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The Effect of Accessibility to Bank Branches on Small- and Medium-Sized Enterprise Capital Structure: Evidence from Swedish Panel Data

Cynthia Sin Tian Ho and Björn Berggren *

Business Administration, KTH Royal Institute of Technology, 100 44 Stockholm, Sweden; cynthiaho711@gmail.com
* Correspondence: bjorn.berggren@abe.kth.se

Abstract: This paper aims to investigate the effects of accessibility to bank branches on the capital structure of small- and medium-sized enterprises (SMEs) by analysing the change in three different leverage measures (total, short-term and long-term leverage). The analysis was conducted using random effects models on two data samples. The full sample consisted of 19,064 SMEs while the other sample used to estimate the long-term leverage consisted of 8707 SMEs over two years, 2007 and 2013. The results show that the distance to the nearest bank branch has a negative relationship with total leverage and short-term leverage but a small positive relationship with long-term leverage. An interesting result from the robustness test shows that the distance to the nearest bank negatively affects the long-term leverage of SMEs in rural areas. SME owners and policymakers may benefit from this research amidst the changing banking landscape; policymakers can help increase access to other types of funding for SMEs in bank deserts by increasing the volume of governmental loans. To the best of the authors' knowledge, the distance to the nearest bank branch office has not been examined in the earlier literature as a determinant of the leverage of SMEs.

Keywords: SMEs; capital structure; bank branch; leverage; bank loans; proximity; Sweden

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1. Introduction

One of the most important trends shaping the financial landscape in most Western economies over the past decades is the rapid decline in the number of local bank branches (Backman & Wallin, 2018; Dallerup et al., 2018; Discanno, 2024). The dismantling of the physical banking infrastructure has been particularly far-reaching in the Nordic countries (Ho, 2021). The rate of transformation in Sweden has been rather dramatic as the number of bank branches has declined by more than 50% since 1990, which makes Sweden an interesting case to analyse (Ho & Berggren, 2020). One reason for the high rate of bank branch closures in Sweden was the advent of Internet banking and the high rate of uptake of digital services (Ho & Berggren, 2020; Laukkanen & Pasanen, 2008; Waite & Harrison, 2015; Di Febo & Angelini, 2022). Another important factor was the development and use of different types of credit-scoring solutions (Almeida et al., 2017; Onay & Öztürk, 2018). A third major factor influencing the closure of local bank branches was the COVID-19 pandemic (Higgs et al., 2022; Pham et al., 2022; Silva et al., 2023).

Recent research indicates that the relationship between SMEs and banks can be better understood as multidimensional (Norberg, 2016). This means that depending on the type of bank service, the degree of both transaction-based and relationship-based elements

differs. Norberg (2016) finds that particularly for bank loan services, the degree of both transaction-based and relationship-based elements is high despite the increasing reliance on credit-scoring models. In Norberg (2016), interviews with 10 SMEs in Sweden were conducted, and the relationship-based elements that were found to be valuable in obtaining a loan from the bank were qualitative information, personal contacts in the bank to establish and maintain trust, a long-term exchange, proximity and familiarity. These relationship-based elements characterise relationship lending, which is a type of lending technology based on soft qualitative information that relies heavily on building relationships between the borrower and the bank (Berger & Udell, 2006; Zhao et al., 2023).

Hence, the rapid decline in the number of local bank branches might pose challenges to relationship lending, owing to the increased physical distance between SMEs and banks. Some bank services such as payments, deposits and currency exchange might transfer without problems to a digital environment (Williams et al., 2008). However, there might be problems in performing credit risk assessments, exchanging qualitative information and giving advice as these tasks are more difficult to conduct digitally due to the higher costs of the transmission of information (Lundberg, 2019; Waite & Harrison, 2015; Fasano & Cappa, 2022).

From the banks' perspective, relationship-lending techniques include gathering and analysing soft information, that is, information that cannot be easily found in annual reports and other quantitative material (Agarwal & Ben-David, 2018). In addition, having a foothold in the local context allows the loan officer to obtain access to other sources of information, such as, for instance, by participating in various events and organisations at the local level (Silver, 2001). Previous studies (Ono & Uesugi, 2009; Udell, 2008) have highlighted the importance of the entrepreneurs' perspective in relationship lending. From the viewpoints of entrepreneurs in opaque young and small ventures, relationship lending based on soft information is more suitable than transaction lending as they lack hard information due to a lack of a track record. Through relationship lending, positive signals about entrepreneurship and soft information transfer through a variety of interactions with the bank over time (Berger & Udell, 2002). Examples of positive signals from the firm include ownership of intellectual property, provision of collateral and media coverage that emphasises the competence of the entrepreneur (Carter, 2006; Markman et al., 2001).

Previous research has revealed that new firm formation is negatively affected by an increased distance to a local bank branch (Ho & Berggren, 2020). The effects were particularly severe for firms in industries with few or no tangible assets. As startups lack a track record, these conclusions are not altogether surprising (Agnese et al., 2018; Cressy & Olofsson, 1997). A relationship strategy could mitigate the effects of having few tangible assets and a lack of a track record. However, the relationship strategy becomes harder to carry out with an increased distance to the bank branch.

In general, going concerns have more assets and a longer track record in comparison with startups. Even so, an increased distance due to bank branch closures will make information exchange more problematic, as previous research has indicated (Kärnä et al., 2020; Nguyen, 2019). Furthermore, Bonfim et al. (2021) show in their research that when bank branches close, potentially valuable information on borrowers is lost. Moreover, the firms that were customers in bank branches that have been closed will receive higher interest rates on their new loans (Bonfim et al., 2021).

As there are very few studies (Kärnä et al., 2020; Nguyen, 2019) on the importance of the proximity of banks for the leverage of SMEs, the purpose of this paper is therefore to investigate the effect of the physical distance between SMEs and banks on the leverage of SMEs in Sweden. The measures of leverage are categorised into total leverage, short-term leverage and long-term leverage in this paper. The data in this paper come from the annual reports of all registered Swedish SMEs, and the sample includes 8707 SMEs over two

years—2007 and 2013. The analysis was conducted using the random effects model and produced several significant results. An increased distance between the bank and the firm will negatively affect the total leverage and the short-term leverage but has a small, positive effect on the long-term leverage of all firms. An in-depth analysis showed that in rural areas, which are particularly vulnerable to bank branch closures, an increased distance between bank branches and firms will have a negative impact on long-term leverage as well. These findings are in line with previous research (Kärnä et al., 2020; Nguyen, 2019; Hegerty, 2020) and highlight a problem for the financing of SMEs in the changing financial landscape. The results in this paper should spur a discussion concerning the conditions for SMEs in rural areas in Sweden as well as other Western economies. A lack of financing opportunities could potentially be a major hindrance to the growth of firms and employment outside of metropolitan areas, and ought to therefore be at the top of the agenda of policymakers.

The remainder of this paper is organised as follows. Section 2 presents a literature review related to the financing of entrepreneurship and bank infrastructure. Section 3 outlines the data, variables and empirical models used in this study, while the empirical results and robustness tests are reported in Section 4. Section 5 concludes the paper with a discussion of the key findings.

2. Literature Review

One of the most important issues for any entrepreneur is to find sufficient financial resources to fund a sustainable business (Birley, 1985). Therefore, it is not surprising that how SMEs handle their finances is one of the perennial issues within entrepreneurship research, as the majority of new jobs are created within the SME sector (Berger & Udell, 2006; Landström, 2017). In Sweden, more than 99 percent of all registered firms belongs to the SME sector, and more than four out five new jobs since 1990 have been created by SMEs (Yazdanfar & Öhman, 2018). Moreover, SMEs dominate the most vibrant part of the Swedish economy—the service sector.

Over time, several rival explanations for the financial strategies among firms have been proposed (de Jong et al., 2011). The classical irrelevance theorem formulated by Modigliani and Miller (1958, 1963) suggests that a firm's value is not related to the capital structure of the firm. The assumptions made by the authors, including perfect capital markets and no transaction costs, make the model less relevant in understanding the financing of firms, especially SMEs (DeAngelo & DeAngelo, 2006). In reality, the capital markets surrounding small firms are not perfect and are characterised by agency costs, information asymmetries and informationally opaque firms (Berger & Udell, 2006; Jensen & Meckling, 1976).

Another strand of research, mostly based on empirical observations of how entrepreneurs make decisions in financial matters, has furthered our understanding of the financing of SMEs (Michaelas et al., 1999). This strand has been called the pecking order theory of finance, which has been tested and developed over the past decades in entrepreneurial research (Mac an Bhaird & Lucey, 2010; Howorth, 2001). In its original form, it states that firms have a stable order of preference for the financing of investments in that retained earnings are preferred over short-term debt, which in turn is preferred over long-term debt (Myers & Majluf, 1984). If credit is not sufficient, firms will issue new shares (Myers & Majluf, 1984). Empirical evidence indicates that the pecking order model is highly relevant in explaining the observed capital structure among SMEs (de Jong et al., 2011; Serrasqueiro & Caetano, 2015).

Over time, the original pecking order theory has been developed and modified. The truncated pecking order, put forward by Howorth (2001), indicates that most entrepreneurs may be unwilling to issue new shares, and a rejected loan application from the bank may therefore result in investments not being undertaken (Vaznyte & Andries, 2019). However,

another modification was put forward by Paul et al. (2007), the bridged pecking order, which states that some firms, especially growth-oriented firms, may choose equity over debt regarding the financing of investments. The bridged pecking order is in line with Vanacker and Manigart (2010), who argued that small firms do not seem to follow a pecking order of preferences due to information asymmetries and the perception of investors towards small firms as "riskier bets". Hence, for small firms, the pecking order may be reversed, with the highest preference for equity compared to other forms of financing. Firms may then turn to banks when they have difficulty securing venture capital (VC) funding, especially in rural regions where VC is not readily accessible.

Previous studies using Swedish data have indicated that SMEs tend to use more short-term debt than long-term debt to finance their operations, which is in line with the pecking order theory (Yazdanfar & Öhman, 2015a). This finding is also in line with other international studies that have indicated that SMEs are more dependent on overdrafts and other types of short-term lending in comparison with large firms (Psillaki & Daskalakis, 2009). As firms grow and can acquire tangible assets, they might qualify for long-term debt at the bank (Hall et al., 2000).

Physical Distance to the Bank Branch and Leverage in SMEs

As the closures of local bank branches is a widespread phenomenon in several developed countries, the topic has received attention from scholars in countries such as Australia, the UK and the US (Argent & Rolley, 2000; Leyshon et al., 2008; Nguyen, 2019). Previous research has indicated that physical distance does matter regarding the possibility of obtaining financing for SMEs (Degryse et al., 2017; Kärnä et al., 2020; Lee & Brown, 2017; Nguyen, 2019; Zhao & Jones-Evans, 2017; Discanno, 2024). Geographical proximity is important in forging a long-term trusting relationship between banks and firms, and the closure of bank branches can have a disruptive effect on lender-specific relationships that have already been formed (Nguyen, 2019; cf. Khatib et al., 2022). More specifically, it seems as though an increased distance between the local bank branch and the SME raises problems in a few dimensions for both the bank and the firm seeking financing.

First, the local bank branch is often seen as a hub that gathers and analyses information regarding local businesses and entrepreneurs. Traditionally, local bank branch managers have been active in different networks, thereby gaining access to a variety of sources of information. With the dismantling of the local financial infrastructure, this function is harder to fulfil, as local knowledge and competence will be lost (Berggren et al., 2010). An increased distance between the bank and the firm will therefore lead to increased costs of information gathering and transmission, as well as inevitably higher agency costs (Degryse & Ongena, 2005). As a result, bank managers might be warier about granting loans to companies located farther away, resulting in lower short-term and long-term leverage for distant firms.

Second, even though credit scoring models of various types have been around for at least 50 years (Marron, 2007), the past decades have witnessed an increased use of these models in the credit risk assessment process of SMEs (Altman & Sabato, 2007). The accuracy of most credit scoring techniques tends to be very high regarding consumer credit and large going concerns (West, 2000; Zhao et al., 2021). The problem with credit scoring models is that they are very dependent on high-quality quantitative information such as financial reports, balance sheets and repayment records (Dietsch & Petey, 2004). The challenge is to forecast the development of young and small firms, as their prospects might be dependent on factors and information that are soft in nature. The problem of incorporating soft information into the credit scoring models used by most banks should therefore not be understated (Fernandes & Artes, 2016; Goel & Rastogi, 2023; Jurado et al., 2024). The risk

is that the banks will reallocate the funds within their portfolio from the SME segment to other, more transparent and easy-to-score segments, such as the mortgage market (cf. Swedish Bankers' Association, 2021). The consequence of this shift is that SMEs in general will have to be more reliant on other forms of financing such as equity, thus reducing their short-term and long-term leverage.

Third, signalling theory is a useful description of two parties' behaviour when they have access to different types of information (Connelly et al., 2011). To convey trust in the bank–SME relationship, visits from the bank to the SME's premises are an important mechanism for conveying and developing trust (Berry et al., 2004). During such meetings, the conversation will be more relaxed, and the quality of the information exchange will most likely be higher (Ibbotson & Moran, 2005). An honest and open conversation will also make it easier for the bank to develop an offer and solution that is more likely to be of use to the SME, for example, the contacts of individuals who can help support the new venture (Lundahl et al., 2009). Hence, an increased distance to the bank branch might be a barrier to quality information exchange and lead to higher monitoring costs, which can lead to firms using less short-term and long-term leverage.

The reasoning above leads to the following hypotheses:

H1a. *The larger the distance between the firm and the bank branch, the less total leverage it will use.*

H1b. *The larger the distance between the firm and the bank branch, the less short-term leverage it will use.*

H1c. *The larger the distance between the firm and the bank branch, the less long-term leverage it will use.*

3. Data and Model Specification

3.1. Data Samples

To test the hypotheses, comprehensive datasets were obtained from Retriever Business, a commercial database that contains detailed accounting information gathered from the annual reports of all registered companies in Sweden. The sample includes all Swedish SMEs in six industries for two years, 2007 and 2013. The six industries include metal, transport, retail trade, consulting, restaurant and construction, which were classified using a one-digit standard industrial classification code. An advantage of the industry mix in the dataset is that it covers capital-intensive, labour-intensive and knowledge-intensive sectors (Yazdanfar & Öhman, 2015b). In line with the definition of an SME from Statistics Sweden, we included firms with at least 1 employee and fewer than 250 employees in our sample (Statistics Sweden, 2018a). The reason for choosing two datasets (2007 and 2013) instead of one is to increase the reliability and robustness of the empirical findings.

Specifically, we selected firms that met the following requirements (cf. Öhman & Yazdanfar, 2017): (i) at least 1 employee and fewer than 250 employees; (ii) total revenue of more than SEK 200,000; (iii) total assets above SEK 100,000; (iv) positive leverage ratio; (v) positive liquidity ratio; and (vi) not included in a bankruptcy process. SMEs with null values were also removed from the sample. Moreover, we removed outliers[2], specifically those with a leverage ratio less than three times the interquartile range (IQR) away from the 25th percentile or more than three times the IQR away from the 75th percentile (Jõeveer, 2013). The total number of SMEs that made up our final dataset was 19,064, for which we investigated the data from two years, 2007 and 2013. Therefore, this resulted in 38,128 observations in a balanced panel dataset.

As this paper also analyses the effects of proximity to banks on the short-term leverage ratio (Leverage_short_term) and long-term leverage ratio (Leverage_long_term), we split the dataset into two samples, since not all SMEs use long-term debt as part of their capital structure. The full sample (Sample_overall) consists of all 19,064 SMEs (38,128 observations), while the other sample (Sample_long_term) consists of 8707 SMEs (17,414 observations) that have a positive long-term debt ratio.

3.2. Variables

The three dependent variables are (1) total leverage ratio (Leverage_total), (2) short-term leverage ratio (Leverage_short_term) and (3) long-term leverage ratio (Leverage_long_term). The reason for studying Leverage_short_term and Leverage_long_term individually apart from Leverage_total is because previous research has shown that total debt masks two opposite effects of short-term and long-term leverage ratios on some of the explanatory variables (Chittenden et al., 1996; van der Wijst & Thurik, 1993).

Following Jõeveer (2013), Kenourgios et al. (2020) and Pinto and Silva (2021), Leverage_total is a broad measure of leverage that is calculated using the ratio of total liabilities to total assets. This broad measure of leverage can also be viewed as a proxy for what is left for shareholders in the case of the liquidation of the firm (Rajan & Zingales, 1995). The short-term leverage ratio is calculated as the ratio of debt repayable within one year to the total assets, while the long-term leverage ratio is calculated as the ratio of total debt repayable beyond one year to the total assets (Ahmed Sheikh & Wang, 2011; Daskalakis et al., 2017; Öhman & Yazdanfar, 2017). All the variables in the current study were based on their book value, following the argument of Myers and Majluf (1984) that book values are proxies for the values of assets in place.

The explanatory variables used are the distance to the nearest bank branch from the target firm (Dist_1), size (Size), age (Age), growth (Growth), profitability (Profitability), liquidity (Liquidity), nondebt tax shield (NDTS) and business risk (Risk). Table 1 shows a summary of the variables.

Table 1. Description of variables.

Construct	Description
Leverage	Book value of total debt/total assets
Leverage_short_term	Book value of short-term debt/total assets
Leverage_long_term	Book value of long-term debt/total assets
Dist_1	Distance from the SME to the nearest bank branch
Size	Net sales
Age in year t	Log (t − founding year of firm)
Growth in year t	Percentage change between net sales in Year t − 1 and net sales in year t
Profitability	EBIT/total assets (ROA)
Liquidity	Current assets/current liabilities
Nondebt tax shields (NDTS)	Depreciation/total assets
Business risk (Risk)	Standard deviation of EBIT over 2 years

Note: t = 2007, 2013.

Dist_1 is calculated as the shortest driving distance from the firm to the nearest bank branch in metres. We assume that this distance variable helps to proxy the approximate distance to its lender bank branch. Like the rationale of Carling and Lundberg (2005), we

made this assumption due to the lack of information in the data; we do not have data on the bank branch office that granted the loan. This assumption also follows the definition of geographical credit rationing. Size is obtained using net sales (Öhman & Yazdanfar, 2017). Age is measured by the difference between the observed year (t = 2007, 2013) and the year the firm was founded (Cole, 2013). Growth is defined as the percentage change in sales (Öhman & Yazdanfar, 2017). Profitability is defined as the quotient between earnings before interest and taxes (EBIT) and total assets (Michaelas et al., 1999; Sogorb-Mira, 2005). Liquidity is measured as the quotient between current assets and short-term liabilities (Mazur, 2007; Panno, 2003). NDTS is defined as the quotient between depreciation and total assets (Clemente-Almendros & Sogorb-Mira, 2018), and Risk is measured as the standard deviation of EBIT over two years (Nguyen & Ramachandran, 2006).

3.3. Descriptive Statistics

In Sample_overall, retail trade makes up the majority (40.7%) of the firms in our sample. The other industries in our sample include transport (24.6%), consulting (20%), restaurants (11.4%), construction (2.3%) and metal manufacturing (1.1%).

Tables 2 and 3 show the descriptive statistics of Sample_overall and Sample_long_term, respectively. In Sample_overall, SMEs have an average Leverage_total of 0.565 and Leverage_short_term of 0.41. However, Leverage_total varies greatly across Sample_overall from a minimum of 0.0004 to a maximum of 1.567. In terms of debt maturity, it is observed that most SMEs employ more short-term liabilities than long-term liabilities, as 54% of the SMEs in Sample_overall do not use any form of long-term liability. The mean Leverage_short_term is 0.41 in Sample_overall as compared to the mean value of Leverage_long_term of 0.28 in Sample_long_term.

Table 2. Descriptive statistics for Sample_overall.

	Number of Observations	Mean	Std. Dev.	Minimum	Median	Maximum
Leverage_total	38,128	0.565	0.248	0.0004	0.574	1.571
Leverage_short_term	38,128	0.41	0.219	0.0004	0.381	1.567
Dist_1	38,128	3911.975	7789.773	3.883	1480.777	248,856.9
Size	38,128	19,500.375	76,436.965	203	5468	6,073,319
Age	38,128	19.204	13.573	1	17	149
Growth	38,128	71.636	4238.824	−98.34	3.31	645,816.7
Profitability	38,128	0.091	0.184	−2.822	0.08	10.193
Liquidity	38,128	2.529	8.659	0.005	1.653	839
NDTS	38,128	0.056	0.074	0	0.028	2.212
Risk	38,128	518.776	3788.744	0	151.321	435,296.3

Table 3. Descriptive statistics for Sample_long_term.

	Number of Observations	Mean	Std. Dev.	Minimum	Median	Maximum
Leverage_long_term	17,414	0.28	0.194	0.00002	0.254	0.837
Dist_1	17,414	4861.901	8799.919	4.806	1963.605	221,614.6
Size	17,414	18,392.364	63,126.399	206	6209.5	3,175,539
Age	17,414	19.883	13.715	1	18	149
Growth	17,414	28.248	691.086	−94.66	3.43	61,700
Profitability	17,414	0.064	0.141	−3.216	0.062	1.629
Liquidity	17,414	2.177	6.178	0.005	1.445	473.854
NDTS	17,414	0.077	0.078	0	0.056	2.016
Risk	17,414	526.294	4728.02	0	161.927	435,296.3

For the distance to the nearest bank branch, there is a large standard deviation of approximately 80 km in Dist_1 in both samples. The maximum of the Dist_1 variable in both samples is very high at more than 200 km (assuming an average driving speed of 60 km/h, it would take slightly more than three hours to reach the nearest bank branch).

To examine possible collinearity problems, we also calculated the global variance inflation factors (VIFs) of the independent variable when evaluated against one another for both samples. Table A1 presents the VIF values between the variables. The variables do not pose the issue of multicollinearity as the VIF values are less than 5 (O'brien, 2007).

3.4. Empirical Model Specification

As the aim of this paper is to estimate the effects of accessibility to bank branches on leverage, we adopted a panel data methodology to test our hypotheses. To determine between a fixed effects model and a random effects model, we calculated the within-variation of the Dist_1 variable in both samples, shown in Table 4. Furthermore, the calculations of the within-variation of Dist_1 were also carried out according to the region types where the firm was situated, i.e., outside urban areas, urban areas or the central town of the municipality.

Table 4. Difference between Dist_1 in 2013 and Dist_1 in 2007 (in m).

	Dist_1 in 2013−Dist_1 in 2007	**Count**	**Mean**	**Std. Dev**	**Min**	**0.25**	**0.5**	**0.75**	**Max**
Sample_overall	Outside urban areas	3283	914.09	11,266.747	−78,359.426	−43.018	0	60.861	221,183.753
	Urban areas	1540	1643.742	5869.534	−45,097.383	0	0	128.102	32,196.413
	Central town of the municipality	14,241	17.526	1080.525	−21,863.995	−21.831	0	19.642	16,079.87
	Total	19,064	303.289	5077.261	−78,359.426	−22.277	0	34.256	221,183.753
Sample_long_term	Outside urban areas	2059	1087.48	10,301.101	−62,389.462	−41.022	0	66.41	221,183.753
	Urban areas	860	1880.34	5854.707	−45,097.383	0	0	128.102	32,076.659
	Central town of the municipality	5788	26.47	1077.111	−21,863.995	−17.322	0	15.704	16,079.87
	Total	8707	460.483	5445.591	−62,389.462	−17.349	0	35.080	221,183.753

From Table 4, we observe little within-variation in the Dist_1 variable on average in both samples. The average within-variation in Dist_1 is the largest in firms located in the urban areas for both samples: 1643.742 m in Sample_overall and 1880.34 m in Sample_long_term. However, the maximum variation in Dist_1 can be observed in the firms located outside urban areas in both samples: 221,183.753 m in both samples. The next-largest variation in Dist_1 is observed in the firms located in urban areas, followed by the firms located in the central town of the municipality.

As it is observed that there are many firms that have no within-variation in the Dist_1 variable, it is unsuitable to use the fixed effects model since the fixed effects model is not able to estimate the effects of a variable with little or no within-group variation (Townsend et al., 2013). Thus, the random effects model is more appropriate in this case. An assumption of the random effects model is that the individual unobserved heterogeneity is constant over time and not correlated with the independent variables. This assumption is plausible in this case, for example, the firm-specific heterogeneity that is fixed over the period and is not related to the independent variables. The random effects model also assumes that the sample used is sampled from a large population, while the fixed effects model assumes that the sample is an entire population of interest, which is not true in our case.

Hence, random effects models are estimated for two years, 2007 and 2013, and are represented as follows:

$$Leverage_{it} = X_{it} \cdot \beta + c_i + u_{it},$$

where $Leverage_{it}$ is the leverage (Leverage_total, Leverage_short_term, Leverage_long_term) of firm i in year t (t = 2007, 2013), and X_{it} represents the eight independent variables, namely Dist_1, Size, Age, Growth, Profitability, Liquidity, NDTS and Risk. Five dummy variables are also included in the model (Consulting, Metal, Restaurants, Retail_Trade, Transport) to use one dummy variable fewer than the number of industry levels for the purpose of the analyses. The industry dummy variables are included to account for industrial heterogeneity as industry-specific effects are found to influence the maturity structure of the debt raised by SMEs (Michaelas et al., 1999). c_i represents the unobservable firm-specific effects that are time-invariant, accounting for the heterogeneity among the firms that are fixed over the period. u_{it} represents the time-varying idiosyncratic error.

All the dependent and independent variables are logged to control for possible non-linearity in the data except for Growth and Profitability. The Growth and Profitability variables are not logged because these two variables include negative values. For the NDTS and Risk variables, a very small constant (0.01) was added to the variables before executing the log transformation due to the presence of zero values in these variables.

4. Empirical Results

4.1. Results of the Random Effects Models

The results of the random effects models presented in Table 5 are statistically significant for all three dependent variables at the 1% significance level. The results suggest a significant and negative relationship between Dist_1 and Leverage_total, a significant and negative relationship between Dist_1 and Leverage_short_term, and a significant and positive relationship between Dist_1 and Leverage_long_term. These findings are in line with Hypotheses H1a and H1b but are in contrast to H1c.

Table 5. Random effects models' results.

	Dependent Variable		
	Log (Leverage_Total)	**Log (Leverage_Short_Term)**	**Log (Leverage_Long_Term)**
	(1)	**(2)**	**(3)**
Intercept	−0.371 (0.029) ***	−1.035 (0.032) ***	−0.426 (0.114) ***
Log (Dist_1 + 0.01)	−0.009 (0.002) ***	−0.028 (0.002) ***	0.012 (0.007) *
Log (Size)	0.033 (0.002) ***	0.062 (0.002) ***	−0.098 (0.009) ***
Log (Age)	−0.081 (0.003) ***	−0.073 (0.003) ***	−0.09 (0.013) ***
Growth	0 (0) *	0 (0)	0 (0) **
Profitability	−0.203 (0.01) ***	0.045 (0.011) ***	−0.852 (0.058) ***
Log (Liquidity)	−0.53 (0.003) ***	−0.618 (0.003) ***	−0.203 (0.013) ***
Log (NDTS + 0.01)	0.001 (0.002)	−0.035 (0.002) ***	0.067 (0.008) ***
Log (Risk + 0.01)	−0.015 (0.001) ***	−0.019 (0.001) ***	−0.004 (0.006)
Consulting	−0.018 (0.019)	0.223 (0.021) ***	−0.148 (0.07) **
Metal	0.062 (0.031) **	0.178 (0.035) ***	0.216 (0.116) *
Restaurants	0.032 (0.019) *	0.097 (0.022) ***	0.058 (0.069)
Retail_Trade	0.149 (0.018) ***	0.25 (0.021) ***	0.161 (0.064) **
Transport	−0.065 (0.018) ***	−0.167 (0.021) ***	0.206 (0.062) ***
Adjusted R-squared	0.513	0.542	0.0678
p value	0.000	0.000	0.000
Total number of observations	38,128	38,128	17,414

Absolute value of t-statistics in parentheses; *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

The estimates indicate that as the distance to the nearest bank branch doubles, the log of the total leverage is associated with a 0.6% decrease, since $\left(2^{-0.009}-1\right) \approx -0.006$. Similarly, the log of the short-term leverage is associated with a 1.9% decrease as the distance to the nearest bank branch doubles, since $\left(2^{-0.028}-1\right) \approx -0.019$. These findings also suggest that the farther the distance to the nearest bank branch, the less total debt

and short-term debt the SME uses. This is in line with previous research showing that the physical distance to the bank branch does matter when it comes to the possibility of obtaining a bank loan (Brevoort et al., 2010; Kärnä et al., 2020; Nguyen, 2019).

Kärnä et al. (2020) found that a shorter distance to a lender bank leads to a larger loan size, as a shorter distance can translate to lower information asymmetry and a lower cost of information transmission, which allow proximate banks to gain greater access to soft information about the loan applicant. Nguyen (2019) showed that an increase in the distance to bank branches due to bank branch closures reduced small business lending. Thus, higher information asymmetry, higher costs of information transmission and reduced credit supply due to long distances to bank branches might explain our finding that an increase in the distance to bank branches is associated with a decrease in both the log of the total leverage and that of short-term leverage.

Furthermore, high information asymmetry and uncertainty create different kinds of agency problems in the form of moral hazard and adverse selection problems, which increase the financial costs of identifying, assessing and managing the investment (Landström, 2017). It is harder for banks to identify potential firms located far away from them as distance erodes lenders' abilities to acquire knowledge about these potential firms (Agarwal & Hauswald, 2010; Berger & Udell, 1995).

The log of the long-term leverage is associated with a 0.8% increase as the distance to the nearest bank branch increases, since $\left(2^{0.012}-1\right) \approx 0.008$. This increase is quite small compared to the magnitude of the effects of Dist_1 on the total leverage and short-term leverage. A possible reason is that for banks to give out long-term loans to SMEs, the distance might play a relatively small role in deciding the granting of the loan, as the nature of the long-term loans is riskier. Brevoort et al. (2010) found that older firms and firms with higher credit quality and more experienced ownership realise a larger increase in distance to their bank lenders compared to younger and more informationally opaque firms. This means that there might be other, more important considerations for the granting of long-term loans such as age, credit quality and ownership experience.

For the other determinants, Table 5 shows that an increase in Age indicates a significant negative relationship with total leverage, short-term leverage and long-term leverage. This result appears to contradict the trade-off theory, which predicts that older firms should have more debt in their capital structure as compared to younger firms. Alternatively, older firms have had more time to create retained earnings, which in turn builds financial slack, implying a negative relationship between leverage and firm age according to the pecking order theory (Cole, 2013).

An increase in Liquidity indicates a significant negative relationship with total leverage, short-term leverage and long-term leverage. This result is inconsistent with the trade-off theory, which predicts that the more liquid the firm is, the higher the leverage it should use since liquid assets can be converted into cash, which helps in reducing the cost of financial distress.

An increase in Risk indicates a significant negative relationship with total leverage and short-term leverage but is unrelated to long-term leverage. This is in line with the trade-off theory that whenever firms deviate from their debt ratio, they adjust by lowering their leverage to move towards their optimal debt ratio.

An increase in Size indicates a significant positive relationship with total leverage and short-term leverage. This finding indicates that larger firms use more debt in general, especially short-term debt. This is in line with both the trade-off theory and the pecking order theory, which predicts that larger firms use more leverage than smaller firms due to their lower information asymmetries. Moreover, Size indicates a significant negative

relationship with long-term leverage. The pecking order theory also predicts that a larger firm accumulates more retained earnings and hence has a lower reliance on debt.

An increase in Profitability indicates a significant negative relationship with total leverage and long-term leverage. This is in line with the pecking order theory which predicts that the more profitable the firm is, the less it relies on leverage due to its availability of internally generated funds. However, an increase in Profitability also indicates a significant positive relationship with short-term leverage. This is consistent with the trade-off theory, which predicts that the more profitable the firm is, the less likely it is to default on its debt, therefore allowing the firm to obtain loans more easily. In addition, the use of higher leverage allows it to enjoy tax-saving benefits.

An increase in NDTS indicates a significant negative relationship with short-term leverage. This implies that the higher the non-debt tax shields a firm has, the lower the short-term leverage will be due to increased tax savings, which is in line with the trade-off theory. This finding is like the results obtained by both Michaelas et al. (1999) and Sogorb-Mira (2005). However, an increase in *NDTS* indicates a significant positive relationship with long-term leverage, which is not in line with the prediction of the trade-off theory.

There is no noticeable association between Growth and any of the three types of leverage.

With reference to SMEs in the construction industry, SMEs in the metal, restaurant and retail trade industries have more total leverage. For short-term leverage, SMEs in the consulting, metal, restaurant and retail trade industries have more short-term leverage than SMEs in the construction industry. For long-term leverage, SMEs in the metal, retail trade and transport industries have more long-term leverage than SMEs in the construction industry.

4.2. Robustness Tests

To increase the robustness of our results, we further calculated additional random effects models by dividing the samples according to the regional division established by Statistics Sweden (2018b). The three categories of regional division are 'outside urban areas', which are regions that are located outside densely populated areas or urban areas, 'urban areas' and 'central town of the municipality'. The results of these models are shown in Table 6.

For firms located in regions outside of urban areas, the distance to the nearest bank branch only has a significant negative association with long-term leverage. This is surprising, as this association is positive when regional division is ignored. This means that when the distance to the nearest bank branch doubles for a firm in a region outside of urban areas, the log of the total leverage is associated with a 2.6% decrease since $\left(2^{-0.038}-1\right) \approx -0.026$. Even though we reasoned earlier that for long-term leverage, the distance might not matter as much as the other factors, such as age and level of entrepreneurial experience, the distance might still play a role in rural regions where there is a limited selection of financial sources compared to urban regions.

For firms located in urban regions, the distance to the nearest bank branch has a significant negative association with the total leverage. This means that when the distance to the nearest bank branch doubles for a firm in urban areas, the log of the total leverage is associated with a 0.6% decrease since $\left(2^{-0.009}-1\right) \approx -0.006$.

For firms located in the central town of the municipality, the distance to the nearest bank branch has a significant negative association with the total leverage and short-term leverage. This means that when the distance to the nearest bank branch doubles for a firm in the central town of the municipality, the log of the total leverage is associated with a 0.5% decrease and the log of the short-term leverage is associated with a 1.4% decrease since $\left(2^{-0.007}-1\right) \approx -0.005$ and $\left(2^{-0.02}-1\right) \approx -0.014$. In contrast, the distance to the nearest bank branch has a significant positive association with the long-term leverage. However, in

the central town of the municipality, there are many other financial sources such as venture capital and business angels. Hence, an increase in the distance to bank branches might matter much more in rural regions regarding applying for long-term debt. In addition, the maximum increase in Dist_1 in the central town of the municipality in Sample_long_term is only 16 km, compared to 221 km in regions outside of urban areas.

Table 6. Robustness tests.

	Outside Urban Areas			Urban Areas			Central Town of the Municipality		
	Log (Leverage_ Total)	**Log (Leverage_ Short_Term)**	**Log (Leverage_ Long_Term)**	**Log (Leverage_ Total)**	**Log (Leverage_ Short_Term)**	**Log (Leverage_ Long_Term)**	**Log (Leverage_ Total)**	**Log (Leverage_ Short_Term)**	**Log (Leverage_ Long_Term)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Intercept	−0.592 (0.081) ***	−1.526 (0.087) ***	−0.503 (0.243) **	−0.268 (0.097) ***	−1.083 (0.102) ***	−0.382 (0.327)	−0.369 (0.034) ***	−1.009 (0.039) ***	−0.307 (0.15) **
Log(Dist_1 + 0.01)	0.002 (0.006)	0.0 (0.006)	−0.038 (0.017) **	−0.009 (0.005) *	−0.0 (0.005)	−0.013 (0.018)	−0.007 (0.002) ***	−0.02 (0.002) ***	0.012 (0.01)
Log(Size)	0.048 (0.006) ***	0.071 (0.006) ***	−0.044 (0.019) **	0.028 (0.008) ***	0.051 (0.008) ***	−0.061 (0.028) **	0.03 (0.002) ***	0.057 (0.003) ***	−0.112 (0.011) ***
Log(Age)	−0.102 (0.008) ***	−0.069 (0.009) ***	−0.137 (0.025) ***	−0.094 (0.011) ***	−0.074 (0.012) ***	−0.104 (0.04) ***	−0.074 (0.003) ***	−0.07 (0.004) ***	−0.074 (0.016) ***
Growth	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0) **	0.0 (0.0)	0.0 (0.0)	0.0 (0.0) **	0.0 (0.0)	0.0 (0.0) **
Profitability	−0.134 (0.032)***	0.091 (0.033) ***	−0.55 (0.131) ***	−0.248 (0.045) ***	0.014 (0.048)	−0.934 (0.204) ***	−0.208 (0.011) ***	0.045 (0.011) ***	−0.934 (0.069) ***
Log(Liquidity)	−0.507 (0.007) ***	−0.584 (0.008) ***	−0.363 (0.023) ***	−0.515 (0.011) ***	−0.598 (0.011) ***	−0.235 (0.038) ***	−0.54 (0.004) ***	−0.633 (0.004) ***	−0.125 (0.017) ***
Log(NDTS + 0.01)	−0.002 (0.005)	−0.047 (0.005) ***	0.037 (0.018) **	−0.003 (0.006)	−0.036 (0.006) ***	0.075 (0.023) ***	0.002 (0.002)	−0.032 (0.002) ***	0.075 (0.009) ***
Log(Risk + 0.01)	−0.012 (0.004) ***	−0.022 (0.004) ***	0.021 (0.012) *	−0.013 (0.005) ***	−0.022 (0.005) ***	−0.004 (0.018)	−0.015 (0.001) ***	−0.017 (0.002) ***	−0.011 (0.007)
Consulting	−0.035 (0.039)	0.253 (0.043) ***	0.019 (0.112)	−0.12 (0.063) *	0.085 (0.067)	−0.191 (0.208)	−0.004 (0.023)	0.203 (0.026) ***	−0.197 (0.097) **
Metal	0.054 (0.081)	0.228 (0.089) **	0.181 (0.266)	−0.045 (0.087)	0.073 (0.091)	0.123 (0.287)	0.084 (0.037) **	0.163 (0.042) ***	0.216 (0.15)
Restaurants	0.083 (0.043) *	−0.025 (0.047)	0.491 (0.117) ***	0.042 (0.07)	−0.219 (0.074) ***	0.408 (0.217) *	0.029 (0.024)	0.102 (0.027) ***	−0.056 (0.096)
Retail_trade	0.153 (0.038) ***	0.277 (0.041) ***	0.248 (0.099) **	0.08 (0.06)	0.135 (0.063) **	0.134 (0.189)	0.158 (0.023) ***	0.238 (0.026) ***	0.12 (0.09)
Transport	−0.08 (0.036) **	−0.079 (0.039) **	0.171 (0.09) *	−0.119 (0.06) **	−0.301 (0.063) ***	0.165 (0.18)	−0.042 (0.023) *	−0.18 (0.026) ***	0.23 (0.09) **
Adjusted R-squared	0.503	0.522	0.095	0.509	0.543	0.076	0.517	0.543	0.065
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total number of observations	6566	6586	4118	3080	3080	1720	28,482	28,482	11,576

Absolute value of t-statistics in parentheses; *, ** and *** denotes statistically significance at 10%. 5% and 1% respectively.

Another measure of leverage that is recommended by Rajan and Zingales (1995) is a narrower measure of leverage and is calculated by the ratio of total debt (sum of short-term debt and long-term debt) to capital (sum of total debt and equity). This narrower measure of leverage proxies the effects of past financing decisions and excludes other types of liabilities apart from debt such as accounts payable, which may be used for transaction purposes. Thus, we conducted a second robustness test using this narrower measure of leverage to calculate the total leverage (total debt/capital, Leverage_total_narrow), short-term leverage (short-term debt/capital, Leverage_short_term_narrow) and long-term leverage (long-term debt/capital, Leverage_long_term_narrow). The results are reported in Table A2. The results are the same as the results obtained using the broader measure of leverage in Table 5. The results from Table A2 suggest a significant and negative relationship between Dist_1 and Leverage_total_narrow, a significant and negative relationship between Dist_1 and Leverage_short_term_narrow, and an insignificant and positive relationship between Dist_1

and Leverage_long_term_narrow. These findings are also in line with Hypotheses H1a and H1b but are in contrast to H1c due to a weak positive relationship between the distance from the firm to the nearest bank branch and long-term leverage.

5. Conclusions

In this paper, we examined the determinants of total leverage, short-term leverage and long-term leverage amongst Swedish SMEs. To the best of the authors' knowledge, the distance to the nearest bank branch office as a determinant of leverage for SMEs has not been analysed in previous research. The empirical results in this paper show that there exist differences in the relationships between the distance to the nearest bank branch and the three leverage measures. The distance to the nearest bank branch is negatively related to total leverage and short-term leverage but positively related to long-term leverage.

The robustness tests of the conduct of the analyses according to the regional divisions helped us to gain deeper insights into the associations between the distance variable and the three leverage measures. We observed a significant negative association between the distance to the nearest bank branch and long-term leverage in SMEs outside of urban areas, a significant negative association between the distance to the nearest bank branch and total leverage in SMEs in urban areas, and a significant negative association between the distance to the nearest bank branch and total leverage and short-term leverage in SMEs in the central town of the municipality. Surprisingly, there was also a significant positive association between the distance variable and long-term leverage in SMEs in the central town of the municipality, albeit a low correlation.

5.1. Implications

This study has several implications for academics, policymakers and SMEs. According to the literature review by Kumar et al. (2017), one of the research gaps is that research on capital structure decisions for SMEs is scant; therefore, a more comprehensive study on the capital structure determinants of SMEs is crucial to bridge these gaps and shed light on this area. The empirical evidence in this paper emphasises the importance of the proximity of bank branches for different measures of SME leverage in all regions. This paper contributes to the extension of the research on capital structure decisions in SMEs by adding the importance of distance among the factors that will influence the composition of debt and equity among SMEs. In 1984, Myers had already concluded that the capital structure decision was "a puzzle" in that both the trade-off theory and the pecking order theory contributed to our understanding of how firms handle their finances (Myers, 1984). Our research is like that of Myers (1984) in that we find support for both theories in our analysis.

We find support for the idea that the recent trend in bank branch closures is disadvantageous for SMEs that want to apply for loans from banks, which is in line with previous research (Nguyen, 2019; Kärnä et al., 2020). Distance does matter when it comes to the possibility of accessing sufficient levels of credit, which in many industries is a prerequisite for operating a business. Awareness of this result is important for both policymakers and SME owners alike. For the small business owners' association, it could be considered to have this topic on their agenda for improving business conditions for Swedish SMEs. For policymakers interested in promoting entrepreneurship, it would make sense to encourage alternative forms of external financing to make lending more readily available to SMEs that need it, especially for short-term debt. The logic behind this is that short-term debt constitutes a major part of the total debt of Swedish SMEs, as 54% of the SMEs in our sample do not use any form of long-term debt. One strategy to offset the decline in credits for SMEs could be to introduce credit guarantees for SMEs in regions with few or no local bank branches. Ensuring a sufficient supply of external finance for SMEs is important as

it helps to stimulate the role of SMEs in job creation and economic development in the long run, especially in regions in decline. Policymakers can also help to increase access to other types of funding to SMEs in bank deserts by increasing the volume of short-term governmental loans in these vulnerable areas.

5.2. Limitations

The current study has some possible limitations. One limitation concerns the over-generalisation of the results. On the one hand, our sample of Swedish SMEs operates in six industries. On the other hand, these industries share the same problems and possibilities, both practical and theoretical, as other industries in Sweden (Öhman & Yazdanfar, 2017). Another limitation is that this study uses Swedish data, and the results might not apply to other countries, as determinants of capital structure might vary in different regions of the world (Kumar et al., 2017). That said, we know from previous studies that SMEs in most economies are very dependent on bank financing (cf. Psillaki & Daskalakis, 2009).

The results from our analysis give some potential directions for future studies. One such direction has to do with short-term debt, as this type of debt is a major component of the total debt of Swedish SMEs. Future studies can therefore decompose short-term debt into its basic elements such as trade credit and equivalents, short-term bank loans and advance payments from customers. The decomposition of short-term debt into basic elements would give a better understanding of what constitutes most of the short-term debt in Swedish SMEs and how proximity to banks affects each of these basic elements of short-term debt, especially short-term loans from banks.

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Appendix A

Table A1. VIF values.

	VIF Values	
	Sample_Overall	**Sample_Long_Term**
Log(Dist_1)	1.052	1.094
Log(Size)	1.469	1.439
Log(Age)	1.071	1.072
Growth	1.001	1.001
Profitability	1.054	1.035
Log(Liquidity)	1.224	1.264
Log(NDTS + 0.01)	1.180	1.284
Log(Risk + 0.01)	1.351	1.345

Table A2. Random effects models' results for narrow measures of leverage.

	Dependent Variable		
	Log(Leverage_ Total_Narrow)	**Log(Leverage_Short_ Term_Narrow)**	**Log(Leverage_Long_ Term_Narrow)**
	(1)	**(2)**	**(3)**
Intercept	−0.131 (0.035) ***	−0.89 (0.038) ***	−0.272 (0.112) **
Log(Dist_1 + 0.01)	−0.01 (0.002) ***	−0.033 (0.002) ***	0.007 (0.006)
Log(Size)	−0.006 (0.003) **	0.018 (0.0030) ***	−0.091 (0.009) ***
Log(Age)	−0.082 (0.004) ***	−0.067 (0.004) ***	−0.102 (0.013) ***
Growth	0 (0) **	0 (0)	0 (0)
Profitability	−0.238 (0.012) ***	0.071 (0.012) ***	−0.93 (0.056) ***
Log(Liquidity)	−0.592 (0.004) ***	−0.696 (0.004) ***	−0.246 (0.013) ***
Log(NDTS + 0.01)	0.007 (0.002) ***	−0.04 (0.002) ***	0.053 (0.008) ***
Log(Risk + 0.01)	−0.009 (0.002) ***	−0.013 (0.002) ***	−0.007 (0.006)
Consulting	0.014 (0.022)	0.335 (0.025) ***	−0.162 (0.069) **
Metal	0.069 (0.037) *	0.209 (0.041) ***	0.22 (0.115) *
Restaurants	0.063 (0.023) ***	0.161 (0.025) ***	0.095 (0.068)
Retail_trade	0.113 (0.022) ***	0.181 (0.024) ***	0.236 (0.063) ***
Transport	−0.03 (0.022)	−0.096 (0.024) ***	0.14 (0.061) **
Adjusted R-squared	0.455	0.478	0.071
p-value	0.000	0.000	0.000
Total number of observations	38,472	38,458	17,754

*, ** and *** denotes statistically significance at 10%. 5% and 1% respectively.

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