2016	723.77	87.95	52.39	40.38
2017	770.81	90.23	49.81	42.13

Source: Financial Access Survey (FAS), IMF 2015; ** Global Financial Development, The World Bank.

Despite notable improvement in SME credit disbursements, more than 40% of SMEs still do not have access to formal finance. Among the surveyed firms, 68.6% of small enterprises and 44.7% of medium enterprises are constrained by finance (Vila 2013). Even for those who have had access, there still exists a substantial credit gap and unmet demand for formal credit. A study conducted by the International Finance Corporation (IFC) suggests that there exists a US$1.8 billion (equivalent to US$ 2 billion) credit gap in terms of current outstanding SME loans (IFC, 2013). The study also estimated an average credit value gap of US$17,000 (equivalent to Bangladesh Taka (BDT) 13, 26,000) per enterprise. Given the credit gap situation of SMEs, policies need to be adopted to mitigate the credit gap among both the unserved and underserved SMEs. The findings from the INSPIRED survey showed that 75% of

the firms obtained their last loan from banks, 19% from family and friends and the remaining 6% from micro-credit institutions (Vila 2013). The role of the bank is still important in providing firms access to formal credit.

The banking sector, currently 57 commercial banks, is reluctant to provide credit to SMEs. However, with the initiatives of the Bangladesh Bank (the central bank), banks are now disbursing more credit to SMEs than before, but with higher interest rates compared to that of larger firms. Not only interest rates, but also access to bank services are difficult in Bangladesh, as private banks tend to be concentrated in the principal cities, with fewer branches in rural areas. The number of branches per 1,000 sq. km was only 70 in 2014 (Table 1). Therefore, the pace of financial development at the disaggregated level is not satisfactory. Interest rates, particularly lending interest rates, have remained high for a long time in Bangladesh even after interest rate deregulations in the 1990s. The interest spread is expected to decline over time as liberalization is accomplished and the financial sector develops, but this has not happened mainly because of institutional pitfalls and distortions in the loan market (Hossain 2012).

The inadequate access to finance is associated with an inadequate bank branch network, a high interest rate and stringent collateral requirements in Bangladesh. Credit guarantee schemes, which are essential to promote collateral-free finance, are not well established and well-functioning. There is also a lack of a nationwide credit risk information database (CRD), credit risk assessment and credit scoring of SMEs.[3] Likewise, there is a lack of a legal framework to promote alternative finances and diversified financial markets, ranging from factoring, venture capitals, equity funds etc.

3. FINANCIAL DEVELOPMENT AND FIRM GROWTH: LITERATURE REVIEW

There is a considerable amount of literature that has highlighted the positive impact of a country's financial development on economic growth. A large body of research highlighted that a well-developed and better functioning financial system supports faster economic growth (King and Levine 1993; Demirguc-Kunt, Laeven and Levine 2004; Demirguc-Kunt and Peria 2010; Leon 2015a). Development of the financial sector increases the overall efficiency of the financial institutions. A developed financial system reduces transaction costs, information asymmetries, market frictions and pool-risk, which could stimulate economic growth by mobilizing savings and facilitating investment in an efficient manner.

For micro-enterprises there is evidence of similar types of finance-growth links. Ayyagari, Demirgu¨c¸-Kunt and Maksimovic (2010) find that bank finance is associated with faster firm growth, while informal finance is not. Beck, Liping and Rudai (2015) show that access to external finance is positively associated with the decision to become an entrepreneur and initial investment. Though there is evidence that informal finance also facilitates firm growth, there is a large body of literature that argues that it is the formal finance that facilitates faster firm growth. Fafchamps and Schündeln

[3] There is a successful example of such a database in Japan, the Credit Risk Database (CRD) of the CRD Association. The purpose of the CRD is to mitigate information asymmetry between SMEs and lenders (or guarantors) and contribute to the provision of funds based on the appropriate pricing. Japan's credit guarantee corporations (CGCs), the main members of the CRD, have used the CRD scoring models created since April 2006. Given that the number of SMEs in Japan is around 4 million, the database contains information on a full three-quarters of the enterprise population (Kuwahara et al. 2016).

(2013) argue that bank availability is critical for certain firms, sectors, and locations at the initial stages of industrial development.

SMEs in developing countries face severe information asymmetries due to a lack of formal financial statements, which hinders credit availability from formal financial institutions (Beck, Liping and Rudai 2015) and therefore firms opt for informal finance. Financial development may reduce such information asymmetries by making financial products and services more accessible to firms. Moreover, financial development may increase competition among banks in a particular area in terms of attracting borrowers, which might facilitate firms' easy access to credit (Berger et al. 2004; Love and Peria 2015). At the same time, it might increase credit default risk as banks remain less compliant to borrower selection. Therefore, the distribution of credit across firms is affected by the asymmetry of information. As Yoshino and Taghizadeh-Hesary (2018) show, due to asymmetry of information, SME borrowers are charged higher interest rates and consequently have a lower volume of loans and therefore the SME loan supply curve takes a backward binding shape. It is also evident from the INSPIRED survey 2013 that SMEs in Bangladesh have been paying a 6−7% higher interest rate than the market rate.

Leon (2015b), by analyzing firm level data covering 70 developing and emerging countries, shows that bank competition alleviates credit constraints, and bank competition not only leads to less severe loan approval decisions but also reduces borrowers' discouragement. However, bank concentration measures are not robust predictors of a firm's access to finance. Financial development generates interbank competition, which is important for three reasons (Leon 2015a): for efficient functioning of financial intermediaries and markets; for firms' and households' access to financial services; and for stability of the financial system. Moreover, competition among financial institutions allows for diversifying products and lending to firms that might help firms to grow. Local level financial development that relies on financial concentration—either formal banking or semi-formal agent or mobile banking concentration, might influence the volume as well as the price of credit (Chauvet and Jacolin 2017). Owen and Pereira (2018) show that greater bank concentration is associated with more access to deposits and loans, provided that market power is limited. Beck and Demirgüç-Kunt (2006) argue that the distribution of credit across firms has important effects on the industrial structure, competition, or the degree of informality in the sector, particularly in low-income countries.

4. THEORETICAL FRAMEWORK AND EMPIRICAL ILLUSTRATION

4.1 The Model

This section provides the theoretical background of the paper for showing the relationship between the number of bank branches and the loan demand and supply.

Eq. 1 shows the bank's profit equation, where π^B denotes bank's profit, r_l denotes bank's lending interest rate, L^s is the amount of bank loan, ρ is probability of default of bank loans which is a function of number of branches (b). The higher the number of bank branches, the better will be their monitoring of SMEs' performance. Hence this will reduce the asymmetry of information resulting in a lower default risk of bank loans, as more loans will go to SMEs with higher creditworthiness and less loans to risky SMEs. r_d denotes the deposit interest rate, d is the amount of deposits that banks receive and C denotes the total costs of the bank, which is a function of loan supply,

number of branches, and the amount of deposits. For simplicity, we are assuming that supply of loan is equal to deposits and the capital of bank is zero and banks keep all of their assets in the form of loans and all of the banks' debts are in the form of deposits.

Bank's profit equation: $\pi^B = r_l L^s - \rho(b)L^s - r_d d - C(L^s, b, d)$ (1)

Subject to: Balance Sheet of Bank $L^s = d$

Bank's cost function: $C(L^s, b, d) = c_1(L^s)^2 + c_2(b)^2 + c_3(d)^2 + c_4(d * L^s)$ (2)

Eq. 2 shows the bank's cost equation, substituting $C(L^s, b, d)$ from Eq. n 2 in Eq.1 results in Eq.3.

$$\pi^B = r_l L^s - \rho(b)L^s - r_d d - [c_1(L^s)^2 + c_2(b)^2 + c_3(d)^2 + c_4(d * L^s)] \quad (3)$$

Earlier, we assumed that loan supply is equal to deposit, therefore we rewrite Eq.3 as per Eq.4:

$$\pi^B = r_l L^s - \rho(b)L^s - r_d L^s - [c_1(L^s)^2 + c_2(b)^2 + c_3(d)^2 + c_4(d * L^s)] \quad (4)$$

Next, we follow the profit maximization behavior of the bank and get the first order condition of π^B with respect to L^s:

$$\frac{\partial \pi^B}{\partial L^s} = (r_l - \rho(b) - r_d) - 2c_1(L^s) + c_4 * d = 0 \quad (5)$$

By writing Eq. 5 for L^s we obtain the bank's loan supply equation in Eq. 6:

$$L^s = \frac{1}{2c_1}(r_l - \rho(b) - r_d) + \frac{c_4}{2c_1} d \quad (6)$$

In the next part of this section we look at the firm's (SME) behavior in order to obtain the loan demand equation. Eq. 7 shows the SME (borrower) production function:

$$Y = F(N, K) = F\big(pop, K(\rho, b)\big) \quad (7)$$

Where Y is the total output of SME, $N\ and\ K$ are labor input and capital input of the SME. Labor input is equal to population (pop) and capital is a function of default risk and number of bank branches. Next, we write the production function in the form of the Cobb−Douglas production function as in Eq. 8:

$$Y = (pop)^{\alpha}\big(K(\rho, b)\big)^{1-\alpha} \quad (8)$$

In the next step, we write the profit equation of the firm (SME) as in Eq. 9

$$\pi^F = P.Y\big((pop)\ \big(K(\rho, b)\big)\ \big) - w.pop - r_l.K \quad (9)$$

where π^F denotes the firm's (SME) profit, where P is the price of the firm's product, and w is the wage rate. We are assuming that the capital of the firm is only coming from a bank loan, ($L^d = K$) then we can rewrite Eq. 9 as in Eq. 10:

$$\pi^F = P.Y\Big((pop)\ \Big(L^d(\rho, b)\Big)\Big) - w.pop - r_l.K \quad (10)$$

The firm is maximizing the profit, hence we get the first order condition of π^F with respect to L^d and write it as in Eq. 11:

$$\frac{\partial \pi^F}{\partial L^d} = P.(1-\alpha)\frac{\mathrm{Y}\left((pop)\,(K(\rho,b))\right)}{K} - r_l = 0 \tag{11}$$

By writing Eq. 11 for L^d we obtain the loan demand equation (Eq. 12):

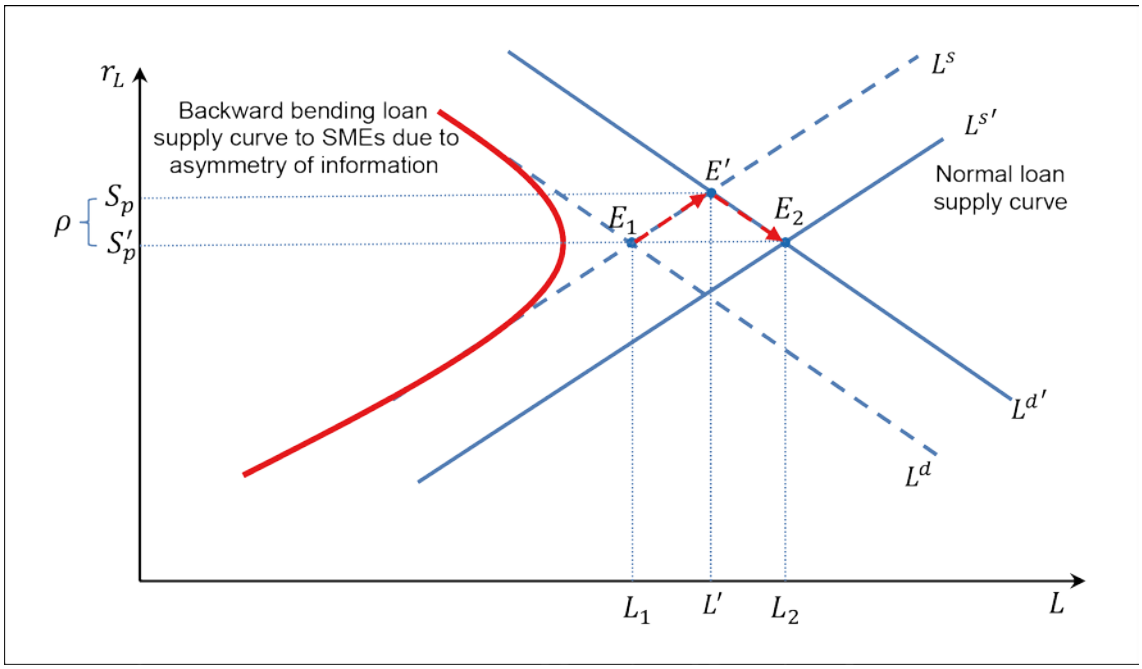
$$L^d = \frac{P.(1-\alpha).\mathrm{Y}\left((pop)\,(K(\rho,b))\right)}{r_l} \tag{12}$$

Or for simplicity as in Eq. 13

$$L^d = -\beta r_l + \gamma(1-\alpha)\{\, a_1(pop), a_2(\rho), a_3(b)\} \tag{13}$$

The loan demand and supply functions in Eq. 6 and Eq. 13 can be explained in Figure 1 as follows. As a bank branch becomes closer to an SME, the asymmetry of information about the borrower will be reduced, which will in turn change the backward-bending shape of the loan supply curve into an upward sloping normal supply curve. This process will help reduce the interest rate and increase the supply of the loan amount with decreased default risk. As Figure 1 shows, if loan demand increases because of a shift of the loan demand curve due to an exogenous policy shock, the bank will charge a higher interest spread (Sp: $(r_l - \rho - r_d)$), considering a positive default risk premium $\rho > 0$. Thus, the equilibrium point will shift from E_1 to E'. According to our assumption, if $\rho = 0$ with policy shifts such as local financial development and subsequent financial inclusion, the loan supply curve will shift to the right, then a new equilibrium E_2 will emerge. In the new equilibrium point, the bank will charge the usual spread, and therefore demand for SME loans will thus increase.

Figure 1: SME Loan Supply Function with Asymmetry of Information and Normal Loan Supply



Source: Authors' compilation.

4.2 Empirical Illustration: SME Loan Demand and Supply Function

In this section we attempt to estimate the loan supply (Eq. 6) and loan demand (Eq. 13) functions from the survey data. For empirical illustration, the Eq. 6 and Eq. 13 are simplified in the following regressions, respectively in regression equations Eq. 14 and Eq. 15.

$$L^s = \alpha_0 + \alpha_1 d + \alpha_2(r_l - \rho - r_d) + \varepsilon_s \quad (14)$$

$$L^d = \beta_0 + \beta_1 Pop - \beta_2(r_l) - \beta_3(\rho) - \beta_4(b) + \varepsilon_d \quad (15)$$

where L^s and L^d represent loans supplied by banks and demanded by the SMEs. In Eq. (14), d represents the amount of deposits in a *thana*[4] and $(r_l - \rho - r_d)$ represents the interest spread. r_l, r_d and ρ represent the lending interest rate, deposit interest rate and default risk premium, respectively In Eq. (15), Pop represents population density in a *thana*.

In order to test our argument empirically, we run a seemingly unrelated regression (SUR) model to estimate loan demand and supply functions simultaneously. As the information on deposits of the firms is not available in the survey data, we estimated the loan supply function using the collateral requirement instead of deposit without loss of generality. We use the amount of outstanding loan of the firm as loan (L) and the interest rates (r_l) of their last loan. For the deposit rate r_d we consider the national average of deposit rates. Due to unavailability of default loan data of the banks across *thanas*, the default risk premium (ρ) is assumed to be the difference between the SME loan rate (reported by SMEs) and the national average lending rate (which is also assumed a risk-free rate) (Table 2).

Table 2: Estimates of Interest Rate Parameters

	r_l	r_d	R_l	ρ
Average rate (Year = 2012)	16.12% (min=9%; max: 22%)	10.22%	13.94%	2.18% (min: –4.94 and max: 8.06)

Note: r_l: SME lending rate estimated from firm survey in 2012; r_d: National average of deposit rate in 2012; R_l: National average of lending rate in 2012; ρ: Estimated default risk premium ($r_l - R_l$).

The results of the SUR are reported in Table 3. Two model specifications are estimated with or without bank branch growth in the demand function just to check the robustness of the results. The results show that the coefficient on spread is positive and significant to the loan supply to SMEs. A 1% increase of spread will increase the supply of SME loans by about 10.0%, which is the reflection of the backward-bending shape of loan supply function as shown in Figure 1. The coefficient on credit default risk rate is negative and significant on loan demand, implying that a 1% increase of default risk premium decreases loan demand by 0.30% (as log (ρ) is used, therefore 14% of ρ is about 0.30% from Table 2. Similarly, higher interest rate has also negative and significant impact on loan demand.

[4] A *thana* is a lower level of administrative unit having at least one police station and thousands of households. In rural areas, a *thana* has a small town with around 100 villages. The average area of a *thana* in our sample is about 147 sq. km. The number of *thanas* in a district ranges between 10 and 300. The main big cities have a higher number of *thanas*.

Table 3: Estimates of Loan Demand and Supply Functions

		Model-1	Model-2
Loan Supply function			
	Collateral (Yes=1, No=0)	0.03 (0.066)	0.03 (0.075)
	Spread (r_l-ρ-r_d)	0.10 (0.033)***	0.10 (0.028)***
	Const.	7.20 (0.11)***	7.19 (0.11)***
	Chi-square (χ^2)	7.53***	7.58***
Loan demand function			
	Log (population density)	0.002 (0.01)	0.003 (0.02)
	Bank branch growth rate (2010–2012)	–	0.07 (0.21)
	Log (ρ)	–0.14 (0.04)***	–0.15 (0.04)***
	Log (1/r)	–0.44 (0.17)***	–0.45 (0.17)***
	Constant	6.38 (0.359)***	6.35 (0.11)***
	Chi-square (χ^2)	5.93**	6.02**
Observations		610	610
R-square		0.03	0.04

Note: Here information on lending interest rates is available only for 610 firms out of the total of 1084 firms.
Source: INSPIRED Survey data, 2013.

5. EMPIRICAL ESTIMATION STRATEGY, DATA, AND VARIABLES

It is quite a challenge to analyze the impact of local financial development on firm performance in a cross-section setup. The link between access to finance and firm performance is subject to omitted variable bias or reverse causation, since banks are expected to lend to firms with high performance and prospects. Therefore, there exists a simultaneous causality, and the bank branch placement suffers from endogeneity biases. There are several ways to tackle endogeneity biases. Instrumental variable (IV) regression is one of the options. However, it is a daunting task to find a valid instrument that is closely associated with bank branch expansion but not with firm performance as both types of firms intend to maximize profit. Therefore, we follow an identification strategy and an estimation approach that is similar to that of Fafchamps and Schündeln (2013). It is possible that firms with poor performance in locations are less likely to be constrained of formal finance. High performing smaller firms are usually constrained by finance. Therefore, high performing firms are in need of finance and thus are affected by poor financial development in their location. This is our key identification strategy. Based on this assumption, we devise a testing strategy that relies on an interaction between a high-performing firm and bank branch. As already mentioned, if a bank comes closer to a firm which is in need of finance, it might facilitate its access to finance by overcoming the asymmetry of information about the firm. Assuming that B_k represents access to a bank in *thana k* at a given time *t,* and C_{ijk} represents a financially constrained but high performing firm i in sector *j* in *thana k*. Therefore, the interaction term B_k*C_{ijk} enters into the model to assess the role of financial development in a locality on firms performance as follows:

$$Y_{ijk} = \beta\,(B_k * C_{ijk}) + \gamma X_{ij} + \delta D_k + m_{ik} + \mu_j + \varepsilon_{ijk} \quad (16)$$

where Y_{ijk} denotes a vector of firm performance taking firm *i*, in industry *j* in a subdistrict *k*. X_{ijk} is a set of firm-level characteristics. D_k is a set of thana-level characteristics including population density, distance to the capital city, access to sanitation, electricity, poverty etc. α, β, γ and δ are unknown parameters to be estimated, and ε_{ijk} is a zero-mean disturbance term representing unmeasured determinants of Y_{ijk} that vary across firms. It is to be noted that firm performance is also affected by unobserved firm-level heterogeneity m_{ik} and *thana* heterogeneity μ_j.

We expect a positive coefficient β as evidence for a positive effect of local financial institutions on Y_{ijk}. A positive β implies that the relative difference between a high-performing firm and a low-performing firm located in a *thana* with good financial development is larger than the difference between firms located in a less financially developed *thana*. In the empirical analysis, we mainly use the level of gross value added to determine C_{ijk}. We consider C_{ijk}=1 if it exceeds the mean gross value added and C_{ijk}=0 otherwise. We also investigate the robustness of our results to the use of different measures of firm performance, such as growth in sales, output, labor productivity, and employment. We also consider several measures of B_k. For example, as a measure of bank access, B represents the log of the total number of bank branches in a thana in year 2012. Therefore, the interaction measures the performances of high performing firms when they are associated with bank branches. As alternative measures of bank access, we consider banks per capita, banks per square kilometer and bank branch growth over 2010-2012[5]. All the measures seek to control for transaction costs and asymmetry of information between banks and customers (firms).

5.1 Data and Variables

5.1.1 The Data Sources

The data used in this study come from three sources. Firm-level data comes from the INSPIRED Survey of Manufacturing SMEs in Bangladesh, conducted in 2013. Financial development data are collected from Bangladesh Bank, the central bank of Bangladesh. Subdistrict level geographical data are extracted from the Household Income and Expenditure Survey (HIES), round 2010 (BBS 2010) with extrapolation for 2011 and 2012, taking consideration of the changes of variables between HIES 2005 and HIES 2010 (BBS 2005/2010). A brief description of the data and variables from the three sources is given below.

The INSPIRED Project of the European Union conducted this survey for the Ministry of Industries, Bangladesh. This is the latest survey that collected information on SME manufacturing firms from 13 districts of 5 administrative divisions of Bangladesh. The sample consists of 609 micro firms (10−20 employees), 414 small firms (25−99 employees) and 177 medium-sized firms (100−250 employees). The target population for the SME survey is defined by all the enterprises (manufacturing) of International Standard Industrial Classification of All Economic Activities (ISIC, Rev. 4), with 10 to 250 employed persons and currently having an industrial connection to the electricity supply companies in Bogra, Chittagong, Dhaka, Khulna, Rajshahi, Sylhet and their industrial belts. The sampling frame for this reference population was extracted from the billing lists of the nine electricity suppliers covering these geographic areas. After these procedures, the INSPIRED Business Register (IBR) was established

[5] Average growth of branch during 2010−2012 is estimated at 8.08%, while the growth between 2011 and 2012 was only about 3%. We wanted to capture the impact of relatively higher levels of local financial development and hence we take the difference between 2010 and 2012.

with 53,927 companies in the database. IBR includes company information on address, ISIC code, size in terms of employed persons, and geographic location. Finally, the activities corresponding to the 23 divisions were grouped into 9 activity sectors. The survey sample consists of 1,200 companies, which are then selected from the IBR following a stratified random sampling design. Strata are defined as a combination of location (Dhaka; Out of Dhaka), industry (Textiles and clothing; Food and beverages; Paper and printing; Metal-mechanic; Plastic and non-metallic; Repair and installation; Wood and furniture; Chemicals and pharmaceuticals; Leather) and size (employed persons: 10−24 as small; 25−99 as medium; 100−250 as large). The total number of strata is 54. The number of enterprises in each stratum is allocated discretionally according to the requirements of the survey (considering area, size, and sector levels).

Our sample firms are distributed across 72 *thana*s (subdistricts) of 16 districts. Subdistrict-level characteristics are controlled in all of the model specifications in order to control area-specific heterogeneity within the samples. The data included distance to Dhaka (the capital city), electricity coverage, sanitation, drinking water coverage, population density, area size, total population etc.

5.1.2 Description of Variables

5.1.2.1 Firm Characteristics

With regard to firm performance, the key outcome variable used is the log of sales revenue and log of gross value-added (GVA) following Beck et al. (2005) and Harrison, Lin and Xu (2014). Other performance variables included labor productivity (output/GVA per worker), employment, capital stock and profit margin. We consider growth of GVA as a proxy for high performance. Though the survey included 1,200 manufacturing SMEs, we lost information of some 100 firms when they were combined with financial development indicators and locational characteristics due to missing information. Finally, the number of surveyed firms stands at around 1100.

We also control for several firm characteristics. The dummy variable *Association* included to control whether the firm is a member of any trade association or not, including one for being a member and zero otherwise. Labor productivity is estimated as a ratio of output (sales revenue) and GVA over total employees. Other variables considered are: skill ratio (ratio of skilled over unskilled employees), training ratio (ratio over training undertaken over others), average number of hours lost due to power outage in a month, ratio of managers over total employees, etc. The specification also includes nine sector-specific dummy variables, namely textile, food, metal, plastic, wood, paper, repair, chemical and leather to control for sector fixed effects. The summary statistics of the firm characteristics are reported in Table 4.

Table 4 presents the basic descriptive statistics of the data used in this study. Our sample of firms consists of micro- (51%), small- (35%) and medium- (15%) sized formal firms. Only about 10% of firms are outward-looking, exporting either directly or indirectly. Of these, the majority belong to a medium category. Average age of the firms is 12 years and average growth of sales is also about 10.2% in 2011 and 11.5% in 2012. Regarding the legal ownership status of firms, 28% are private limited, 56% are sole proprietorship and 15% are joint venture companies. About 70% of the firms are a member of a business association. Among the sample of firms, 61% currently have a loan, 6% have trade credit, less than 1% has an overdraft facility and 59% of the firms finance part of their working capital using a bank credit.

Table 4: Summary Statistics of Firm-level Variables

Variables	Mean	Std. Deviation	Max.	Min.	N
Sales revenue 2012 ('000 Tk.)	110,052.70	1,829,356.00	60,000,000.00	480.00	1,084
Profit margin	8.41	9.05	40.00	–34.00	1,084
Growth of rev. 2012	11.47	35.77	902.74	–88.89	1,036
Growth of rev. 2011	10.24	23.34	206.33	–80.00	1,000
Access to credit	0.61	0.49	1	0	1,084
Overdraft facility	0.005	0.067	1	0	1,084
Trade credit	0.06	0.22	1	0	1,084
Loan used for working capital	0.59	0.49	1	0	1,084
Outstanding loan ('000 Tk.)	9,471.23	95,087.25	3,000,000.00	0.00	1,084
Interest rate	16.94	8.99	22.00	0.00	680
Fixed asset	83.34	106.29	300.00	5.00	1,084
Duration of activity (years)	11.79	10.28	87.00	0.00	1,084
If member of an association	0.70	0.46	1.00	0.00	1,084
Experience of top manager (years)	17.28	9.47	60.00	1.00	1,084
Top manager if female	0.03	0.18	1.00	0.00	1,084
Total employee per firm	49.24	58.98	250.00	10.00	1,084
Proportion of skilled workers	0.01	0.03	0.10	0.00	1,084
Have formal training program	0.36	0.48	1.00	0.00	1,084
Total capacity utilization	0.07	0.26	1.00	0.00	1,083
Hours of power outage (daily)	1.09	0.29	3.00	0.30	1,083
Skill ratio	1.04	0.82	0	8	1,084
Manager ratio	0.05	0.03	0.004	0.1	1,084
Ratio of trained employee	0.17	0.28	0	1	1,084

Source: INSPIRED Survey, 2013.

5.1.2.2 Local Financial Development Variables

As already mentioned, several local financial development indicators, such as bank branch growth, bank branch per capita and bank branch per sq. km. in a *thana* are considered. Table 5 presents summary statistics of some financial development indicators. There is high heterogeneity across *thanas* on bank density. Except for Dhaka and Chittagong, the situation of bank density in other cities is very poor. On average, there are 16 bank branches within a square km. in a *thana* in Dhaka, 5 in Chittagong and 1 in Rajshahi. There are about 1.7 bank branches per 10,000 population at the *thana* level, which is also concentrated in big metropolitan cities. By looking at the number of accounts, we see that although overall private bank accounts per adult are higher (0.99) than public bank accounts (0.52), the variation is much higher for private banks compared to public banks, indicating better coverage of public banks across districts.

Table 5: Local Financial Development Indicators

Variables: Mean (sd)	2012	2011	2010	N
Bank branch density per sq.km per *thana*	7.16 (21.05)	7.12 (21.05)	7.00 (20.75)	1,084
Bank branch per 10,000 population	1.73 (2.55)	1.71 (2.55)	1.67 (2.51)	1,084
Number of bank accounts (total) per adult	2.0 (2.34)	1.6 (2.80)	1.5 (2.68)	1,084
Number of bank accounts (private banks) per adult	1.50 (1.67)	1.02 (1.78)	0.99 (1.93)	1,084
Number of bank accounts (public banks) per adult	0.524 (0.84)	0.523 (0.85)	0.52 (0.79)	1,084

Source: Bangladesh Bank, Financial Sector Review, various issues.

6. ECONOMETRIC RESULTS

6.1 Output and Gross Value Added

Following the model in Eq. 16, first we estimate the effect of B_k*C_{ijk} on firm gross value added and revenue in 2012 in Table 6. We estimate different specifications for different interaction terms for different bank access variables, such as BC for log (bank branch in 2012), BC1 for log (bank branch per capita), BC2 for bank branch growth over 2010–2012, and BC3 for bank branch per sq. km. As expected, in all the specifications, the coefficient β of the interaction term B_k*C_{ijk} is positive and significant except for BC1. The coefficient of BC1 turns out to be negative because we take the logarithm of bank branches per capita with a greater denominator (population), otherwise it would appear to be positive with a big coefficient. Thus, this positive coefficient implies that fast-growing firms grow more relative to less-performing firms if they are located in *thanas* with the same level of financial development. The effect is strongly significant and large in magnitude, which is consistent with Fafchamps and Schündeln (2013).

Table 6: Impact of Financial Development on Output and Gross Value Added

	(1) Log (GVA)	(2) Log (GVA)	(3) Log (GVA)	(4) Log (GVA))	(5) Log (Revenue)	(6) Log (Revenue)	(7) Log (Revenue)	(8) Log (Revenue)
Variables	**BC**	**BC1**	**BC2**	**BC3**	**BC**	**BC1**	**BC2**	**BC3**
B_k*C_{ijk}	0.343***	–0.164***	3.055***	0.007***	0.300***	–0.151***	3.224***	0.007**
	(0.027)	(0.011)	(0.957)	(0.002)	(0.033)	(0.011)	(0.995)	(0.003)
Assoc. member	0.158**	0.154*	0.257***	0.234**	0.202***	0.193***	0.311***	0.291***
	(0.079)	(0.081)	(0.085)	(0.089)	(0.073)	(0.072)	(0.078)	(0.082)
Have trade lisc.	–0.001	–0.002	–0.001	–0.001	–0.005	–0.005	–0.004	–0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Have office in multiple locations	0.059	0.065	0.097	0.076	0.121	0.131	0.150	0.122
	(0.103)	(0.099)	(0.116)	(0.117)	(0.143)	(0.140)	(0.147)	(0.151)
Top manager's experience	0.005	0.006**	0.007**	0.008**	0.007**	0.008**	0.010***	0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
If top manager is female (1/0)	0.049	–0.059	0.098	0.086	–0.002	–0.096	0.041	0.025
	(0.177)	(0.188)	(0.204)	(0.202)	(0.208)	(0.204)	(0.228)	(0.227)
Power outage (hours in month)	–0.171	–0.126	–0.156	–0.132	–0.112	–0.069	–0.105	–0.068
	(0.110)	(0.112)	(0.109)	(0.108)	(0.124)	(0.123)	(0.118)	(0.117)
Capacity utilization	0.054	0.034	0.108	0.126	0.071	0.042	0.129	0.150
	(0.101)	(0.085)	(0.094)	(0.092)	(0.148)	(0.134)	(0.115)	(0.127)
Skill ratio	0.018	0.001	0.010	0.014	–0.041	–0.056	–0.054	–0.050
	(0.033)	(0.033)	(0.037)	(0.040)	(0.036)	(0.034)	(0.038)	(0.040)
Manager ratio over employee	–16.965***	–15.044***	–28.464***	–30.605***	–21.016***	–18.586***	–30.427***	–32.636***
	(1.446)	(1.425)	(1.734)	(1.565)	(2.281)	(2.006)	(2.098)	(1.928)
Trained employee ratio	0.090	0.087	0.171	0.211*	0.045	0.032	0.105	0.154
	(0.093)	(0.096)	(0.121)	(0.123)	(0.123)	(0.123)	(0.137)	(0.135)
Financial depth of firm (credit/rev)	–0.058***	–0.051***	–0.083***	–0.088***	–0.075***	–0.067***	–0.095***	–0.101***
	(0.014)	(0.014)	(0.012)	(0.014)	(0.017)	(0.017)	(0.015)	(0.017)
Innovation initiatives	0.107	0.056	0.038	0.068	0.272**	0.231**	0.177	0.207*
	(0.086)	(0.086)	(0.090)	(0.098)	(0.112)	(0.112)	(0.107)	(0.119)
Lon(pop den)	–0.084**	–0.044	–0.004	–0.069	–0.109**	–0.073	–0.032	–0.101**
	(0.035)	(0.040)	(0.052)	(0.045)	(0.043)	(0.046)	(0.053)	(0.049)
Log (dis. to Capital city)	–0.073**	–0.054*	–0.035	–0.061**	–0.082*	–0.064	–0.048	–0.079*
	(0.028)	(0.029)	(0.032)	(0.030)	(0.042)	(0.041)	(0.042)	(0.041)

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Table 6 *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log (GVA)	Log (GVA)	Log (GVA)	Log (GVA))	Log (Revenue)	Log (Revenue)	Log (Revenue)	Log (Revenue)
Variables	**BC**	**BC1**	**BC2**	**BC3**	**BC**	**BC1**	**BC2**	**BC3**
Urbanization (%)	0.323**	0.155	–0.041	0.059	0.248	0.109	–0.066	0.049
	(0.144)	(0.143)	(0.177)	(0.149)	(0.235)	(0.224)	(0.248)	(0.228)
Literacy rate	–0.829	0.496	0.854	–0.088	–1.910**	–0.640	–0.226	–1.264
	(0.559)	(0.611)	(0.735)	(0.614)	(0.883)	(0.888)	(0.766)	(0.897)
Electricity coverage (%)	–0.076	0.179	0.153	0.489*	0.773*	0.965**	0.967***	1.332***
	(0.223)	(0.251)	(0.289)	(0.251)	(0.405)	(0.474)	(0.332)	(0.382)
Sanitation (%)	0.710**	–0.017	–0.261	0.060	0.700	0.033	–0.334	–0.017
	(0.333)	(0.258)	(0.351)	(0.281)	(0.539)	(0.480)	(0.507)	(0.526)
Sector dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	11.370	11.569	10.871	11.706	20.463**	20.576**	19.295**	20.156**
	(7.552)	(7.268)	(7.854)	(8.194)	(8.989)	(8.457)	(9.192)	(9.481)
Observations	1,076	1,076	1,076	1,076	1,114	1,114	1,114	1,114
R-squared	0.690	0.708	0.608	0.589	0.638	0.657	0.590	0.573

Notes: Figures in parentheses are robust standard errors adjusted for clusters of *thana*s. *, ** and *** represent statistical significance at the 10% level, 5% level (or better), and 1% level (or better), respectively. Nine sector dummies, such as textiles and clothing; food and beverages; paper and printing; metal-mechanic; plastic and non-metallic; repair and installation; wood and furniture; chemicals and pharmaceuticals; and leather were also included to control sector fixed effects.

6.2 Productivity and Employment

To check the robustness of the above findings, next we try to identify the channels that established the relationship between finance and value added growth. The underlying assumption in the finance and growth literature is that access to finance facilitates investment and that this, in turn, generates growth in value added by increasing capital and raising productivity. We first test whether firms with better access to bank finance increase gross value-added per worker, as finance/investment would help raise labor productivity. In the case of investment in labor saving equipment, it is also conceivable that value added rises but output remains unchanged.

The next issue we investigate is what the investment is used for. External finance may nevertheless help firms remain competitive internationally by investing to reduce labor cost and increase output per worker. To investigate this, we estimate model (Eq. 16) using output and employment as dependent variables. Results in Table 7 indicate that bank branch expansion as a proxy for access to credit is associated with a significant increase in both gross value-added per worker, and employment. This exercise is consistent with our theoretical model framework that argues that bank branch expansion increases the demand for loans among the good borrowers (high performing borrowers) that helps raise productivity. The effect, however, is noticeably larger in magnitude and statistically more significant for GVA than it is for employment indicating enhancement of productivity through investment in capital machineries.

Table 7: Local Financial Development, Gross Value Added Per Worker and Employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log (GVA per Worker)	Log (GVA per Worker)	Log (GVA per Worker))	Log (GVA per Worker)	Log (Employment)	Log (Employment)	Log (Employment)	Log (Employment)
Variables	**BC**	**BC1**	**BC2**	**BC3**	**BC**	**BC1**	**BC2**	**BC3**
B_k*C_{ijk}	0.285***	–0.137***	2.835***	0.007***	0.048***	–0.023***	0.140	0.000
	(0.026)	(0.011)	(0.860)	(0.002)	(0.008)	(0.003)	(0.177)	(0.001)
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thana characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,076	1,076	1,076	1,076	1,114	1,114	1,114	1,114
R-squared	0.297	0.329	0.165	0.126	0.890	0.890	0.885	0.885

Note: Figures in parentheses are robust standard errors adjusted for clusters of *thana*s. *, ** and *** represent statistical significance at 10% level, 5% level (or better), and 1% level (or better), respectively. Firm characteristics, *thana* characteristics and sector dummies were included in the regressions as control factors following Table 6. The results are not reported here to save space.

6.3 Profit Margin and Capital Investment

It is possible that local financial development increases labor productivity because loan recipient firms are likely to be more proactive in increasing the sales revenue and repaying the loan with close monitoring of the lending bank. Another explanation for this result is that SMEs try to make the best use of credit to earn higher returns from investment by reducing labor costs per unit of output and investing in labor saving technologies to increase the value added (Fafchamps and Schündeln 2013). To check this possibility, in Table 8 we further estimate the model (Eq. 16) to see the relationship between finance and profitability as well as investment in capital stock (in percent). We see that access to credit increases the profit margin of the firms, but it is not very likely that they invest in increasing capital stock (Cols. 5-8). Only in one specification (BC3) we find that if a bank branch is located within a sq. km. it might facilitate investment in capital stock, which might help increase labor productivity.

Table 8: Profit Margin and Capital Stock from Foreign Sources

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Profit Margin	Profit Margin	Profit Margin	Profit Margin	% Capital Stock	% Capital Stock	% Capital Stock	% Capital Stock
Variables	**BC**	**BC1**	**BC2**	**BC3**	**BC**	**BC1**	**BC2**	**BC3**
B_k*C_{ijk}	0.810***	–0.442***	9.614*	–0.003	0.615	–0.136	19.484	0.102*
	(0.228)	(0.094)	(5.201)	(0.020)	(0.617)	(0.292)	(12.143)	(0.058)
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thana characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	29.817	30.157	26.347	29.830	482.098**	481.185**	472.101**	474.671**
	(72.745)	(74.041)	(74.875)	(74.669)	(206.603)	(206.997)	(205.877)	(205.689)
Observations	1,114	1,114	1,114	1,114	819	819	819	819
R–squared	0.075	0.083	0.064	0.059	0.131	0.130	0.133	0.132

Note: Figures in parentheses are robust standard errors adjusted for clusters of *thana*s. *, ** and *** represent statistical significance at 10% level, 5% level (or better), and 1% level (or better), respectively. Firm characteristics, *thana* characteristics and sector dummies were included in the regressions as control factors following Table 6. The results are not reported here to save space.

6.4 Finance-Growth Nexus

To investigate the finance-growth nexus, we next re-estimate the model by assuming that a bank branch at the initial level $B_{k(-1)}$ will facilitate growth of output and gross value-added of the high-performing firms. As we have revenue and labor data for the preceding year 2011 and bank branch stock in 2011 at the *thana* level, we first estimate the interaction between log (bank branch in 2011) and C_{ijk} and then regress on output and GVA growth. The results in Table 9 show that access to credit in an earlier year facilitates the growth of both output and GVA of the high-performing firms, but the latter at a higher magnitude.

Table 9: Growth of Output and GVA

Variables	(1) Output Growth	(2) GVA Growth
$B_{k(-1)}*C_{ijk}$	0.007*	0.042***
	(0.015)	(0.067)
Firm characteristics	Yes	Yes
Sector dummy	Yes	Yes
Thana characteristics	Yes	Yes
Constant	–3.883**	–9.487**
	(1.583)	(4.746)
Observations	1,066	977
R-squared	0.028	0.034

Notes: Figures in parentheses are robust standard errors adjusted for clusters of *thana*s. *, ** and *** represent statistical significance at 10% level, 5% level (or better), and 1% level (or better), respectively. Firm characteristics, *thana* characteristics and sector dummies were included in the regressions as control factors following Table 6. The results are not reported here to save space. Here $B_{i(-1)}$ represents a one-year lagged bank branch in 2011.

6.5 Thana-Level Aggregate Analysis

Next, we attempt to assess the role of financial development on thana-level aggregate output and GVA as well as aggregate GVA and output per worker. For this exercise, we take the sum of output and GVA as well as employees of all sample firms in a *thana.* Similarly we recalculate C_k based on aggregate GVA. We show the results of the estimates considering the interaction B_k*C_k. The results reported in Table 10 show that the thana-level bank branch stock significantly improves aggregate GVA and output. But its effect on GVA per worker is marginally significant and insignificant to aggregate output per worker. This finding indicates that firms invest in technology marginally, which improves aggregate GVA per worker marginally, leaving aggregate output per worker unchanged. This finding is consistent with the findings in Tables 7 and 8 that with access to external finance, SMEs try to invest in technologies, albeit marginally, which improves gross value-added per worker.

Table 10: Thana Level Aggregate Output, GVA and Labor Productivity

Variables	(1) Log (agg_gva)	(2) Log (agg_gva_w)	(3) Log (agg_out)	(4) Log (agg_out_w)
B_k*C_k	0.517***	0.174*	0.403***	0.063
	(0.093)	(0.088)	(0.081)	(0.047)
Firm-level characteristics	Yes	Yes	Yes	Yes
Thana-level characteristics	Yes	Yes	Yes	Yes
Sector dummy	Yes	Yes	Yes	Yes
Constant	22.379***	13.447***	18.469*	7.519
	(8.129)	(5.026)	(10.874)	(5.515)
Observations	1,023	1,023	1,114	1,114
R-squared	0.626	0.260	0.635	0.292

Note: Figures in parentheses are robust standard errors adjusted for clusters of *thana*s. *, ** and *** represent statistical significance at 10% level, 5% level (or better), and 1% level (or better), respectively. Firm characteristics, *thana* characteristics and sector dummies were included in the regressions as control factors following Table 6. The results are not reported here to save space.

7. CONCLUSIONS

In this article, we examine whether and to what extent local financial development facilitates access to finance and firms' performances. First, we have developed a theoretical model based on banks' and firms' profit-maximizing behavior. The model shows that bank branch network expansion reduces the probability of default risk by minimizing the asymmetry of information between borrowers (SMEs) and lenders (banks) and therefore enables access to loans to relatively good performing SMEs at relatively lower costs. Our initial empirical estimation of SME loan demand and supply functions corroborates the findings that a decrease of default risk increases the demand for loans by SMEs. In the next step of our analysis, we examine whether an increase in bank branch has positive impact on firms' performances. We find that bank density has a positive and significant impact on firm output, gross value added and to some extent labor productivity. The robustness of the results is confirmed by assessing the role of bank branch network per capita and per square kilometer too and their impact on various firm performances, such as employment, capital stock, profit margin and output and GVA growth. In addition, we examine the role of financial development in a *thana* on aggregate output and GVA as well as aggregate-level productivity. Combining both the results, it may be concluded that an increase in bank branches might reduce asymmetry of information and increase relationship between banker and customer that might decrease the probability of loan default risks, which in turn facilitates easy access to loans for good SMEs. For the analysis, we have combined data from three sources, such as data from a recent survey of manufacturing enterprises in Bangladesh, data on local financial development as well as on local level area-specific characteristics (subdistrict data). We test the robustness of the results using alternative measures of financial development indicators and firm performances, employing IV regression techniques.

The results confirm that local level financial development matters for firms' access to credit and growth. The results of this study are in line with a slew of recent literature, which comes across from both cross-sector and cross-country studies and underlines how financial development favors firm performances. Analyzing disaggregated subdistrict level financial development and SME performances, this study makes some contribution to the strands of research that deal with within country variations of local financial development and firm performances. For policy purposes, the findings of this study underscore the need for expansion of bank branches at -subdistrict level outside metropolitan cities in order to enhance better access to credit for SMEs and their growth opportunities. This will be a win−win situation for both banks and SMEs, as bank branch network expansion is likely to reduce default risk as well as borrower monitoring costs. On the other hand, firms will get credit at a lower rate than before as the rate will be free from default risk premium. As a result, bank branch network expansion promotes local financial development that appears to be conducive to firm growth. Therefore, the findings of this study corroborate the finance−growth nexus at the firm-level and call for specific plans and incentive mechanisms for formal banks to enhance and expand their services to more subnational disaggregated levels.

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