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Determinants of debt ratio levels among small-scale manufacturing enterprises in Ethiopia: Do government policies matter?

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Abstract

Businesses, consumers, and individual investors rely on a host of debt instruments when their internal resources are insufficient. This paper explores the determinants of debt financing choices among small-scale manufacturing enterprises in Ethiopia—with special focus on the role of government policies. The study exploits survey data gathered from 1321 enterprises in the Amhara region of Ethiopia and employs conditional mixed process (CMP) estimation technique to isolate the key drivers of firm debt levels. The major econometric findings confirm that enterprises that had some debt mix in their startup capital are more likely to be in higher debt categories than those enterprises that kick start exclusively with their own internal resources. In addition, the results also reveal that self-reported profitability, firm age, ownership structure, access to business development services, and receipt of bureaucratic support during enterprise formation process have strong effects on the degree of firms' indebtedness. However, firm size, gender, and owner-manager's education have no discernible correlation with reported debt levels in the sampled firms.

Keywords: *debt financing, small-scale enterprises, ordered probit, conditional mixed process, Ethiopia*

JEL Classifications: *C23, G30, G32*

1. Introduction

The contribution of small-scale enterprises to GDP is higher than that of big companies and small and medium firms constitute the majority of business establishments in developing economies (Bas et al. 2009; Ayyagari et al. 2011a). Micro, small, and medium enterprises tend to dominate the global business landscape accounting for more than 95% of the enterprises that generate over 60% of the global private sector employment. Thus, micro firms and SMEs provide badly needed jobs in emerging and developing economies plagued by large and persistent unemployment problems. Moreover, SMEs are usually more labour intensive and make substantial contribution to job creation (Edinburgh Group 2013).

Ethiopia exhibits one of the most underdeveloped financial systems in the world. For instance, the 2019 Global Competitiveness Report (GCR) indicated that Ethiopia's overall competitiveness rank was 126 out of 141 countries. In addition, the report's 9th pillar components that capture financial system development show a rank of 103/141 for domestic credit to private sector as percentage of GDP; 114/141 for access to SME financing and 124/141 for soundness of banks (GCR 2019). Ethiopia lags far behind other African countries in terms of access to formal financial institutions. Preference for informal saving clubs, pervasive unemployment, low income, distance, high cost of borrowing, and documentation barriers are among the most prominent bottlenecks to financial inclusion in Ethiopia (Tekeste and Azadi 2020). However, with a population of over 100 million and increasing mobile penetration¹, the country is well positioned to harvest benefits of advances in technology for better financial innovation² and inclusion. Recently, the country's central bank (NBE 2020) has made a significant step forward by passing a new directive that governs the authorization and operation of digital payment systems in Ethiopia. The directive permits the provision of several financial products and services that include cash-in and cash-out; local money transfer; loading and transferring to card and bank accounts; purchase and bill settlements; over the counter transactions as well as facilitation of inbound international remittances. According to the new directive—with written approval from the NBE--licensed digital financial platforms can also offer micro-credit, micro-saving, micro-insurance, and pension products through outsourcing agreements with regulated financial institutions and

¹ There are now over 40 million mobile phone subscribers in Ethiopia as of August 2020.

² According to Dunne and Kasekende (2018), there has been an increase in financial innovations after 2008, specially in the East African region where digital finance has expanded capitalizing on new technologies such as mobile money

pension funds. Such legal and regulatory frameworks have the potential to transform financial innovation in Ethiopia via mobile, internet and related communication technologies.

Currently, the financial system in Ethiopia is dominated by banks, insurance companies and microfinance institutions without functioning stock markets. The banking sector is characterized by dormant³ interbank transactions and excess liquidity which suggest for the presence of excess capacity within the financial system. Despite the dominance of Ethiopia's financial system by banks, the government's bold financial inclusion measures have encouraged the development of microfinance institutions and savings and credit cooperative unions, which have been instrumental in expanding financial services to previously unbanked segments of the economy (IMF 2019).

According to reports by the National Bank of Ethiopia (NBE 2019), commercial banks and the Development Bank of Ethiopia (DBE) together injected Birr 164.5 billion⁴ of credit into the Ethiopian economy in fiscal year 2018/19, which represented about 42.5% growth over the previous fiscal year. Of this total credit, private banks disbursed about 61% and the remaining 39% was supplied by the twin state-owned banks. The industry sector absorbed about 25% of this credit followed by domestic trade (20%), international trade (17%), housing and construction (12%) and agriculture (11%) while the remaining fraction went to other sectors in the economy. Regarding equity, the twin state owned banks controlled nearly 57% of the capitalization in the banking system while 16 private commercial banks claimed the remaining 43%.

The report also indicates that credit provided by the 38 microfinance consortium constitutes a significant magnitude. During the same fiscal year, microfinance institutions in Ethiopia had a total capital of about Birr 16.6 billion with outstanding total credit of Birr 58.7 billion—which accounts for about 10% of the total outstanding credit advanced by the banking system. In addition, about 110 thousand small and micro enterprises were created; these newly created firms received Birr 7.3 billion in credit and employed about 882 thousand people (NBE 2019).

³ For instance, since the onset of interbank borrowing activity in 1998, only 23 transactions worth about 259 million Birr have been realized. Moreover, though there is now one bank branch for every 17 thousand people, over 90% of the population (most of them in the countryside) remain excluded from banking financial services.

⁴ About US \$5.4 billion at current official exchange rate.

Table 1. New formation, credit receipts, and job creation by micro and small firms in Ethiopia (credit in millions of Birr)

	2016/17	2017/18	2018/19
No of firms	157,768	144,107	110,253
(Share)			(29%)
Credit	7,075.8	8,633.7	7,311.8
(Share)			(18%)
Employment	1,172,678	187,945	882,098
(Share)			(19%)

Sources: adapted from the annual report by NBE (2019).

Note. In the last column numbers in brackets indicate percentage shares for Amhara region.

Table 1 shows the distribution of the newly formed micro and small enterprises, credit advancement to and employment creation by these enterprises in the last three fiscal years. Nationally, some 411 thousand enterprises were created that generated about 2.2 million jobs in the last three years alone. As shown in the last column, in the fiscal year 2018/19, the Amhara region accounted for 29% of the new firms created, 18% of the credit allocation, and 19% of the new jobs created by these firms in the country.

Given the pivotal role of small-scale firms in employment and poverty reduction, understanding the determinants of their debt levels is important in several respects. For instance, one strand of the existing literature relates indebtedness and the strength of firm balance sheet to monetary policy transmission mechanism in representative-agent model economies (Gertler et al. 2003). Several studies have also linked increasing indebtedness and deleveraging to distortions in the financial system and the real economy (Reinhart and Rogoff 2009a; Mian and Sufi 2010; Cecchetti and Kharroubi 2012). Still a recent line of thinking suggests a public-private “debt mutualization” where excessive debt accumulation by the private sector results in economic and financial crises triggering subsequent increase in public debt and deficit (Batini et al. 2016; Mbaye et al. 2018).

While there is mounting evidence about the positive effects of debt financing on several metrics of firm growth (see, for instance, Levine 2004 ; Cornille et al. 2019 and Gomez 2019), most studies concentrate on large listed corporations mainly in emerging and high-income countries. Moreover, many of the previous studies in developing countries are disproportionately obsessed with identifying the major factors that facilitate or hinder firms’ access to credit assuming that entrepreneurs make every effort to apply for external financing. One major point not given due consideration is that even when financial intermediaries are willing and able to provide loans, firms may not explore and utilize external financing options for various reasons—which suggests for the presence of heterogeneity in debt level choices. This

paper, therefore, focuses on small scale manufacturing enterprises in a low-income economy to isolate the determinants of different levels of debt/leverage employing conditional mixed process (CMP) method. The contribution of this paper to the existing literature will be twofold. First, the effect of the composition of startup capital on current degree of indebtedness will be examined to see if there is debt persistence among these firms. Second, policy and regulatory environments affect the nature of financing mix used by firms (Bortolotti et al. 2011 ; Faulkender and Petersen 2006). This study is the first attempt in the context of Ethiopia to test the effects of government policies on patterns of firm financing behaviour using access to government-provided business support facilities as proxies for policy variables.

The remainder of the paper is organized as follows: Section 2 discusses the relevant theoretical and empirical literature. Overview of data and the methodology is presented in section 3. Section 4 bears the discussion of empirical results, and finally, section 5 offers conclusion and recommendations.

2. Literature review

2.1 Theoretical review

Modigliani and Miller (1958) provided the launching pad for the theory of capital structure. They proved that without corporate taxes, bankruptcy risks, and related distortions, a firm's balance sheet structure would have no effect on its market value if capital markets are competitive. Overtime, several scholars have offered alternative theoretical frameworks that mainly helped rectify many of the conceptual loopholes in the Modigliani-Miller model, which, in its original form, had limited empirical relevance.

One such alternative framework is the trade-off (TOT) theory that suggests that financing options are haunted by the need to ponder the relative costs and benefits of utilizing external financial resources. The model views a firm's choice of optimal debt-equity mix as a function of three parameters: taxation, liquidation risks, and conflicts among key agents. If the firm decides to use debt, for instance, it enjoys reduction in its corporate tax obligations and boosts the after-tax income at its disposal. In consequence, tax advantage and the market value of the firm co-move in the same direction as a result of firms' efforts to align the tax advantages of more debt with increasing probability of bankruptcy risks (Kraus and Litzenberger 1973; Myers 2001)

The second major capital structure theory is due to Jensen and Meckling (1976) where financing mix is regulated by agency costs. According to this theory, such costs emerge as a result of conflicts of interest that involve managers, shareholders, and creditors/bondholders. For instance, in Harris and Raviv (1990) though shareholders and/or creditors want to liquidate the firm, managers would rather struggle to extend the life of the firm in question to protect their own economic advantage. In addition, Stulz (1990) also

suggests managers have vested interests to invest funds at their disposal despite shareholders' preferences for cash dividend receipts.

The third major framework in the capital structure literature is the pecking order theory (POT) that was introduced by Donaldson (1961) and was later formalized by Myers and Majluf (1984). The POT of Myers (1984) and Myers and Majluf (1984) did not look for optimal leverage ratio; instead it can be viewed as an alternative model to the TOT. This particular model offers explanations as to why successful business establishments rely a lot more on internal resources and financially less successful firms resort to debt financing as their internal finances are meager. Even though the POT was developed to analyze the financing structure of large corporations, its relevance to the study of small-scale-enterprise financing cannot be discounted (Mlohaolas et al. 1998; Osei-Assibey et al. 2012). For one thing SMEs are opaque and entail considerable information-related costs (Psillaki 1995). Moreover, SME owners want independence and prefer to maintain control over their own firms (Berggren et al. 2000) and SMEs are likely to be infested with adverse selection and moral hazard problems (Frank and Goyal 2003).

Graham and Leary (2011) reviewed several attempts aimed at overcoming the empirical shortcomings of the traditional capital structure theories. The authors emphasized efforts that considered, among others, mis-measurement of key variables in empirical studies, the effect of leverage on nonfinancial stakeholders, supply side effects on business capital structure, the role of financial contracts, bias in estimates of leverage adjustment speeds, and capital structure dynamics. Related developments point out that firms' leverage structure can be influenced by several other factors that include source of capital (Faulkender and Peterson 2006), macroeconomic and institutional factors (Kenourgios et al. 2019), unobserved firm fixed effects (Nguyen et al. 2019), credit supply shocks or systemic financial meltdown (D'Amato 2019; Demirgüç-Kunt et al. 2020). Other scholars also suggest that debt and leverage structure respond to observable country specific macroeconomic conditions such as GDP or inflation (Bas et al. 2009; ur Rehman et al. 2017 and Zafar et al. 2019), unobservable country fixed effects (Hall et al. 2004), regulatory environment (Bortolotti et al. 2011) and exposure to debt rating (Faulkender and Petersen 2006). Guercio et al. (2019) have also argued that firm size affects not only the demand for but also the effective access to financing options. Smaller firms are less likely to apply for and obtain alternative financial instruments. In addition, the authors also suggest that innovation to be an important determinant of financing decisions-- innovative firms are more inclined to seek external financing opportunities but less likely to realize their demand. Other scholars also argue that owner-manager specific characteristics--such as education and gender--play considerable roles in shaping the financing preferences and leverage structures of business establishments (Abor 2008 ; Nawi 2015).

2.2 Empirical review

Empirically numerous studies have examined the sources, patterns and implications of different financing preferences of firms. Guercio et al. (2019) using micro data provided by the European Central Bank and the European Commission studied the characteristics of small and medium enterprises. They found that firm size affects not only the demand for but also the effective access to financing options. Smaller firms are less likely to apply for and obtain alternative financial instruments. In addition, the study also found innovation an important factor in shaping financing decisions. Innovative firms were more likely to seek external financing opportunities but were less likely to realize their demand. The authors mention uncertainty surrounding the innovation process, protracted time lag in product delivery, intangibility of major firm resources, and the practical hurdles in replicating the processes outside the innovating firms as relevant explanations.

Khemiri et al. (2018) investigated the role of information imperfection in shaping the debt choice hierarchy among French companies. The authors relied on ordered probit specification on a sample of 121 non-financial companies whose shares are traded on the Euronext Paris Stock Exchange. Their main findings revealed a noticeable pattern of financing preferences among these firms: the hierarchy followed an ordered direction from bank debt to bond debt to convertible bonds. Moreover, apart from information asymmetry, this financing hierarchy correlated strongly with company size, default risk, and research and development expenditures of the sampled firms. Similarly, de Haan and Hinloopen (2002) tracking Dutch companies for the period 1984-1997 had identified financing hierarchies that involved internal finance, bank loans, share issues and bonds contracts.

Serrasqueiro et al. (2016) provided another European perspective on the drivers of the financial structure of 2,329 Portuguese small firms observed between 2007 and 2011. Disaggregating total debt into short- and long-term components, the study identified possible connection between asymmetric information and agency problems on one side and small firms' access of long-term debt financing on the other. The findings also pointed out that firm size and level of collateral as important predictors of access to long-term debt. Further, liquidity was found to have positive relationship with long-term debt and negative association with short-term debt. In addition, the authors reported higher profitability to be associated with lower levels of debt. The study concluded that the financing behavior of Portuguese firms was consistent with the predictions of POT and TOT, suggesting that no single unified framework can adequately capture and explain the capital structure of entrepreneurial entities.

Concentrating on Brazilian small and medium firms, Forte et al. (2013) studied the determinants of firm capital structure exploiting extensive information gathered from over 19,000 enterprises covering the period 1994 to 2006. The results from the application of system generalized method of moments estimator revealed negative association between profitability and leverage and positive correlation between asset growth and leverage. The authors suggest that these results provide support for the pecking order theory of capital structure and that small and medium firms solicit debt when internal resources prove insufficient. Moreover, in the dynamic specification the lagged value of leverage enters significantly capturing high degree of persistence verifying the working hypothesis that small and medium firms regulate their debt-equity ratio towards a target value albeit at a low speed of adjustment.

Bulent et al. (2013) investigated the determinants of capital structure among unbalanced panel of 11,726 firms in Turkey observed between 1996 and 2009. Their descriptive and econometric findings revealed a number of evidences that reinforce existing empirical regularities. For instance, the authors report that short-term debt is considerably more common than long-term debt obligations. In addition, firm size was found to be the most significant firm attribute than firm age or industrial membership in predicting financing structure. Firm- and industry-specific characteristics, tax-related and other macroeconomic indicators also affected the capital structure of the target firms during the period under investigation. Firms make adjustments to their leverage, especially their short-term leverage, gravitating to the industry median value. Finally, the results suggest that capital flows affect balance sheet structures of firms, especially the non-manufacturing firms that are bigger and more mature.

Looking at another emerging economy, ur Rehman et al. (2017) examined 760 firms in China exploiting extensive dataset stretching from 2001 to 2013. The authors used generalized method of moments estimation method in order to understand the firms' adjustment behavior towards target leverage ratios. The results identify that Chinese firms have target levels of leverage and that they adjust towards those preferred levels. In addition, the study found differing adjustment rates for private and state owned enterprises (SOEs), namely, SOEs had higher adjustment rate than non-state owned firms, suggesting for the presence of an aggressive leverage policy within publicly controlled firms. Further, the findings indicated that firm size and growth opportunities exert significantly positive effect on leverage while profit performance and liquidity have negative correlation with firms' degree of indebtedness.

In the context of developing countries, Salawu and Agboola (2008) focused on the capital structure drivers of 33 Nigerian non-financial firms spanning the period 1990 to 2004. Incorporating alternative measures of leverage (total, short term, and long term debt to asset ratios) and controlling for unobserved fixed effects, they found that profit, tangibility and firm size to have positive correlation with total debt

and long-term debt while growth opportunities had negative relationship with total debt. This empirical study based on Nigerian data supports that the financing behaviour of large firms closely mimics the patterns predicted by trade-off theory of capital structure.

Gwatidzo et al. (2016) exploited unbalanced panel dataset of 239 firms listed on stock exchange markets in South Africa and tracked over the period 1996 to 2010. The study included firms that had at least three years of observations and employed quantile regression to control for heterogeneous effects of target predictors across the distribution of leverage. Their main findings suggest that the effects of key standard predictors do not vary with different levels of leverage. The only exceptions were asset tangibility and firm age, whose influence rose with the degree of leverage. These empirical results for South Africa imply that estimates of determinants of leverage at the mean values of data points are still largely unbiased.

Abstracting from the corporate sector and focusing on small and micro firms in rural Ghana Osei-Assibey et al. (2012) studied the determinants of financing patterns by exploring a wide range of financing options above and beyond the setting in the traditional finance literature. The authors examined the existence of hierarchical preference ordering as suggested by the pecking order theory using survey data collected from 176 enterprises and employing ordinal logistic regression. Their findings indicate that younger firms tend to prefer low-cost, less-risky or less-formal external sources starting from internal finances. However, as the enterprises mature over time, they expand their participation in formal financing schemes improving their likelihood of utilizing higher levels of formal financing instruments. The findings also support that education or financial literacy of owners, family control over fixed assets, firm ownership structure, firm size and perception of borrowing costs to be significant drivers of past, current, and future financing choices.

Among recent studies on capital structure in Ethiopia include Umer (2014) that explored the determinants of capital structure among a panel of 37 large taxpayer share corporations identified by the country's Revenue and Customs Authority branch offices in Addis Ababa covering the period 2006 to 2010. Using static random-effect panel data methods the author found positive correlation between leverage (defined as the ratio of long-term debt to assets) and firm size, firm age, tangibility, liquidity position and non-debt tax advantages while profit, income volatility and dividend payments had negative co-movement with degree of firm indebtedness. This study of large taxpayer firms in Ethiopia revealed that agency cost theory to be in a better position in explaining the capital structure of the sampled companies.

Other studies that confirmed the importance firm specific attributes in determining the financing structure of firms include Serghiescu and Vaidean (2014), Handoo and Sharma (2014), Alipour et al.(2015), Menike (2015) as well as Sarlija and Hanc (2016). By contrast, Graham et al. (2015) using U.S. data have shown that changing firm characteristics were less powerful to explain the surge in firm leverage over the past century. Instead, their findings supported the importance of variation in public borrowing, macro-economic instability, and financial sector development to be more important drivers of the observed-firm-debt dynamics in the U.S. over the past several decades. Related studies also suggested that debt and leverage structure can be influenced by observable country specific macroeconomic conditions such as GDP or inflation (Bas et al. 2009; ur Rehman et al. 2017, and Zafar et al. 2019) or unobservable country fixed effects (Hall et al. 2004).

Over and above the role of firm-specific factors, some scholars have accentuated the importance of owner-manager specific characteristics in shaping the financing preferences and leverage structures of business establishments. For instance, in a study of small and medium enterprises in Malaysia, Nawi (2015) found that owner's networking and social relationship had positive influence on the probability of debt financing while owner age and education had little effect on firms' balance sheet structures. In addition, the study documented that ethnic minorities were more likely to rely on funds from families and friends and less likely to secure external loans suggesting the possibility of discrimination in the credit market against minority (Chinese and Indian) borrowers. Other studies that account for owner-specific features in the capital structure literature include Kuruppu and Azeez (2016) for Sri Lanka as well as Abor (2008) and Osei-Assibey et al. (2012) for Ghana.

2.3 Hypothesis development

While standard determinants of capital structure are widely studied, the role of policy and regulatory environment has received scant attention, especially in the context of developing countries in general and Ethiopia in particular. Government regulation and policy stances can have marked influence over financing decisions, leverage level preferences, product pricing and market value of firms. Many governments in developing and advanced economies deploy a combination of financial, fiscal, monetary, and taxation policies in order to influence the development of business enterprises. It is also common practice to use subsidies or provide training to improve the competitiveness of firms and raise their productivity.

For instance, it is now widely recognized that tax policy considerations and probability of bankruptcy risks influence firm financing choices (Kraus and Litzenberger 1973; Myers 2001). Overesch and Voeller (2010) confirmed that high tax benefit of debt has significant positive effect on a firm's financial leverage. In addition, they found that the leverage structures of smaller firms adjust more readily to changes in the tax benefit of debt. Zhang et al. (2015) have shown that leverage ratio declines with increasing economic policy uncertainty. Moreover, Cao et al. (2013) found that highly indebted firms tend to reduce their leverage levels while less indebted firms are inclined to delay borrowing in times of high political uncertainty. Bortolotti et al. (2011) found higher leverage among firms that are privately owned and subject to regulation by an independent regulatory authority. Similarly, Faulkender and Petersen (2006) identified significantly more leverage among firms with exposure to debt rating and having access to the public bond markets.

In Ethiopia, federal and local governments provide several financial and non-financial support packages as part of an effort to encourage small-scale enterprise development as a tool for poverty reduction and job creation. These packages include training, technology transfer, and organizational support in business formation process by the unemployed youth (Federal Democratic Republic of Ethiopia, 2011). These government-provided services are used as proxy for policy activism. The expectation is that firms that have access to such services and facilities could develop leverage structures that are significantly different from those enterprises that do not enjoy similar entrepreneurial support facilities.

In light of the above discussion, the major hypotheses the study aims to test are the following:

H1: Access to business development services (BDS) has no effect on debt financing preference.

H2: Government support in group business formation process has no effect on debt financing preference.

3. Materials and methods

3.1. Data source

The data used in this paper is part of a broader dataset collected in 2016/17 fiscal year as part of a mega research project to assess the status of small and micro manufacturing enterprises in the Amhara region of Ethiopia. Available information was collected by administering structured questionnaires to focal persons (including owners and managers) in 1381 small and micro manufacturing enterprises. These enterprises were scattered across eleven zonal capital towns of the same region. Ultimately 1321 enterprises filled in and returned the distributed questionnaires giving rise to a response rate of about 96 percent.

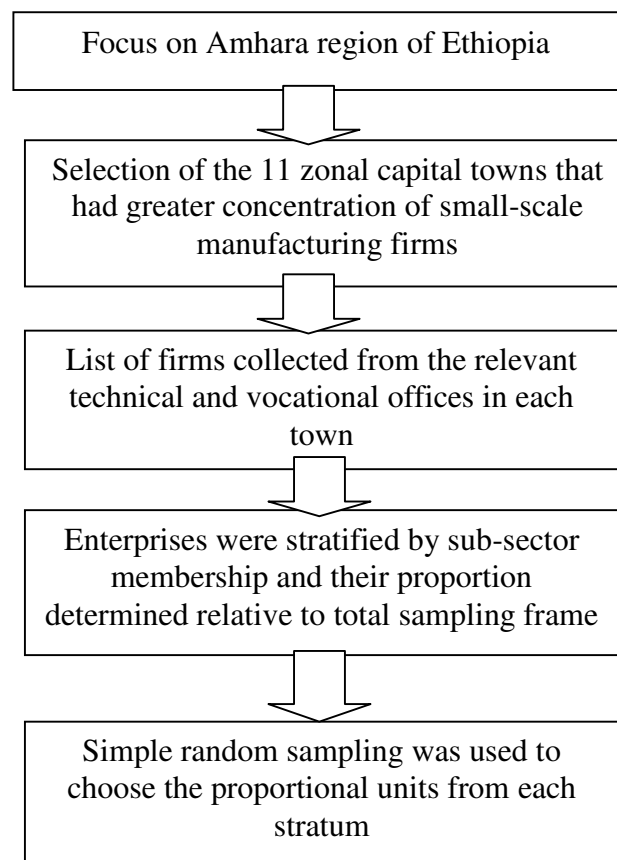


Fig. 1 Sampling procedures
Source: Author's own construction

The available information was gathered from the owners/managers of the target firms by employing multi-stage stratified simple random sampling techniques. In the first stage, the Amhara region was selected as this region housed the university that supported the specific research as part of an effort to understand the socio-economic problems and contribute to the local community development needs. Inclusion of other regions in the country was not possible because of financial constraints. In the second

stage, the team leaders decided to cover all the eleven zonal capital towns of Amhara region as the vast majority of the small and micro manufacturing enterprises was concentrated in those towns. In each town, the enumerators contacted the concerned technical, vocational, and enterprise development office personnel for lists of the target firms. The lists provided information on the location, sub-sector membership, year of business creation, and the names of the specific firms, among others. In the final stage, the questionnaires were distributed to proportionally allocated and randomly selected enterprises to make sure that each sub-sector receives fair representation in the total sample.

3.2. Econometric model

The present study follows de Haan and Hinloopen (2002), Beck et al. (2004), Brunzell et al. (2015) and Belas et al. (2018) who adopted ordered-choice models to examine the determinants of financing decisions among diverse group of firms. Drawing on Wooldridge (2002), let y be an ordered-response variable taking on the values of 0, 1, 2, , J. For some known integer J the relevant ordered probit model for y (conditional on explanatory variables x) can be derived from a latent variable model. Denoting this latent variable by y^* the relevant relationship can be determined by:

$$y^* = xb + e, \quad e | x \sim N(0,1) \quad (1)$$

where b is a k -by-1 parameter vector to be estimated and x is a vector of k predictors that potentially affect the dependant variable and e is the model residual term. Let $\lambda_1 < \lambda_2 < \dots < \lambda_J$ be unknown threshold parameters, it is possible to define:

$$\begin{aligned} y = 0 & \text{ if } y^* \leq \lambda_1 \\ y = 1 & \text{ if } \lambda_1 < y^* \leq \lambda_2 \\ & \vdots \\ y = J & \text{ if } y^* > \lambda_J \end{aligned} \quad (2)$$

In this study y equals 0 if the specific firm reported no debt at all; 1 if it has a debt ratio level above 0 but below 50 percent; and 2 if the debt ratio level at the time of the survey exceeds 50 percent. Thus, $J=0, 1, 2$ represent absence of any debt, moderate level of leverage and significantly higher level of debt to asset ratio, respectively, in the sampled small and micro manufacturing firms included in the present analysis.

Given the normality assumption for the error term in equation (1), the conditional distribution of y given x , which corresponds to the probability for each outcome, can be expressed as:

$$\begin{aligned}
pr(y = 0 | x) &= pr(y^* \leq \lambda_1 | x) = pr(xb + e \leq \lambda_1 | x) = \Phi(\lambda_1 - xb) \\
pr(y = 1 | x) &= pr(\lambda_1 < y^* \leq \lambda_2 | x) = pr(\lambda_1 < xb + e \leq \lambda_2 | x) = \Phi(\lambda_2 - xb) - \Phi(\lambda_1 - xb) \\
pr(y = 2 | x) &= pr(y^* > \lambda_2 | x) = pr(xb + e > \lambda_2 | x) = 1 - \Phi(\lambda_2 - xb) = \Phi(xb - \lambda_2)
\end{aligned} \quad (3)$$

where $\Phi(\bullet)$ is the normal cumulative distribution function.

The required parameter vectors λ and b can be identified using maximum likelihood estimation method imposing the restriction of no intercept term in b . The log-likelihood function for the sample size of N can be formulated as:

$$\sum_{i=1}^N \sum_{j=0}^J z_{ij} \log [\Phi(\lambda_j - xb) - \Phi(\lambda_{j-1} - xb)] \quad (4)$$

where z_{ij} is an indicator function that takes a value of one if the target response is j for individual i and 0 otherwise. Given the specification in equation (3), relevant marginal effects can be computed for each alternative outcome in the usual way.

3.3. Description of variables

3.3.1. Dependent variable

Several studies have used level categories to study degree of indebtedness among individuals, households, and firms (e.g. Zhao et al. 2006). In this study, the dependant variable encompasses three alternatives based on the estimated debt to asset ratio reported by the sampled respondents. The lowest category (no debt) has been coded as 0; the middle category for debt ratio between 0 and 50 percent coded as 1; and the uppermost category representing debt-to-asset ratio in excess of 50 percent coded as 2. These ratios were constructed based on respondents' estimation of their assets and debt levels. As obtaining exact figures were difficult due to absence of recording, the respondents were asked to choose among the specified leverage categories. The three category choices may appear arbitrary; however, given the practical limitations, this approach minimizes classification errors. The respondents can easily memorize whether their debt-to-asset ratio is below or above the 50% threshold. However, they could find it hard to distinguish whether their leverage is above or below, say, the 75% threshold. Some authors (e.g. Zhao et al 2006) have considered levels with four categories where the uppermost group includes those consumers with indebtedness exceeding 20%. Such refinement was not possible in this study due to absence of financial recordings at the target enterprises.

3.3.2 Independent and control variables

This study incorporates numerous independent variables drawing from the existing literature. In order to capture potential effects of government policy, the study includes two proxy variables, namely, access to government-provided business development services and existence of local government initiative⁵ in organizing job seekers to form groups and start business. Finally, the study considers the role of the composition of startup capital on current degree of firms' indebtedness (see Table 2 for variable definition and measurement)

Table 2 Definition, sources, and expected signs of model variables

Variable	Definition	Sources	Expected sign
Firm age	In categories of years	Klapper et al. (2006); Umer (2014); Gwatidzo et al. (2015)	+/-
Firm size	Total number of employees	Antoniou et al. (2008); Salawu and Agboola (2008); Osei-Assibey et al. (2012); Bulent et al. (2013); Alipour et al. (2015); ur Rehman et al. (2017); Khemiri et al. (2018)	+/-
Ownership type	Solo=1, group=0	Klapper et al. (2006); Osei-Assibey et al. (2012); ur Rehman et al. (2017)	+/-
Profit over time	Decreased, unchanged, increased	Antoniou et al. (2008); Salawu and Agboola (2008); Bulent et al. (2013); Umer (2014); Gwatidzo et al. (2015)	+/-
Access to training and other business development services (BDS)	Access=1, no access=0	Osei-Assibey et al. (2012); Kuruppu and Azeez (2016)	+
Owner education	Basic, primary, secondary, college+	Scherr et al. (1993); Abor (2008); Osei-Assibey et al. (2012); Nawi (2015); Kuruppu and Azeez (2016)	+
Owner sex	Male=1, female=0	Scherr et al. (1993); Abor (2008); Osei-Assibey et al. (2012); Kuruppu and Azeez (2016)	+/-
Location	Current firm location	Abor (2008); Osei-Assibey et al. (2012)	+/-
Sub-sector	Major marketed product	Klapper et al. (2006); Kuruppu and Azeez (2016)	+/-
Startup capital mix	Some loan=1, no loan=0		+
Government initiative in firm creation	Present=1, absent=0	Bortolotti et al. 2011 ; Faulkender and Petersen 2006	+

⁵ In many parts of the country federal and local administrative units cooperate in identifying unemployed citizens and organizing them into groups so that they can develop a workable business plan whose financing is supported by the government. The bureaucracy also provides training, technology transfer, and other business development services to those business owners willing and able to participate.

4. Results and discussion

4.1 Descriptive results

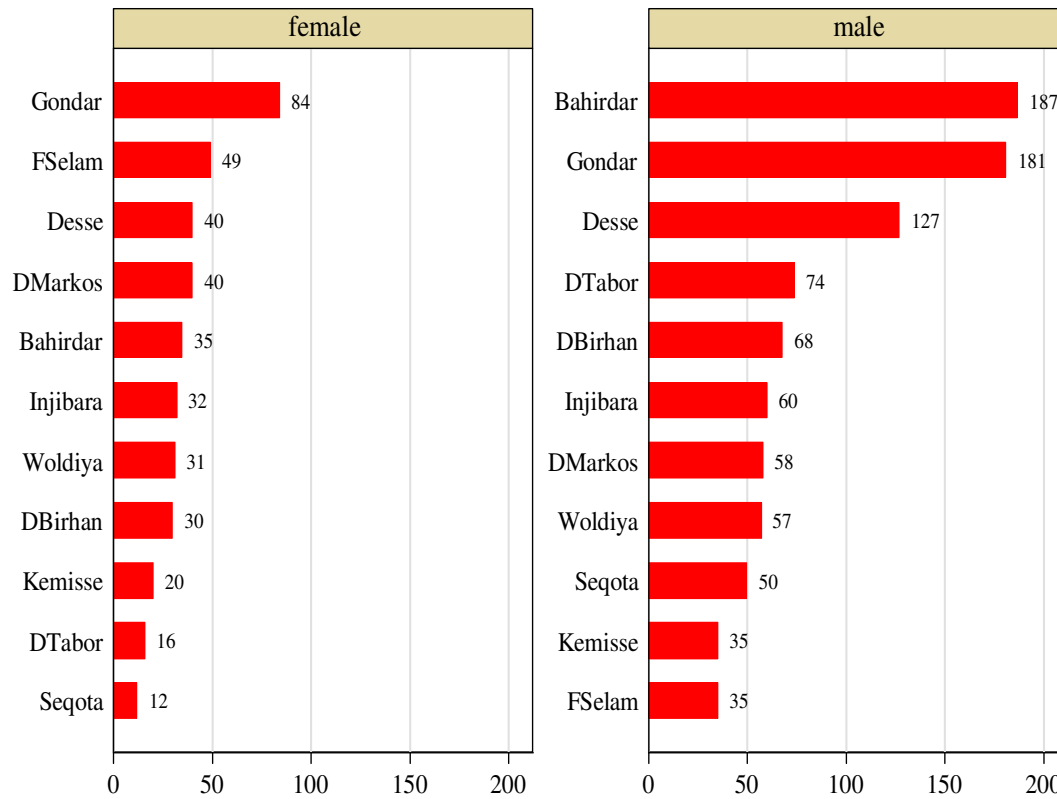


Fig. 2 Distribution of sample size across towns by sex

Figure 2 presents the distribution of the study sample (1321 enterprises) across the relevant zonal capital towns of Amhara region disaggregated over sex. With the exception of F/Selam, in each town, there are significantly more enterprises being managed/operated by men than by women -- which reveals the usual lopsided economic participation to the disadvantage of women.

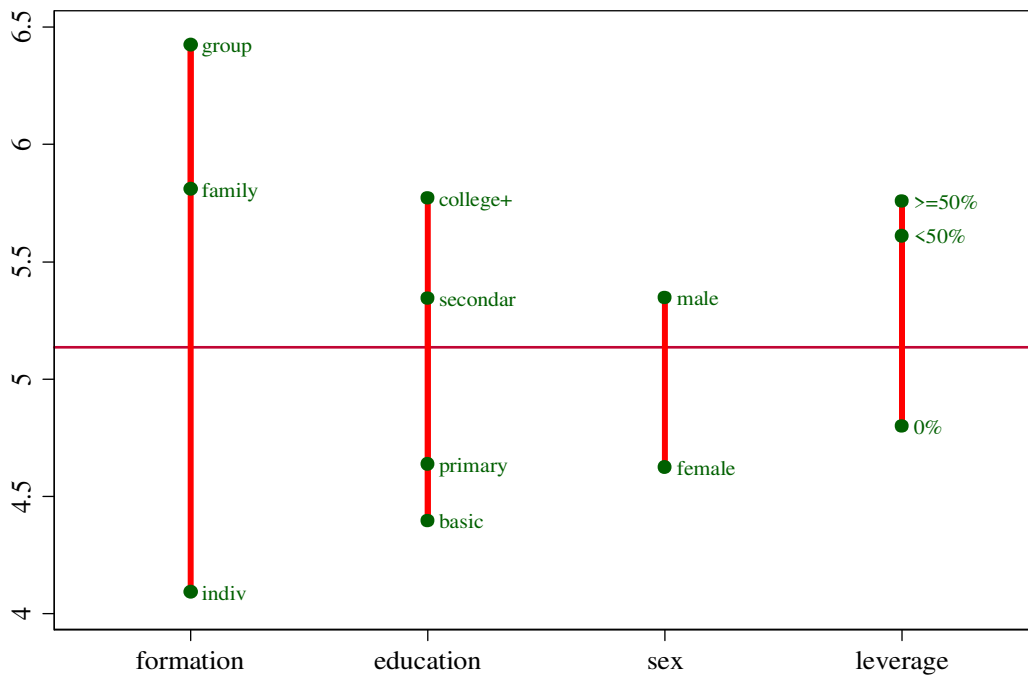


Fig. 3 Mean employment by degree of leverage, education, sex and ownership

The average employment level across different categories is shown in figure 3. We see that the average employment tends to be higher in firms with more mix of debt on their balance sheet as well as in firms controlled by groups and operated by owners/managers with increasing level of educational attainment. This specific result confirms the assertions made in the introduction section that leverage structure could correlate with employment and poverty reduction.

Descriptive statistics of the major model variables are presented in table 3. Most of the enterprises in the sample are young as the average age of the business establishment is about four years with standard deviation of 3.45. Similarly, the typical enterprise had an employment level of about five workers which suggests that the distribution is tilted towards micro-type⁶ businesses. Regarding owner-manager profiles, the vast majority of them (about 70%) were males and about half of the total respondents were high school graduates. Responding to business environment perception, most (about 60%) said profitability of their business increased since they started operation; about 27% of the sample respondents saw no discernible change, and the remaining 13% experienced shrinkage. When asked about the mix of the financing scheme when they started operation, about 64% reported that they relied exclusively on their own internal resources and the remaining fraction used some mix of debt and own finances.

⁶ In Ethiopia, based on government definition of enterprise-size classification, micro-business have employment level of at most six workers and small enterprises have employment level between six and thirty workers.

Table 3 Descriptive statistics of variables

Variable	Min	Max	Mean	St.dev
a) Continuous				
Enterprise age	0.2	45	4.25	3.45
Employees	1	30	5.13	4.54
b) Categorical				
Sex of owner	Percentage			Counts
Male	70.6			932
Female	29.4			389
Education of owner				
College+	17.6			232
Secondary	46.4			613
Primary	23.6			312
Basic	12.4			164
Profit since establishment				
Increased	60.4			798
Unchanged	26.8			354
Decreased	12.8			169
Mix of startup capital				
Own funds	64.3			849
Full or partial loan	35.7			472
Current access to business development services				
Yes	69			908
No	31			393
Enterprise formation process				
By government initiative	14.3			189
Other	85.7			1,132
Ownership type				
Individual	52.6			695
Group/family	47.4			626
No. of observations				1321

Source: Author's own computation based on survey data

Table 3 also shows that about 69% of the enterprises had access to some type of government-provided business development services that include training, technology extension, work place management and other related skill transfers. In terms of organizational structure there is roughly equal distribution between individual control and group ownership of enterprises. Most enterprises (about 86%) joined the manufacturing sector on their own initiative and the remaining 14% through government encouragement and support. In the econometric part, we will formally test whether these two variables influence leverage positions of firms in a systematic way. The expectation is that firms that are increasingly exposed to business development orientations and some bureaucratic support will be in a better position to appreciate

and explore alternative financing options to start and expand their businesses. The incorporation of these two qualitative variables in the variety of regressions performed in tables 5, 6 and 7 amounts to a test of the role of public policy in shaping firms' debt financing patterns.

Table 4 Financial profile of sample firms

a) Link between startup finance and recent access to credit

Startup finance	Recent access to credit		Total
	No	Yes	
Loan only	69(27%)	185(73%)	254
Own funds only	658(78%)	191(22%)	849
Some mix	72(33%)	146(77%)	218
Total	799	522	1,321

b) Link between startup finance and current leverage status

Startup finance	Current leverage status			Total
	0%	<50%	>=50%	
Loan only	81 (32%)	136 (53.5%)	37(14.5%)	254
Own funds only	647(76%)	150(18%)	52(6%)	849
Some mix	68(31%)	119(55%)	31(14%)	218
Total	796	405	120	1,321

Source: Author's own computation based on survey data

Stylized facts on the sampled firms' financing profiles⁷ are provided in table 4 under panels (a) and (b). The results summarize two-way-cross tabulations of recent-credit-access history and leverage positions with the structure of startup finance. The numbers in brackets indicate cell fractions relative to row totals. For instance, among 254 enterprises that started production relying on exclusively borrowed funds, an overwhelming majority (73%) had recent access to credit and about 68% had some amount of debt on their balance sheet. Similarly, 77% of the 218 enterprises that started business with a mix of own resources and debt had also access to credit in the couple of years preceding the interview. By contrast, out of the 849 firms without any debt upon establishment, only 191 (22%) were able to access external finance and only 24% had non-zero leverage positions at the time of the interview. These descriptive results suggest that there is considerable *debt inertia* in the sense that those enterprises that get into

⁷ Among those firms that accessed external finance in the couple of years before the conduct of the specific survey 81% got credit from microfinance institution, 4% from banks, and the remaining from informal sources.

business with some liability are more likely to have access to credit market and to maintain a certain degree of indebtedness over time. The converse also applies: enterprises that finance their startup operations with own funds are less likely to access external credit opportunities and still less likely to accumulate debt over time.

4.2. Econometric results

The baseline⁸ coefficient estimation output is shown in table 13 in the appendix. One striking aspect of these results is that the effect of the nature of startup capital on current financing structure is consistently positive and significant at 99 percent confidence level—whose robustness remains intact as we move from model (1) to model (7) by adding more controls. This suggests for the presence of strong state dependence: firms that had some debt on their balance sheet when they start production are more likely to be in higher leverage positions through time than those firms that kick start their production activities without any debt. The current finding is in congruence with the descriptive results discussed earlier on the presence of debt inertia. Other studies have also established the existence of persistence in leverage structure by employing a diversity of materials and statistical techniques (see, for instance, Antoniou et al. 2008 and ur Rehman et al. 2017).

Table 5 presents the corresponding marginal effects from ordered-probit model for the fully-fledged specification in the baseline setup. The results show that using some debt in startup finance lowers the probability of being in no-debt category by about 38% which is significant at 99 percent confidence level. Similarly, using some debt in startup finance raises the probability of being in moderate and high leverage categories by about 25% and 13%, respectively.

Firm age (with those below three years as a benchmark) has non-linear effect on leverage positions of target firms. The debt hierarchy of relatively younger firms (those between three and six years) does not appear to be affected by age. By contrast as firms get to grow and mature the odds of seeking external financing declines. For instance, those firms older than 8 years have about 12% additional probability of being in no-debt category while the corresponding probabilities for being in moderate and high levels of leverage decline by about 8% and 3.4%, respectively. The marginal effects are significant at 95 percent

⁸ One model adequacy test result for multicollinearity is provided in the appendix. Since the data used in this study is cross sectional, another major statistical problem would be potentially heteroskedastic error term across individual units. This particular problem can be handled by undertaking estimations using different subsamples from the original dataset as reported in tables 6-9.

confidence level. These findings indicate that maturity has inverse relationship with the likelihood of using higher levels of debt in clear contrast with the prediction of the POT. The present finding is inconsistent with the findings of Abor (2008); Osei-Assibey et al. (2012), and Umer (2014), for example, who find positive relationship between firm age and leverage; suggesting older and more reputable firms tend to finance their companies with less equity and more debt while younger ones have to fall back on their own net worth. It is, however, in line with the results of Gwatidzo et al. (2015) that showed that for some quantile of the data distribution, older and more established firms tend to be less leveraged.

Table 5 Ordered-probit marginal effects: baseline model

<i>Dependent variable: debt level categories</i>			
Predictors	Pr.(no debt)	Pr. (lev. < 50%)	Pr. (lev. >=50%)
Startup finance (debt=1)	-0.375*** (-13.74)	0.250*** (11.28)	0.125*** (10.59)
Firm age >= 4 & <=6 years	-0.010** (-0.35)	0.007 (0.35)	0.004 (0.35)
Firm age >6 & <= 8 years	0.116** (2.50)	-0.082** (-2.36)	-0.034** (-2.78)
Firm age > 8 years	0.115** (2.39)	-0.081** (-2.26)	-0.034** (-2.66)
Firm size (total workforce)	-0.006** (-2.10)	0.004** (2.08)	0.002** (2.08)
Profitability -unchanged	0.090** (2.00)	-0.053** (-2.06)	-0.037* (-1.88)
Profitability -increased	0.144*** (3.52)	-0.089*** (-3.81)	-0.054** (-2.98)
Ownership (solo=1)	0.021 (0.71)	-0.014 (-0.71)	-0.006 (-0.71)
Firm formation (government=1)	-0.025 (-0.65)	0.0170 (0.65)	0.008 (0.67)
Access to BDS (yes=1)	0.032 (1.14)	-0.022 (-1.14)	-0.011 (-1.14)
Education –primary	-0.019 (-0.40)	0.013 (0.40)	0.006 (0.41)
Education - secondary	-0.036 (-0.84)	0.024 (0.83)	0.011 (0.87)
Education – college+	-0.090* (-1.85)	0.059* (1.82)	0.031* (1.86)
Sex (male = 1)	-0.025 (-0.87)	0.017 (0.87)	0.008 (0.87)
	Observations	1,321	

Note: ***<0.01, **<0.05, *<0.1.

The complete set of marginal effects in table 5 confirms that improvement in profitability across time has strong negative correlation with leverage level positions. For example, those enterprises that reported increased profitability saw a 14% increase in the probability of being in no-debt category while the corresponding probabilities of staying in moderate and high levels of leverage declined by about 9% and 5%, respectively. Consistent with the pecking order theory, these findings imply more profitable enterprises tend to rely on internal financing schemes while less profitable enterprises seek external debt finance as their internal resources are insufficient. Negative correlations (with and without qualifications) between leverage and different profit measures have been confirmed by previous studies that include, among others, Klapper et al. (2006), Abor (2008), Bas et al. (2009), Forte et al. (2013), Handoo and Sharma (2014), Umer (2014), Alipour et al. (2015), Gwatidzo et al. (2015), Sarlija and Harc (2016), and ur Rehman et al. (2017). The present finding is, however, inconsistent with Scherr et al. (1993) who confirmed the existence of significant positive correlation between expected business income and the level of debt relative to total firm capitalization.

Ownership structure of the firm has been suggested to correlate with current and future financing patterns. For instance, Klapper et al. (2006) considered variation among public, private, and foreign controls while ur Rehman et al. (2017) compared financing adjustments between private and government owned companies. As all firms in this study are under private control, it would be interesting to see if sole proprietors behave any differently from group/family controlled enterprises in terms of their leverage positions. In the results presented in table 5, the marginal effect estimates for solo enterprises is statistically insignificant for all leverage categories. Similarly, government policy efforts through the provision of business development services (yes=1) and supporting the formation of group enterprises (government = 1) do not seem to exert meaningful influence on the probability of debt financing preferences of the firms under consideration.

The marginal effects in table 5, also reveal that entrepreneurs with at least college education attainment see increased probabilities of exposure to higher level of debt financing compared with the literate (the base group)—results which are significant at 90 percent confidence level. This finding clearly contradicts the results of Nawi (2015) who found no significant association between entrepreneurs' education and related financial decisions of SMEs. Other studies by Abor (2008), Osei-Assibey et al. (2012) and Kuruppu and Azeez (2016) have found some subtle effects of education on the financing structure of firms. Last, consistent with the results of Scherr et al. (1993) this specific study does not reveal significant relationship between gender and debt financing.

To sum up, the foregoing results confirm the two hypotheses of the study suggesting that government involvement through the provision of business development services and bureaucratic support in business formation processes has no impact on the debt financing behavior of firms.

4.3. Sub sample, location and subsector membership fixed effects

Tables 6 to 9 present various estimation outputs⁹ to see whether the results discussed so far hold out under different practical scenarios. Tables 6, 7 and 8 show three blocks of marginal effects using different classification criteria: firm age, firm size, and recent access to external funding opportunities. First, the effect of the composition of startup finance on current debt level maintains its economic and statistical significance in all the three blocks of regression results. Second, recent access to credit also raises the probabilities of being in higher leverage categories. Third, the other controls that were significant in the baseline specification—profit measure, firm age, firm size, and education—also enter significantly at standard confidence levels. Last, access to business development services, ownership type, sex of owner/manager, and the role of government initiative in the formation of group-based enterprises remain strikingly insignificant as in the baseline model reported in table 5.

Table 9 provides an additional support for the consistency of the baseline results. In this case the location and subsector fixed effects are taken into account. There are eleven zonal capital towns in our sample and Bahirdar is the omitted benchmark category. Similarly, twelve subsectors were identified within the target small-scale manufacturing industry and the bamboo subsector has been omitted in the relevant regression to avoid indeterminacy in the estimation process (see Appendix for sub sector description). Apparently, there is no noticeable connection between enterprise subsector membership and the degree of debt financing. However, regarding location, the results are fairly in line with conventional empirical regularity. With the exception of Debre Markos, the probability of being in higher debt levels tend to increase in entrepreneurial towns like Desse and Injibara¹⁰ and remain insignificant in smaller urban

⁹ For brevity, table 9 presents the results without the variables that were insignificant in the baseline estimation. These variables were also found highly insignificant in the robustness checking exercises. Similarly, all the subsector categories had insignificant marginal effect estimates and were omitted in reports presented in table 9. Additional regression output that controls for the state of credit constraint is included in table 14 in the appendix. The marginal effects in table 14 are still consistent with the baseline estimation output reported in table 5.

¹⁰ With a population of over 200,000, Desse is a very significant commercial town in Amhara region. Nearly half of its residents are Muslims who historically tend to be business entrepreneurs. Injibara also enjoys noticeable

areas like Debre Tabor, Finote Selam, and Woldiya. Looking at the marginal effects for Desse, the relevant results suggest that enterprises located in this town saw a 23% reduction in the probability of staying in the no-debt category while the corresponding probabilities of being in moderate and high levels of leverage categories are about 17% and 7%, respectively. This last result is consistent with previous studies that confirmed that firms in sparsely populated and low income locations tend to be associated with limited exposure to external debt financing options (Osei-Assibey et al. 2012).

Table 6 Determinants of debt levels: ordered-probit marginal effects by firm age

<i>Dependent variable: debt level categories</i>						
	<i>Firm age < 4 years</i>			<i>Firm age > = 4 years</i>		
	<i>Pr. (no debt)</i>	<i>Pr.(lev. < 50%)</i>	<i>Pr.(lev. >=50%)</i>	<i>Pr. (no debt)</i>	<i>Pr.(lev. <50%)</i>	<i>Pr.(lev. >=50%)</i>
Startup finance (debt=1)	-0.420*** (-10.75)	0.275*** (8.42)	0.145*** (8.06)	-0.337*** (-8.69)	0.230*** (7.44)	0.107*** (6.87)
Firm size (total labour force)	-0.007* (-1.75)	0.005* (1.74)	0.002* (1.73)	-0.005 (-1.15)	0.003 (1.15)	0.002 (1.15)
Profitability-unchanged	0.105* (1.72)	-0.061* (-1.78)	-0.044 (-1.59)	0.098 (1.48)	-0.059 (-1.52)	-0.039 (-1.38)
Profitability –increased	0.143** (2.51)	-0.086** (-2.71)	-0.056** (-2.16)	0.152** (2.55)	-0.096** (-2.79)	-0.056** (-2.12)
Ownership (solo=1)	0.006 (0.14)	-0.004 (-0.14)	-0.002 (-0.14)	0.0163 (0.39)	-0.011 (-0.39)	-0.005 (-0.39)
Firm formation (government=1)	-0.064 (-1.21)	0.042 (1.20)	0.022 (1.20)	0.0391 (0.65)	-0.027 (-0.65)	-0.012 (-0.65)
Access to BDS (yes=1)	0.043 (1.07)	-0.279 (-1.07)	-0.015 (-1.07)	0.025 (0.62)	-0.017 (-0.62)	-0.008 (-0.62)
Education-primary	-0.102 (-1.59)	0.068 (1.55)	0.021* (1.63)	0.059 (0.90)	-0.043 (-0.91)	-0.016 (-0.87)
Education-secondary	-0.072 (-1.22)	0.049 (1.18)	0.023 (1.28)	-0.023 (-0.39)	0.016 (0.39)	0.007 (0.40)
Education-college+	-0.049 (-0.74)	0.034 (0.73)	0.014 (0.74)	-0.136** (-1.95)	0.085** (1.89)	0.051** (1.94)
Sex (male=1)	-0.026 (-0.62)	0.017 (0.32)	0.008 (0.62)	-0.019 (-0.47)	0.013 (0.47)	0.006 (0.47)
Observations	657			664		

*Note: Z values are provided in brackets ***<0.01, **<0.05, *<0.1*

commercial activities due to its proximity to Sudan to the West and its location on the crossing of the highways leading to Addis Ababa and Asosa, the capital of the Benishangul-Gumuz regional state.

Table 7 Determinants of debt levels: ordered-probit marginal effects by firm size

<i>Dependent variable: debt level categories</i>						
	<i>Firm size < 6 workers</i>			<i>Firm size >= 6 workers</i>		
	<i>Pr.(no debt)</i>	<i>Pr. (lev. < 50%)</i>	<i>Pr. (lev >= 50%)</i>	<i>Pr. (no debt)</i>	<i>Pr. (lev. <50%)</i>	<i>Pr.(lev. >=50%)</i>
Startup finance (debt=1)	-0.369*** (-11.27)	0.237*** (9.16)	0.132*** (8.91)	-0.386*** (-7.77)	0.279*** (6.51)	0.107*** (5.60)
Firm age >= 4 & <= 6 years	-0.028 (-0.79)	0.022 (0.80)	0.011 (0.78)	0.006 (0.11)	-0.004 (-0.11)	-0.002 (-0.11)
Firm age > 6 & <= 8 years	0.052 (0.82)	-0.034 (-0.79)	-0.018 (-0.87)	0.200** (2.68)	-0.156** (-2.54)	-0.045** (-2.72)
Firm age > 8 years	0.131** (2.32)	-0.092** (-2.16)	-0.039** (-2.63)	0.067 (0.78)	-0.048 (-0.76)	-0.019 (-0.82)
Profitability-unchanged	0.059 (1.13)	-0.034 (-1.16)	-0.025 (-1.10)	0.171** (1.92)	-0.107** (-2.04)	-0.063* (-1.61)
Profitability –increased	0.125** (2.62)	-0.076** (-2.79)	-0.049** (-2.31)	0.180** (2.25)	-0.114** (-2.57)	-0.066* (-1.73)
Ownership (solo=1)	0.031 (0.90)	-0.020 (-0.90)	-0.011 (-0.90)	-0.043 (-0.79)	0.031 (0.78)	0.011 (0.78)
Firm formation (government=1)	-0.081 (-1.57)	0.052 (1.56)	0.029 (1.56)	0.045 (0.73)	-0.032 (-0.73)	-0.012 (-0.73)
Access to BDS (yes=1)	0.041 (1.23)	-0.026 (-1.23)	-0.015 (-1.23)	-0.006 (-0.10)	0.004 (0.10)	0.002 (0.10)
Education-primary	-0.022 (-0.42)	0.015 (0.42)	0.007 (0.42)	-0.022 (-0.23)	0.016 (0.23)	0.006 (0.23)
Education-secondary	-0.067 (-1.40)	0.044 (1.36)	0.023 (1.46)	0.024 (0.27)	-0.018 (-0.27)	-0.006 (-0.26)
Education-college+	-0.102* (-1.76)	0.066 (1.75)*	0.037* (1.74)	-0.076 (-0.81)	0.052 (0.79)	0.023 (0.85)
Sex (male=1)	-0.035 (-1.04)	0.023 (1.03)	0.013 (1.03)	-0.021 (-0.37)	0.015 (0.37)	0.006 (0.37)
Observations		910			411	

Note: Z values are provided in brackets ***<0.01, **<0.05, *<0.1

Table 8 Determinants of debt levels: ordered-probit marginal effects by recent access to credit*Dependent variable: debt level categories*

	<i>Not accessed</i>			<i>Accessed</i>		
	<i>Pr. (no debt)</i>	<i>Pr.(lev. <50%)</i>	<i>Pr.(lev. >=50%)</i>	<i>Pr.(no debt)</i>	<i>Pr.(lev. <50%)</i>	<i>Pr.(lev. >=50%)</i>
Startup finance (debt=1)	-0.224*** (-5.13)	0.122*** (4.47)	0.102*** (4.85)	-0.320*** (-9.13)	0.211*** (7.65)	0.109*** (7.01)
Firm age >= 4 & <= 6 years	0.011 (0.25)	-0.005 (-0.25)	-0.006 (-0.25)	0.020 (0.58)	-0.013 (-0.58)	-0.007 (-0.58)
Firm age > 6 & <= 8 years	0.193** (2.43)	-0.122** (-2.12)	-0.071** (-2.92)	0.068 (1.33)	-0.046 (-1.28)	-0.022 (-1.42)
Firm age > 8 years	0.194** (2.45)	-0.122** (-2.14)	-0.071** (-2.92)	0.071 (1.32)	-0.048 (-1.27)	-0.023 (-1.41)
Firm size (total labour force)	0.000 (0.03)	-0.000 (-0.03)	-0.000 (-0.03)	-0.009** (-3.03)	0.006** (2.96)	0.003** (2.92)
Profitability-unchanged	0.017 (0.26)	-0.008 (-0.26)	-0.009 (-0.26)	0.103* (1.86)	-0.059** (-1.92)	-0.044* (-1.73)
Profitability –increased	0.073 (1.23)	-0.038 (-1.35)	-0.035 (-1.11)	0.174** (3.39)	-0.106*** (-3.65)	-0.068** (-2.82)
Ownership (solo=1)	0.009 (0.21)	-0.005 (-0.21)	-0.004 (-0.21)	0.018 (0.55)	-0.012 (-0.55)	-0.006 (-0.55)
Firm formation (government=1)	0.022 (0.38)	-0.012 (-0.38)	-0.009 (-0.38)	-0.077* (-1.70)	0.051* (1.69)	0.026* (1.68)
Access to BDS (yes=1)	0.013 (0.29)	-0.007 (-0.29)	-0.006 (-0.29)	0.043 (1.36)	-0.028 (-1.36)	-0.015 (-1.35)
Education-primary	0.040 (0.95)	-0.018 (-0.61)	-0.023 (-0.57)	-0.020 (-0.44)	0.014 (0.44)	0.005 (0.44)
Education-secondary	0.134** (2.08)	-0.072** (-2.36)	-0.063* (-1.73)	-0.125** (-2.96)	0.084** (2.79)	0.041** (3.05)
Education-college+	0.010 (0.14)	-0.004 (-0.14)	-0.006 (-0.14)	-0.114** (-2.13)	0.077** (2.13)	0.037** (2.02)
Sex (male=1)	0.032 (0.72)	-0.018 (-0.72)	-0.015 (-0.72)	-0.039 (-1.20)	0.026 (1.19)	0.013 (1.19)
Observations		522			799	

*Note: Z values are provided in brackets ***<0.01, **<0.05, *<0.1*

Table 9 Ordered-probit marginal effects with location and subsector fixed effects

<i>Dependent variable: debt level categories</i>			
Predictors	Pr.(no debt)	Pr. (lev. < 50%)	Pr. (lev. >=50%)
Startup finance (debt=1)	-0.299*** (-9.72)	0.217*** (8.85)	0.082*** (7.97)
Firm age >= 4 & <=6 years	0.008 (0.25)	-0.006 (-0.25)	-0.002 (-0.25)
Firm age >6 & <= 8 years	0.115** (2.40)	-0.087** (-2.29)	-0.028** (-2.66)
Firm age > 8 years	0.104** (2.06)	-0.078** (-1.98)	-0.026** (-2.28)
Firm size (total workforce)	-0.008** (-2.69)	0.006** (2.67)	0.002** (2.65)
Profitability -unchanged	0.072 (1.54)	-0.048 (-1.57)	-0.024 (-1.46)
Profitability -increased	0.128** (2.99)	-0.088** (-3.17)	-0.040** (-2.55)
Education –primary	-0.015 (-0.32)	0.011 (0.32)	0.004 (0.32)
Education - secondary	-0.047 (-1.08)	0.035 (1.060)	0.012 (1.12)
Education – college+	-0.084* (-1.65)	0.061* (1.63)	0.023* (1.65)
Access to credit (yes= 1)	-0.190*** (-6.22)	0.133*** (6.23)	0.057*** (5.24)
Location			
DebreBirhan	-0.148** (-2.50)	0.107** (2.60)	0.040** (2.16)
Debre Markos	0.190*** (4.12)	-0.162*** (-4.08)	-0.027*** (-3.53)
Debre Tabor	0.067 (1.21)	-0.055 (-1.19)	-0.012 (-1.25)
Desse	-0.229*** (-4.62)	0.156*** (4.68)	0.073*** (3.87)
Finot Selam	-0.109 (-1.59)	0.081 (1.64)	0.028 (1.41)
Gondar	-0.092** (-2.11)	0.070** (2.09)	0.023** (2.05)
Injibara	-0.308*** (-5.11)	0.195*** (5.66)	0.114*** (3.69)
Kemisse	-0.081 (-1.09)	0.061 (1.12)	0.019 (0.98)
Seqota	-0.207** (-2.87)	0.144** (3.12)	0.063** (2.24)
Woldiya	-0.092 (-1.50)	0.069 (1.54)	0.022 (1.37)
	Observations	1,321	

Note: ***<0.01, **<0.05, *<0.1.

4.4 Conditional mixed process (CMP) system estimation

The results discussed up until now were produced under the implicit assumption that all right-hand-side variables are exogenous. This implicit assumption ignores the possibility that causality could run in both directions. For instance, the results so far confirmed that the nature of startup financing mix affects current leverage structure significantly. It is also possible to argue that current financing structure could influence the nature of startup financing in existing and newly created enterprises. Ignoring such potential spillover effects running in both directions could constitute a major model misspecification if they are present. A similar argument can be made in view of the profitability variable.

As outlined in the methodology section, the target dependent variable (leverage level) is of ordinal scale taking on values 0, 1, and 2 while the potential endogenous predictors include startup financing mix which is binary and profitability with three levels (decreased, unchanged, and increased). Roodman (2011) has developed fully observed recursive conditional mixed process (CMP) framework that extends the standard seemingly unrelated regression (SUR) model into a non-linear setting. The CMP approach facilitates inter-dependent equations to be correlated across a recursive system where the dependent variables could be binary, ordered, or truncated. The CMP framework allows the endogenous independent variable in one equation to act as a dependent variable in another equation through recursive arrangement. The CMP model is superior to the standard single equation estimation techniques only in so far as the correlation coefficient of the error terms between the two equations is statistically significant.

Table 10 displays the marginal effects for both the leverage and startup financing equations. The degree of correlation between the two equations (Atanhrho) is -1.537 and is statistically significant at 99 confidence level—which justifies the use of system estimation confirming the cross-equation interdependence in both directions. However, the possibility of endogenous feedback from the profitability¹¹ equation is not supported empirically as the estimated correlation measure is statistically insignificant (see the coefficient estimates included in

¹¹ The leverage, startup, and profitability equations were also considered all at once. But, like the two-equation-system results in table 15 (in the appendix), the parameters in the profitability equation were not precisely estimated. The degree of correlation between startup and profitability equations was also insignificant.

appendix table 15). In both cases, a new categorical variable called ‘rental cost’ was used as a possible excluded instrument. The rental cost variable is a binary indicator that equals 1 if the specific firm reported that rental cost of production and/or sales premises is important and zero otherwise.

Table 10 Determinants of debt levels: marginal effects from CMP system estimation for endogenous startup finance mix

<i>Dependent variable: debt level categories</i>				
	<i>Debt level equation</i>			<i>Startup finance equation</i>
	<i>Pr. (no debt)</i>	<i>Pr.(lev. <50%)</i>	<i>Pr.(lev. >=50%)</i>	<i>Pr.(debt=1)</i>
Startup finance (debt=1)	-0.508*** (-77.89)	0.108*** (13.12)	0.401*** (44.30)	
Firm age >= 4 & <= 6 years	0.006 (0.38)	-0.001 (-0.38)	-0.048 (-0.38)	0.010 (0.13)
Firm age > 6 & <= 8 years	0.051* (1.82)	-0.011* (-1.77)	-0.041* (-1.83)	-0.022 (-0.17)
Firm age > 8 years	0.063** (2.21)	-0.013** (-2.15)	-0.050** (-2.22)	0.081 (0.63)
Firm size (total labour force)	-0.001 (-0.66)	0.000 (0.65)	0.001 (0.66)	0.015* (1.80)
Profitability-unchanged	0.039 (1.56)	-0.008 (-1.54)	-0.031 (-1.56)	0.089 (0.73)
Profitability –increased	0.069** (3.09)	-0.015** (-2.92)	-0.055** (-3.12)	0.081 (0.73)
Ownership (solo=1)	0.034** (2.10)	-0.008* (-1.73)	-0.027** (-2.09)	0.137* (1.75)
Firm formation (government=1)	0.038* (1.75)	-0.008* (-1.76)	-0.030* (-1.75)	0.367*** (3.39)
Access to BDS (yes=1)	0.028* (1.79)	-0.006* (-1.76)	-0.022* (-1.79)	0.136* (1.79)
Education-primary	-0.033 (-1.29)	0.007 (1.28)	0.026 (1.29)	-0.072 (-0.59)
Education-secondary	-0.013 (-0.53)	0.003 (0.53)	0.010 (0.53)	0.053 (-0.59)
Education-college+	0.015 (0.55)	-0.003 (-0.55)	-0.012 (-0.55)	0.374** (2.79)
Sex (male=1)	-0.014 (-0.86)	0.003 (0.86)	0.011 (0.86)	-0.038 (-0.50)
Rental cost				-0.147** (-2.50)
Observations		1321		1321
Atanhrho		-1.537*** (-7.34)		

*Note: Z values are provided in brackets ***<0.01, **<0.05, *<0.1*

The marginal effects presented in table 10 suggest that considering the endogeneity of startup finance mix reveals a number of interesting results. First, while the statistical significance

remains intact, the estimated marginal effects for startup are 51% (negative), 11%, and 40% for being in no-debt, moderate, and high levels of leverage categories, respectively. In other words, the probability of being in either extreme category is substantially larger compared with the baseline results. Second, the sign and significance of both firm age and profitability are also preserved in the system estimation results. Third, the ownership variable, which was insignificant so far, now enters significantly at 95 percent confidence level. Fourth, the policy activism variables become statistically significant at 90 percent confidence levels. Specifically, firms which have government support during their formation process and firms having exposure to business development services see increased probability of being in the zero-debt and decreased probabilities of being in higher debt categories. This could be due to the fact that firms that get bureaucratic support and entrepreneurial training are more successful in their business performance which in turn lowers the odds of being in higher levels of indebtedness. Finally, firm size, ownership structure, government support in business formation process, education attainment, and perception about the role of rental cost are significant drivers of the mix of startup finance. For instance, having college education raises the probability of using debt in startup financing by about 37%, a result significant at 95 percent confidence level. This implies that education affects leverage level indirectly through its effect on the choice of startup finance mix.

5. Conclusion and recommendations

Understanding the patterns and drivers of firm balance sheet composition is important from macro- and micro-economic points of view. This paper explores the determinants of debt levels among small-scale manufacturing enterprises in Ethiopia. The study relies on survey data gathered from Amhara region during 2016/17 fiscal year and employs descriptive and conditional mixed process (CMP) estimation techniques to isolate the effects of both standard and heterodox factors on firm financing preferences. The major finding suggests that enterprises that had some debt mix in their startup capital are more likely to be in higher leverage categories than those enterprises that kick start exclusively with their own internal resources. The economic and statistical significance of this persistence survived in the face of alternative specifications that allowed location and intra-industry fixed effects as well as system estimations. In addition, the results also revealed that profit measure, firm age, ownership structure, access to business development services, and receipt of bureaucratic support during enterprise formation have strong correlation with degree of firms' indebtedness.

The foregoing results provide several policy relevant insights. First, the systematic connection between startup and current balance sheet structures suggests for the presence of largely static nature of debt utilization among small-scale manufacturing establishments in Ethiopia. In other words, enterprises that start business with their own internal finances are less likely to seek external credit and therefore less likely to accumulate liabilities over time. For instance, the descriptive results indicated that out of the 849 firms without any debt upon establishment, only 191 (22%) were able to access external finance and only 24% had some debt at the time of the interview. Since policy activism was found to have significant relationship with the likelihood of using less debt finance, concerned policymakers should strengthen existing financial and non-financial policy intervention packages in order to lower the probability of firms' falling into destabilizing debt levels

Finally, this study documented that access to government-provided business development services has noticeable effect on the financing decisions of the target firms. While these services include technology extension and work place management and related skill transfers, due consideration should be given to the art of exploring and utilizing outside funding sources as there is mounting evidence about the positive effects of external financing on several metrics of firm growth (see, for instance, Levine (2004) for a systematic review of the literature on the finance-growth nexus). Moreover, the National Bank of Ethiopia (NBE 2019) report indicates that the non-performing loan in the Ethiopian financial system for the year 2017/18 was below the required ceiling of 5%. This suggests that there is still substantial room for the country to work on the aggressive expansion of debt financing to its consumers and entrepreneurs.

Limitation of the study

One major challenge when trying to study small and micro manufacturing enterprises —especially in low-income countries—is that these firms do not maintain financial recordings of their transactions on a regular basis, not even at semi-annual or yearly frequencies. This creates a major problem for quantitative analysis as information on the necessary variables such as asset, debt, profit, tangibility, effective tax rate, and liquidity, which are widely used in capital structure studies are not immediately accessible. Finally, impact assessment could have been considered (say, using difference-in-difference approach) if observations for at least two years were available. Future researchers can take advantage of these caveats recognized in this study.

Declarations:

Abbreviations

BDS: business development services; GCR: Global Competitiveness Report; GDP: gross domestic product; IMF: International Monetary Fund; NBE: National Bank of Ethiopia; POT: pecking order theory; SME: small and medium enterprises; TOT: tradeoff theory.

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Availability of data and material

The author is willing to share the data with anyone upon reasonable request.

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http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

Appendix 1

Table 11 Distribution of small and micro manufacturing enterprise by sector engagement (N=1321)

Sector	Number	Percent
Detergent	9	0.7
Bamboo	17	1.3
Jewelry	17	1.3
Leather	20	1.5
Stove	37	2.8
Drink	38	2.9
Metal	146	11.1
Wood &Metal	161	12.2
Wood	194	14.7
Textile	227	17.2
Food	398	30.1
Other	56	4.2

Appendix 2

Table 12 Contingency correlation test results for the existence of dependence among qualitative determinants of debt financing preferences

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Startup (a)	1										
Firm age (b)	0.020	1									
Profit (c)	0.059	0.067	1								
Credit access(d)	0.468	0.131	0.098	1							
BDS(e)	0.065	0.052	0.059	0.039	1						
Gov't role (f)	0.140	0.075	0.058	0.046	0.019	1					
Ownership (g)	0.150	0.113	0.069	0.045	0.032	0.383	1				
Education (h)	0.109	0.075	0.124	0.112	0.071	0.013	0.062	1			
Sex (i)	0.036	0.063	0.090	0.067	0.029	0.049	0.012	0.123	1		
Location (j)	0.163	0.197	0.209	0.192	0.257	0.166	0.305	0.222	0.240	1	
Subsector (k)	0.099	0.136	0.129	0.139	0.103	0.087	0.118	0.127	0.463	0.183	1

Notes: Cramer's V correlation stats are all below 0.5 signaling the absence of serious linear dependence among the target qualitative predictors.

Appendix 3

Table 13 Determinants of debt levels: baseline ordered-probit coefficient estimates

	<i>Dependent variable: debt level categories</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Startup finance (debt=1)	0.989*** (14.27)	0.997*** (14.35)	0.985*** (14.12)	0.997*** (14.24)	0.973*** (13.84)	0.965*** (13.55)	0.984*** (13.71)
Firm age >= 4 & <=6 years		0.029 (0.39)	0.009 (0.12)	0.024 (0.31)			0.027 (0.35)
>6 & <= 8 years		-0.283** (-2.13)	-0.310** (-2.32)	-0.313** (-2.34)			-0.319** (-2.36)
> 8 years		-0.307** (-2.26)	-0.336** (-2.45)	-0.310** (-2.26)			-0.314*** (-2.26)
Firm size (total labour force)			(0.016)** (2.24)	0.016** (2.21)	0.014* (1.85)	0.013* (1.79)	0.016** (2.10)
Profitability -unchanged				-0.217** (-1.95)			-0.227** (-2.00)
-increased				-0.346** (-3.40)			-0.370** (-3.56)
Ownership (solo=1)					-0.11 (-0.15)	-0.15 (-0.20)	-0.054 (-0.71)
Firm formation (government = 1)					0.074 (0.73)	0.079 (0.78)	0.067 (0.65)
Access to BDS (yes=1)						-0.107 (-1.46)	-0.085 (-1.14)
Education –primary						0.020 (0.16)	0.050 (0.40)
- secondary						0.051 (0.46)	0.095 (0.83)
- college and above						0.161 (1.27)	0.236* (1.83)
Sex (male=1)						0.057 (0.75)	0.066 (0.87)
Pseudo R^2	0.090	0.093	0.090	0.101	0.091	0.093	0.104

Note: Z values are provided in brackets ***<0.01, **<0.05, *<0.1

Table 14 Ordered-probit marginal effects: controlling for the state of credit constrained

<i>Dependent variable: debt level categories</i>			
Predictors	Pr.(no debt)	Pr. (lev. < 50%)	Pr. (lev. >=50%)
Startup finance (debt=1)	-0.352*** (-12.73)	0.238*** (10.75)	0.114*** (10.00)
Firm age >= 4 & <=6 years	-0.001 (-0.05)	0.001 (0.05)	0.000 (0.05)
Firm age >6 & <= 8 years	0.125** (2.72)	-0.090** (-2.56)	-0.035** (-3.03)
Firm age > 8 years	0.112** (2.31)	-0.079** (-2.19)	-0.032** (-2.57)
Firm size (total workforce)	-0.006** (-2.08)	0.004** (2.07)	0.002** (2.06)
Profitability -unchanged	0.090** (1.99)	-0.054** (-2.05)	-0.036* (-1.87)
Profitability -increased	0.146*** (3.56)	-0.092*** (-3.85)	-0.054** (-3.01)
Ownership (solo=1)	0.026 (0.87)	-0.017 (-0.87)	-0.008 (-0.87)
Firm formation (government=1)	-0.030 (-0.76)	0.020 (0.76)	0.009 (0.76)
Access to BDS (yes=1)	0.034 (1.20)	-0.023 (-1.20)	-0.011 (-1.20)
Education –primary	-0.018 (-0.39)	0.013 (0.39)	0.005 (0.39)
Education - secondary	-0.034 (-0.80)	0.024 (0.79)	0.010 (0.82)
Education – college+	-0.08* (-1.66)	0.054* (1.63)	0.027* (1.67)
Sex (male = 1)	-0.02 (-0.69)	0.014 (0.69)	0.007 (0.69)
Reason	0.154*** (4.67)	-0.104*** (-4.54)	-0.050*** (-4.51)
	Observations		1,321

Note: ***<0.01, **<0.05, *<0.1.

Note: the regression output adds control for those firms which did not have access to credit in the couple of years before the conduct of the survey but did so because they had no need in the first place. The 'Reason' variable is a dummy that takes a value of 1 if the specific firm did not have access to credit because it had no need for external finance and 0 otherwise.

Table 15 Determinants of debt levels: coefficients from CMP system estimation for possible endogenous profitability

<i>Dependent variable: debt level categories</i>		
	<i>Debt level equation</i>	<i>Profitability equation</i>
Firm age >= 4 & <= 6 years	0.067 (0.92)	-0.079 (-1.12)
Firm age > 6 & <= 8 years	-0.235* (-1.69)	-0.081 (-0.69)
Firm age > 8 years	-0.227* (-1.78)	0.057 (0.39)
Firm size (total labour force)	0.019** (2.55)	-0.004 (-0.53)
Profitability-unchanged	1.329 (1.50)	
Profitability –increased	0.473 (0.99)	
Ownership (solo=1)	0.033 (0.46)	-0.059 (-0.84)
Firm formation (government=1)	0.158 (1.49)	0.066 (0.68)
Access to BDS (yes=1)	-0.067 (-0.93)	0.103 (1.50)
Education-primary	-0.046 (-0.40)	0.086 (0.78)
Education-secondary	0.030 (0.26)	0.145 (1.43)
Education-college+	0.284** (1.98)	0.117 (0.99)
Sex (male=1)	0.108 (1.35)	-0.181** (-2.59)
Rental cost		-0.105* (-1.69)
Observations	1321	1321
Atanhrho	-0.585 (-1.40)	

Note: Z values are provided in brackets ***<0.01, **<0.05, *<0.1