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RESEARCH ARTICLE

Does the information content and value relevance of trade debt in early-stage firms help in raising external equity?

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Abstract We assess the information content and value relevance of trade debt for external equity providers deploying the Kauffman Survey Data on early-stage firms. Our findings indicate that trade debt attracts external equity by virtue of its information content and determines its amount by virtue of its value relevance in unprofitable but growing firms. These findings remain robust after controlling for nonfinancial information on firms and their owners, macroeconomic conditions, and tests of reverse causality. The findings persist for firms that are labor-intensive, use simple technologies, and recur to high levels of trade debt. Our findings highlight critical links between debt and equity markets in early-stage firms, and the need to factor the signaling earnings potential (information content), and the relation between book and market estimates (value relevance), when it comes to assessing and valuing early-stage firms. We detail the academic, practice, and policy implications of these findings.

Plain English Summary Trade debt helps early-stage firms in raising external equity. Early-stage firms often require external equity to facilitate their growth. External equity providers need to rely on signals to reduce information asymmetries with respect to their earnings potential (information content), and to determine an appropriate value for these firms (value relevance). We draw on the theoretical and the empirical literatures to develop hypotheses that relate the information content and value relevance of trade debt. We test these hypotheses using the confidential Kauffman Survey data on early-stage firms. Our findings indicate that trade debt attracts external equity and determines its amount in unprofitable but growing firms. The relation between trade debt and external equity persists for firms that make intensive use of labor, operate with simple technologies, and recur to high levels of trade debt. Early-stage firms can thus attract external equity by signaling and showing the value relevance of their trade debt.

Keywords Asymmetric information · Financing policy · New firms

JEL classification D82 · G32 · M13

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1 Introduction

While the puzzling reason for early-stage firms (henceforth firms) resorting to external equity and not debt for their external financing, which contradicts the popular pecking order of the capital structure prescription in situations of high information asymmetries, continues to be debated in the academic, practitioner and policy circles (Vaznyte & Andries, 2019), it is crucial to understand the mechanism by which these highly opaque firms are able to attract external equity and facilitate the determination of their value.[1]

The absence of track records, audited financial statements, and the validation of activities by financial markets not only generates significant information asymmetries on the future growth potential but also concern over their value for external equity providers. These information asymmetries and valuation concerns can generate significant adverse selection and losses for equity providers. As such, external equity providers need to weave out content from the ex-ante information provided by firms to allay asymmetries (Akerlof, 1970; Spence, 1973) and ascertain their value (Casson, 2003, 2010). Information is said to carry content when it indicates or signals future growth prospects of firms (Miller & Modigliani, 1961),[2] and it is said to have value relevance when it determines the market value of firms (Ball & Brown, 1968; Beaver, 1968).[3] We assess the extent to which trade debt can attract external equity by virtue of the information contained in it and determine its value by virtue of its relevance.[4]

The existing literature contends that trade debt can alleviate debt market imperfections including rationing in the market for bank lending (Smith, 1987). This potential of trade debt is grounded on its advantage to gather and process information on customers. This distinct information processing advantage is derived from proximity to customers and their operations, which not only facilitates the assessment of their creditworthiness, short-term monitoring, and possibility of price discrimination, but also limits discretionary management of operations due to the underlying features of supplies and its salvaging value. The purposeful extension of debt in the supply of goods thus points towards a favorable assessment of suppliers about the future growth potential of their customers (Petersen & Rajan, 1997) which should be amplified in the case of financially constrained firms (Burkart & Ellingsen, 2004). This positive relation between trade debt and future growth potential of firms can be reversed if firms use trade debt for the purposes of exercising their financial power to benefit from price discrimination, reducing transactions associated with contracting bank debt or warranty, among others. Thus, trade debt usage by financially constrained or less profitable firms reinforces its positive relation with future growth potential (Goto et al., 2015).

This trade debt framework is complementary, and in the case of financially constrained or unprofitable firms substitutive (Fabbri & Menichini, 2010), to bank debt that relies on covenants and collateral to limit the discretionary management of cash (Epure & Guasch, 2020). Bank debt in the form of cash is commonly sourced by self-serving managers interested in drawing perquisites, entrenching or building empires. Such debt is rarely extended to financially constrained or unprofitable firms as it may make managers more

[1] The existing literature devotes significant attention to the financing of these small and medium size firms but not to the means by which these firms attract external equity (Beck et al., 2006; Cowling and Sclip, 2023; De Blick et al., 2024; Dejardin et al., 2024; Farè et al., 2024). Deal activity for early and late-stage equity in 2021 doubled from 2020, the overall activity in 2021 reached $329.6 billion against $166.4 billion in 2020 (Pitchbook & NVCA, 2022). The increasing activity of external equity providers in the eighteen months following the COVID-19 pandemic and the amounts of equity transactions involved demonstrate that early-stage firms continue attracting external equity.

[2] The information contained in dividends is said to signal future earning potential. It is also referred to as the signaling hypothesis.

[3] The distinction between information content and value relevance is important. The former relates announcements or disclosures on financial reporting measures to price changes which subsumes changes in cash flows and the beliefs that measure risks associated with future cash flows. The latter relates financial reporting measures accounted for at book values to market values. Information content and value relevance

Footnote 3 (continued)
studies are popularly used in the case of listed firms but not in the case of privately-held early-stage firms.

[4] Denominated and measured as accounts payables following Belluci et al. (2023), Bussoli et al. (2023) and Dottori et al. (2024). External equity is from business angels and venture capitalists. Future extensions can accommodate other measurements.

prone to overinvest, substitute safe for risky assets, or milk the better assets (Huyghebaert et al., 2007). Trade debt in the form of supplies is more commonly sourced by managers interested in maximizing value for their firms. Such debt is even extended to financially constrained or unprofitable firms as suppliers may be better informed about the future growth prospects of their customers (Aktas et al., 2012).

The trade debt framework can be quite costly to replicate and simulate, but external equity providers can use the signals embedded in this framework to reduce information asymmetries relating to the ex-ante growth potential and to appraise the value of early-stage firms. To the best of our knowledge, the link between trade debt and external equity in the case of the very opaque early-stage firms has not yet been developed and tested. We address this gap in the literature by investigating the extent to which trade debt attracts and determines the value of external equity. To do so, we develop our main hypotheses building on the theory and literature related to trade debt, and test these hypotheses recurring to the multistage empirical framework of Heckman and to the confidential data obtained from the Kauffman Firm Survey database on early-stage firms in the United States (U.S.) between 2004 and 2011. Our findings indicate that trade debt attracts external equity and determines its value in unprofitable but growing firms after controlling for nonfinancial information on firms and their owners, and macroeconomic conditions (Bhimani et al., 2013). Tests of reverse causality confirm that the relationship runs from trade debt to external equity and not the other way round. The findings persist in firms that operate in labor-intensive industries, use simple technologies and recur to large amounts in trade debt.

In Section 2, we develop our main hypothesis. In Section 3, we describe our data and the method. We report the findings in Section 4 before concluding with a discussion that also addresses the academic, practice, and policy implications.

2 Theory, empirical evidence, and hypotheses

The pervasiveness of information asymmetries in the financing of firms is most pronounced in the pecking order theory (Myers, 1984; Myers & Majluf, 1984), which advocates a hierarchy that runs from internal to external sources. Equity issuance is rare, as it generates the highest level of asymmetries: managers that believe their firms are undervalued are likely to issue equity while managers that believe that their firms are overvalued are likely to issue debt, which also carries a risk premium albeit lower than equity. However, recent research on early-stage firms that are expected to exhibit high levels of information asymmetries shows that, after the initial equity of owners, these are markedly financed by external equity providers (Gregory et al., 2005; Lemmon & Zender, 2010). Moreover, trade debt is invariably more important for these firms than bank debt, and acquires heightened relevance as these firms enter into the growth phase (Cuñat, 2006). This order of financing is surprisingly at odds with the original prescription of the pecking order of financing alternatives (Robb & Robinson, 2014).

As early-stage firms do not commonly possess sufficiently long business histories and tangible assets (The Economist Events, 2014) to facilitate the attraction and determination of their value, external equity providers must rely on other sources to reduce information asymmetries and make value appraisals. An owner or promotor of a project that transforms it into an early-stage firm has two routes to tap into external debt before attracting external equity. One such route is trade debt which is short-term in nature, involves repeated trade between firms and their suppliers, relies on informal debt assessment, and focuses on closer monitoring of buyer illiquidity, salvage value of goods, and price discrimination; thus, generating information content and value relevance to the operational activity of firms (Petersen & Rajan, 1997). Trade debt ameliorates information asymmetries on the uncertainties associated with turnover and organic growth of early-stage firms. It thus indicates the presence of operational governance that ensures regular repayment of payables, monetization of supplies, liquidity, and embeddedness within the buyer–supplier ecosystem. Another route is bank debt which is long-term in nature, relies on formal debt scoring imposed by regulators and supervisors, resorts to covenants, collateral and guarantees to limit losses emerging from firm insolvency and illiquidity, and focuses on monitoring that disincentivizes mismanagement; thus, generates information content and value relevance on financial metrics and governance of firms (Epure & Guasch, 2020). Bank

debt ameliorates agency concerns associated with discretionary use of cash flows through collateral and covenants. It thus indicates the presence of financial governance that ensures the regular repayment of interest and principal, solvability, and the ability of banks to take control or repossess assets. Both routes can attract external equity but for distinct reasons. The distinct frameworks of trade and bank debts have led to the understanding that the two are complementary when firms are not financially constrained, and substitutes when firms are financially constrained (Fabbri & Menichini, 2010). Figure 1 synthesizes the main routes available to firms to tap into external debt before attracting external equity.

Some empirical studies show the interesting influence of trade debt on equity of listed firms. For example, Aktas et al. (2012), in a sample of 5466 U.S. listed firms over 1992–2007, show that trade debt translated into higher equity valuation and this effect was sharper for the opaquer firms, leading the authors to conclude that this was achieved by virtue of investors reading growth potential in these firms. Goto et al. (Goto et al., 2015) also, in a sample of 68,547 firm-years of U.S. listed firms over 1971–2009, show that trade debt translated into higher sales growth as well as equity returns and their predictability, again leading to the conclusion that this was achieved by virtue of investors reading growth potential in these firms.

In a related stream of research, trade debt has also been found to signal another feature, namely the implicit informal assessment of suppliers. Trade debt requires prior screening of buyers by sellers. To this end, such debt reveals the implicit pre-lending (observed) and post-lending (unobserved) risk of buyers as assessed by sellers (Murro & Peruzzi, 2022). Any post-credit default in repayment of such debt is more likely to crystallize early on than in its absence, namely where buyers pay in cash. The revelation of the implicit risk in buyer–supplier relationships is crucial for lenders given that it cannot be generated through financial markets. This private information on the implicit informal assessment embedded in trade debt has been shown to reduce rationing in bank lending (Smith, 1987). Empirical evidence along this line shows that the closeness of the buyer–supplier relationships facilitates gathering, processing and distribution of information which can act as a pre-lending screening device (Atanasova, 2007; Kling et al., 2014; Petersen & Rajan, 1997; Voordeckers & Steijvers, 2006). This role of trade debt is shown to pervade in the financing of 4543 surveyed Italian (Agostino & Trivieri, 2014), 352 Russian (Cook, 1999), 3561 U.S. (Alphonse et al., 2004), 72,849 European (Andrieu et al., 2018), and 60,377 European (Palacín-Sánchez et al., 2019) small and medium enterprises.

Overall, the literature indicates that suppliers gather and process important information on their buyers, and are very well positioned to have a clear perspective of their operational activity. Their information on the future growth opportunities is relevant

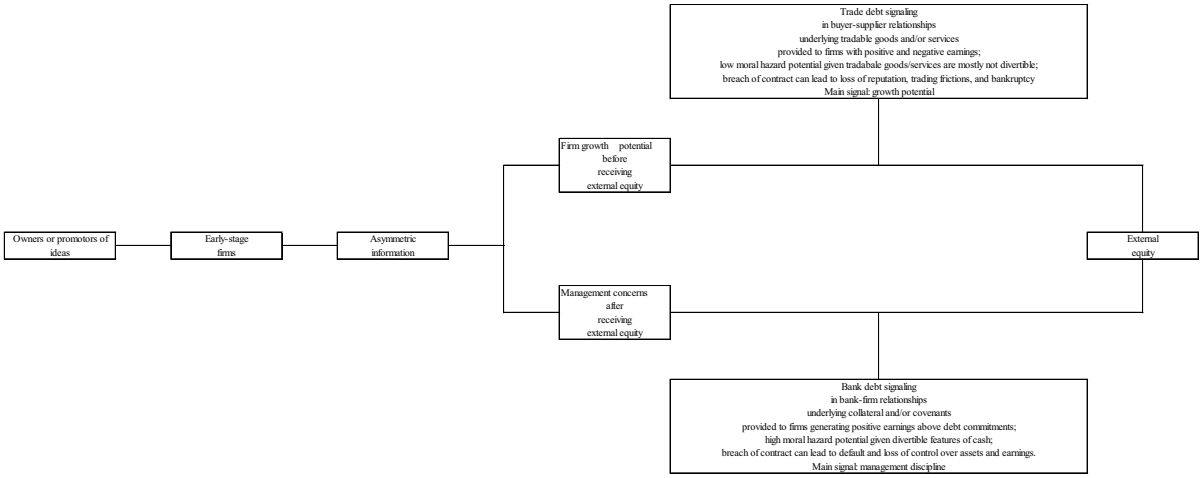

Fig. 1 Factors determining choice of trade and bank debt to signal external equity in early-stage firms

for equity (and debt) markets, and particularly in situations of high opacity (Aktas et al., 2012; Goto et al., 2015). These prior results from listed markets are encouraging as far as information asymmetries and value appraisal of early-stage firms are concerned for limiting adverse selection and losses for equity providers. Therefore, we expect that trade debt can reduce the ex-ante information asymmetries and facilitate value appraisal. *H1a: There is a positive relation between trade debt and the likelihood of attracting external equity (information content or signaling hypothesis). H1b: There is a positive relation between trade debt and the amount of external equity (value relevance hypothesis).*

3 Data and methods

3.1 Data

We use the confidential and detailed version of the Kauffman Firm Survey Data (KFSD). This data set is only available to researchers using a secure remote access data enclave provided by the National Opinion Research Center (NORC) based at the University of Chicago. The survey tracked 4928 firms from 2004 to 2011. The data contain information on industry, location, financials, financing sources, as well as detailed information on the entrepreneurs.

The target population for the survey was all new businesses established in 2004 in the U.S. As there was no national registry of startups at the time, Kauffman Foundation based the survey on firms that the Dun & Bradstreet database reported as starting in 2004. This database combines data from various sources involved in registering data on new businesses, such as state offices, credit bureaus, and credit card and shipping companies, among others.

The target population, the sampling process used to construct the initial sample, how the data are treated during the seven follow up surveys, and how the final survey data is organized for researchers is described neatly in DesRoches et al. (2008), Farhat and Robb (2014), and Robb et al. (2009). The KFSD includes sole proprietorships, limited liability companies (LLC), corporations and partnerships, and encompasses several sectors. We excluded sole proprietorships and partnerships due to their legal specificities. We also excluded utilities and financials (NAISCS codes 22, 52, and 53) due to their commercial and financial specificities. Although our empirical framework does not require continuous data, we condition the use of data for firms with two consecutive years and strictly positive values for the book value of total assets. Our final sample has 5822 firm-year observations and includes firms that have no gaps in data on any of the variables used.

We present a summary of the data and its descriptive statistics in Tables 1 and 2. The data in Table 1 show that the average proportion of firms that recur to trade debt in the full and sub-sample of firms that received external equity, and those that attracted external equity and recurred or did not recur to trade debt, with the respective average amounts of external equity received. These data show that 49% of firms recur to trade debt. Within the group that attracted external equity, 70% recur to trade debt. Within the group of firms that attracted external equity, the one that recurs to trade debt received an average amount of 1.19 million USD in external equity compared to an average amount of 0.64 million USD in external equity for the one that did not recur to trade debt. The data also show that more than 80% of the observations come from micro firms, and that medium and large firms only account for about 3% of the observations.[5] In terms of capital and labor intensities, the data show that more than 80% of the observations are from labor intensive industries. Table 2 shows that the average amount of external equity received by firms that attracted external equity is 2.09 million, and firms on average owe 0.07 million USD in accounts payables.[6]

[5] Micro firms operate with less than 10 employees, and less than 2 million USD of revenues and total assets. Small firms have more than 10 and less than 50 employees and more than 2 million and less than 10 million USD of revenues and total assets. Medium and large firms operate with more than 50 employees, and more than 10 million USD of revenues and total assets.

[6] In Table 2, the descriptive statistics for these variables are reported in natural logarithms. The pairwise correlations of all variables reported in Table 2 do not show linear dependence to the point of generating multicollinearity in multivariate regressions. These are available from the corresponding author.

Table 1 Percentage of early-stage firms with trade debt and that received external equity and observations by firm size. Trade debt is proxied with accounts payables. The average equity operations are in thousands of USDs. All variables represent the number, value, or percentage of each variable surveyed at the end of each year. One observation in 2009 was excluded from the current table because it involved one large equity increase of 200 million USD which could distort the analysis of the average external equity. Micro firms have less than 10 employees and less than 2 million USD of revenues and total assets. Small firms have more than 10 and less than 50 employees and more than 2 million and less than 10 million USD of revenues and total assets. Medium and large firms have more than 50 employees and more than 10 million USD of revenues and total assets

Description/Year	2005	2006	2007	2008	2009	2010	2011	Average
Full-sample of early-stage firms								
% with trade debt	45%	48%	50%	54%	51%	49%	45%	49%
Sub-sample of early-stage firms that received external equity								
% with trade debt	59%	65%	82%	83%	88%	80%	89%	70%
Sub-sample of early-stage firms that received external equity with trade debt								
Average external equity received (in thousands of USD)	1436	1442	959	1022	1464	352	396	1191
Sub-sample of early-stage firms that received external equity without trade debt								
Average external equity received (in thousands of USD)	315	988	71	149	1150	4025	725	642
Observations by industries/Year	2005	2006	2007	2008	2009	2010	2011	Total
Capital intensive	275	178	144	134	109	111	89	1040
Labor intensive	1125	850	679	624	544	505	454	4782
Observations by firm size/Year	2005	2006	2007	2008	2009	2010	2011	Total
Micro	1199	848	658	607	524	484	421	4741
Small	181	161	136	128	109	113	100	928
Medium and large	20	19	29	23	21	19	22	153
Total sample	1400	1028	823	758	653	616	543	5822

3.2 Methods

We model external equity as a two-step process in which, in the first-step, trade debt carries information content to external equity that may or may not provide equity, and in the seconds-step, conditional upon having attracted external equity, trade debt determines the amount of external equity. In this framework, the first-step information content regression may or may not be independent from the second-step value relevance regression when the amount is set. The empirical models to be tested can be described as follows, in which the information content (Eq. 1) and value relevance (Eq. 2) equations are:

$$\begin{aligned} Ext\_Eq\_Dum_{i,t} =& \alpha + \beta_1 Tradedebt_{i,t} + \beta_2 Ext\_Eq\_Dum_{i,t-1} \\ &+ \beta_3 X_{i,t} + \beta_4 Z_{i,t} + \beta_5 Crisis_{i,t} + \delta_{i,t} + \\ &+ \gamma_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

$$\begin{aligned} Ln(Ext\_Eq)_{i,t} =& \alpha + \beta_1 Tradedebt_{i,t} + \beta_2 X_{i,t} + \beta_3 Z_{i,t} \\ &+ +\beta_4 Crisis_{i,t} + \delta_{i,t} + \gamma_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where $Ext\_Eq\_Dum_{i,t}$ is a dummy variable that assumes one if the firm i attracts external equity in year t, and zero otherwise, $Ln(Ext\_Eq)_{i,t}$ is the logarithm of one plus the amount in USD of external equity received by firm i in year t. $Tradedebt_{i,t}$ is the logarithm of one plus the amount in USD of accounts payables of firm i in year t, or the amount in USD of accounts payables of firm i in year t minus the previous year, $X_{i,t}$ is a vector of variables related to firm i in year t, $Z_{i,t}$ is a vector of variables related to the characteristics of the principal owner i in year t, $Crisis_{i,t}$ is a dummy variable that assumes one between years 2007 and 2009, and zero otherwise, $\delta_{i,t}$ is the fixed effect for year, $\gamma_{i,t}$ is the fixed effect for industry,[7] and $\theta_{i,t}$ is a control variable for the legal status.

[7] These fixed effects intend to capture the distinct industries in which early-stage firms operate, namely professional, scientific, and technical services (32%), manufacturing (18%), lumber and wood products, except furniture (9%), retail (9%), administrative, support and waste management services (8%), and other (24%).

Table 2 Descriptive statistics of the variables of our sample of firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. Micro firms have less than 10 employees and less than 2 million USD of revenues and total assets. Small firms have more than 10 and less than 50 employees and more than 2 million and less than 10 million USD of revenues and total assets

Variables	Type	#	Mean	Std. Dev	Minimum	Maximum
Dependent						
External equity dummy	Yes = 1; No = 0	5822	0.03	0.18	0.00	1.00
External equity amount	Ln (1 + value of external equity in USD)	5822	0.38	2.12	0.00	19.11
Independent						
Main						
Trade debt	Ln (1 + value of accounts payables in USD)	5822	4.82	5.17	0.00	17.15
Variation in trade debt (1)	Value of accounts payables in (t) minus accounts payable in (t-1)—in millions of USD	5822	0.02	0.58	− 10.90	28.00
Financial debt (2)t	Ln (1 + value of financial debt in USD)	5822	5.76	5.24	0.00	17.62
Trade debt × Financial debt	Ln (1 + value of accounts payables in USD) × Ln(1 + value of financial debt in USD)	5,822	37.50	55.23	0.00	262.93
Variation in trade debt x Financial debt	(1) × (2)	5822	0.27	6.90	− 60.23	307.44
Bank debt (3)	Ln (1 + value of bank debt in USD)	5822	3.19	4.78	0.00	17.62
Trade debt × Bank debt	Ln (1 + value of accounts payables in USD) x Ln(1 + value of bank debt in USD)	5822	23.43	47.57	0.00	247.85
Variation in trade debt x Bank debt	(1) × (3)	5822	0.14	4.63	− 60.23	295.09
Micro firms	Yes = 1; No = 0	5822	0.81	0.39	0.00	1.00
Small firms	Yes = 1; No = 0	5822	0.16	0.35	0.00	1.00
Firm characteristics						
Revenues	Ln (1 + value of revenues in USD)	5822	10.64	4.34	0.00	20.09
Delinquency risk	Dun & Bradstreet delinquency risk score: 1 (lowest) to 5 (highest)	5822	2.88	0.98	1.00	5.00
Employees	Number of employees	5822	6.28	15.47	0.00	476.00
High-tech	Yes = 1(firm on industries defined as technology employers and generators; No = 0 (otherwise)	5822	0.19	0.39	0.00	1.00
Cash	Ln (1 + value of cash and deposits in USD)	5822	8.25	3.45	0.00	20.37
Accounts receivables	Ln (1 + value of accounts receivables in USD)	5822	6.56	5.08	0.00	16.77
Inventories	Ln (1 + value of inventories in USD)	5822	4.10	5.02	0.00	17.62
Fixed assets	Ln (1 + value of fixed assets in USD)	5822	8.18	4.49	0.00	18.42
Net profit	Net profit in thousands of USD	5822	22.47	956.60	− 54,000.00	28,342.32
Return on assets	Net profit over the value of total assets	5820	16%	1.11%	− 40,00%	21.43%
Owner characteristics						
Age	Number of years	5822	45.61	10.37	20.00	90.00
Industry experience	Number of years of industry experience of the principal owner	5822	14.55	10.81	0.00	60.00

Table 2 (continued)

Variables	Type	#	Mean	Std. Dev	Minimum	Maximum
Week hours	Number of average week hours dedicated by principal owner	5822	45.97	23.10	0.00	120.00
Startup experience	Number of previous startup experiences of the principal owner	5822	0.88	1.30	0.00	5.00
Education	Number from 1 (< 9th grade) to10 (doctorate)	5822	6.77	2.03	1.00	10.00
Male	Yes = 1 (principal owner is male); No = 0 (otherwise)	5822	0.80	0.40	0.00	1.00
U.S. born	Yes = 1 (principal owner is US born); No = 0 (otherwise)	5822	0.89	0.31	0.00	1.00
Macroeconomic						
Crisis	2007 to 2009 = 1; Other = 0	5822	0.38	0.49	0.00	1.00
Instrumental						
Lines of credit	Ln (1 + value in USD)	5822	1.69	3.88	0.00	15.89
Other variables						
Revenues	value in thousands of USDs	5822	1142.76	9742.93	0.00	530,150.00
Total assets	value in thousands of USDs	5822	620.14	9880.69	0.00	701,524.99

In the Heckman selection model, an exclusion restriction is usually recommended (Cameron & Trivedi, 2009). This requires the information content equation to have an exogenous variable that is excluded from the value relevance equation. The excluded variable should have a substantive impact on the likelihood of information content and not directly affect value relevance. To this end, we use $Ext\_Eq\_Dum_{i,t-1}$ as it fulfills the exclusion restriction, i.e., it is relevant for the information content equation (likelihood of attracting external equity) but not for the value relevance equation (setting the amount of external equity). The information content equation is estimated by a probit regression, and the value relevance equation is estimated by an OLS regression.

Although some authors (Aktas et al., 2012; Goto et al., 2015) have concluded that trade debt sends a positive signal to investors of listed firms, the presence of external equity may incentivize suppliers to increase their credit, i.e., the causality between trade debt and external equity can be questioned because, on the one hand, a firm that has trade debt can convey information content on its operational activity and thus attract external equity and influence its amount; but, on the other hand, a firm that has attracted external equity can have better conditions to develop its operational activity and thus increase trade debt. In order to address this issue, we use the two-stage least squares (2SLS) model, with the following formulations for the first and second-stage regressions:

$$\begin{aligned} Tradedebt_{i,t} =& \alpha + \beta_1 Instrumental\ Variable_{i,t} \\ &+ \beta_2 Ext\_Eq\_Dum_{i,t-1} + \beta_3 X_{i,t} \\ &+ \beta_4 Z_{i,t} + \beta_4 Z_{i,t} + \beta_5 Crisis_{i,t} + \delta_{i,t} \\ &+ + \gamma_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{3}$$

$$\begin{aligned} External\ Equity_{i,t} =& \alpha + \beta_1 Trade\ debt_{i,t} \\ &+ + \beta_2 Ext\_Eq\_Dum_{i,t-1} + \beta_3 X_{i,t} \\ &+ \beta_4 Z_{i,t} + \beta_5 Crisis_{i,t} + \delta_{i,t} + \gamma_{i,t} \\ &+ \theta_{i,t} + \varepsilon_{i,t} \end{aligned}$$

External Equity in Eq. 4 is measured by $Ext\_Eq\_Dum_{i,t}$ and $Ln(Ext\_Eq)_{i,t}$. We use the value of lines of credit available, measured by the logarithm of one plus the amount in USD of lines of credit received by firm i in year t as the instrumental variable. As required, this instrument is highly correlated with trade debt, measured as the logarithm of one plus the amount in USD of accounts payables, but not with external equity (Petersen & Rajan, 1997).

4 Findings

4.1 Baseline

We report our baseline findings in Table 3 in which we use four different model specifications that include all macroeconomic conditions and all fixed effects: column I with trade debt, and firm and owner characteristics, or the full model, column II with trade debt and only owner characteristics (no firm characteristics), column III with trade debt and only firm characteristics (no owner characteristics), and column IV with only trade debt. All columns are subdivided into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions. Trade debt is positive and significantly related to the likelihood of attracting external equity in all the model specifications at the 1% confidence level. This leads us to not reject our hypothesis H1a. In columns II.2 and IV.2, trade debt is positive and significantly related to the amount of external equity at the 5% confidence level and, in columns I.2 and III.2, trade debt is not significantly related to the amount of external equity. This leads us not to accept our H1b partially, in the presence of the model with firm characteristics and the full model.

A point of particular interest in Table 3 relates to the relevance of the role of owner characteristics in attracting external investors being very similar to that of firm characteristics, although firm characteristics seem to be more relevant in influencing the amount of investment, which is in line with previous studies (Bernstein et al., 2017; Epure & Guasch, 2020; Hoenig & Henkel, 2015; Hsu, 2007; Wessendorf et al., 2019). Translating the aforementioned findings from the full model in economic terms, an increase of 1% in the amount of trade debt, on average 730 USD, increases the probability of a firm receiving external equity by 0.051 percentage points. Moreover, one additional year in the owner age increases the probability of firms receiving external equity by 1 percentage point; one additional year in the owner experience in the same industry decreases the probability of firms receiving external equity by 1 percentage point, and each experience of owners increases the probability of firms receiving external equity by 8 percentage points. In Table 4, we report our findings for the variation in trade debt. As can be observed, these findings are fully in line with the stock of trade debt.

4.2 Reverse causality

We report the findings for 2SLS regressions instrumented with credit lines in Tables 5 and 7 for the likelihood of attracting external equity and the determination of the amount of external equity. These tables comprise four columns, column I to IV, in which we present findings from our different model specifications. All columns are divided into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-stage regressions. In Table 5, in all the model specifications used, credit line is positive and significantly related to trade debt at the 1% confidence level, and trade debt is positive and significantly related to attracting external equity between 1 and 5% confidence levels. In Table 7, credit line is positive and significantly related to trade debt at the 1% confidence level in all model specifications except for columns I.2 and III.2, and trade debt is not significantly related to the amount of external equity in any of the model specifications. These results confirm that there is no reverse causality. In economic terms, in the full model, an increase of 1% in the amount of credit line, on average 185 USD, raises the amount of trade debt by 0.174%, on average by 128 USD to 73 thousand USD; and an increase of 1% in the amount of trade debt, on average 730 USD, increases the likelihood of firms receiving external equity by 0.009 percentage points. In Tables 6, 7, and 8, we report our findings for variation in trade debt. These findings are not fully consistent with those obtained for the stock of trade debt due to the lower correlation between the credit lines and variation in trade credit.

4.3 Interactions between trade, financial, and bank debts

Suppliers and banks collect different types of information through their channels. Petersen and Rajan (Petersen & Rajan, 1997) used U.S. small and medium size firm data to study the determinants of demand and offer of trade debt. They find that the offer of trade debt does not follow the same rationale as bank debt because suppliers have distinct advantages in collecting information, in monitoring,

Table 3 Heckman two-step model regressions for testing hypotheses H1a and H1b. The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1 while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote significance at the 1%, 5%, and 10% confidence levels respectively

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.051*** (0.009)**	**0.034 (0.029)**	**0.037*** (0.007)**	**0.067** (0.032)**	**0.051*** (0.009)**	**0.032 (0.031)**	**0.038*** (0.007)**	**0.068** (0.033)**
External equity dummy (t-1)	1.320*** (0.102)		1.427*** (0.098)		1.407*** (0.100)		1.521*** (0.096)	
Firms characteristics								
Revenues	−0.026*** (0.009)	−0.014 (0.027)			−0.024*** (0.008)	−0.005 (0.029)		
Cash	0.038*** (0.012)	0.183*** (0.033)			0.039*** (0.012)	0.180*** (0.035)		
Accounts receivables	−0.027*** (0.009)	0.027 (0.030)			−0.028*** (0.009)	0.031 (0.031)		
Inventories	0.004 (0.008)	0.034 (0.026)			0.008 (0.008)	0.026 (0.027)		
Tangible assets	−0.005 (0.009)	0.054** (0.026)			−0.007 (0.009)	0.029 (0.027)		
Net profit	−0.000*** (0.000)	−0.000 (0.000)			−0.000** (0.000)	−0.000 (0.000)		
Return on assets	−0.003 (0.002)	0.005 (0.012)			−0.004* (0.002)	0.003 (0.013)		
Delinquency risk	0.049 (0.042)	−0.406*** (0.133)			0.044 (0.041)	−0.442*** (0.140)		
Employees	0.002 (0.002)	0.011 (0.009)			0.002 (0.002)	0.020** (0.010)		
High tech	0.101 (0.099)	0.966*** (0.302)			0.127 (0.094)	0.892*** (0.308)		
Owner characteristics								
Age	0.011*** (0.004)	−0.013 (0.014)	0.009** (0.004)	−0.017 (0.017)				
Industry experience	−0.008** (0.004)	−0.008 (0.014)	−0.007* (0.004)	0.023 (0.016)				
Week hours	0.003* (0.002)	0.003 (0.005)	0.002 (0.002)	−0.003 (0.007)				
Startup experience	0.079*** (0.026)	0.135 (0.084)	0.078*** (0.025)	0.072 (0.102)				
Education	0.032 (0.020)	0.146** (0.068)	0.049** (0.019)	0.263*** (0.083)				

Table 3 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Male	0.057 (0.107)	1.004*** (0.377)	0.009 (0.103)	0.851* (0.459)				
U.S. born	−0.161 (0.107)	−0.012 (0.338)	−0.161 (0.106)	0.375 (0.413)				
Macroeconomic								
Crisis	−0.200** (0.091)	0.184 (0.304)	−0.199** (0.088)	0.353 (0.374)	−0.171* (0.089)	0.443 (0.316)	−0.172** (0.086)	0.524 (0.391)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	127.579*** (45.141)	59.801 (158.016)	143.917*** (43.273)	−197.459 (194.219)	131.102*** (44.352)	−7.632 (167.486)	143.221*** (42.583)	−156.316 (206.246)
#	5822	186	5822	186	5822	186	5822	186
Chi2	437.68***	161.49***	386.20***	55.58***	405.51***	127.01***	353.40***	33.27***
Pseudo R2	0.266		0.235		0.246		0.215	
Log likelihood	−604.68		−630.42		−620.76		−646.82	
Lambda		−0.705*** (0.241)		−1.055*** (0.273)		−0.830*** (0.238)		−1.245*** (0.267)
Rho		−0.425		−0.489		−0.460		−0.528
Sigma		1.660		2.158		1.805		2.360

in salvaging value from existing assets, and using price discrimination. To test the possible differences between the information content of trade and bank debt, we add the variables $FinancialDebt_{i,t}$ and $Tradedebt_{i,t} \times FinancialDebt_{i,t}$ to our baseline model. The variable $FinancialDebt_{i,t}$ is the logarithm of one plus the amount in USD of total financial debt of firm i in year t or the logarithm of one plus the amount in USD of total bank debt of firm i in year t. Both, trade debt (this paper) and financial debt (Epure & Guasch, 2020), act as signals to external equity providers in early-stage firms. Nevertheless, it is relevant to assess their combined influence on attracting external equity and determining its value.

Table 9 sets out the results of regressions with the trade debt and financial debt, measured as total financial debt. This table has four columns, columns I to IV, in which we present findings for the combined influence of trade debt and financial debt. All columns are divided into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions. In Table 9, our variables of interest trade debt and financial debt are positively and significantly related to the probability of attracting external equity at the 1% confidence level. In addition, trade debt is positively and significantly related to the amount of external equity at the 5% confidence level in columns II.2 and IV.2 but financial debt is not significantly related to the amount of external equity in all specifications. Table 10 reports the findings for the variation in trade debt. As can be observed, the findings are in line with those reported in Table 9.

Table 11 sets out the results of regressions with the trade debt and financial debt and their combination. This table has four columns, columns I to IV, in which we present findings for the combined influence of trade debt and financial debt. All columns

Table 4 Heckman two-step model regressions for testing hypotheses H1a and H1b. The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1 while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2 and IV.2. Standard errors in parenthesis. ***, **, and * denote significance at the 1%, 5% and 10% confidence levels respectively

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.092****	**0.028**	**0.099*****	**0.099**	**0.095****	**0.059**	**0.105*****	**0.129***
	(0.042)	**(0.059)**	**(0.034)**	**(0.075)**	**(0.041)**	**(0.062)**	**(0.034)**	**(0.078)**
External equity dummy (t-1)	1.386***		1.501***		1.472***		1.600***	
	(0.101)		(0.097)		(0.099)		(0.095)	
Firms characteristics								
Revenues	−0.023***	−0.019			−0.022***	−0.010		
	(0.009)	(0.028)			(0.008)	(0.029)		
Cash	0.037***	0.178***			0.038***	0.174***		
	(0.012)	(0.034)			(0.012)	(0.035)		
Accounts receivables	−0.008	0.039			−0.008	0.045		
	(0.008)	(0.028)			(0.009)	(0.029)		
Inventories	0.012	0.039			0.017**	0.030		
	(0.008)	(0.026)			(0.008)	(0.027)		
Tangible assets	−0.002	0.057**			−0.003	0.034		
	(0.008)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000**	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.003			−0.004*	0.001		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.049	−0.409***			0.044	−0.428***		
	(0.041)	(0.135)			(0.040)	(0.142)		
Employees	0.003	0.012			0.003*	0.020**		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.110	0.971***			0.123	0.891***		
	(0.097)	(0.305)			(0.093)	(0.310)		
Owner characteristics								
Age	0.011***	−0.012	0.009**	−0.013				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.008**	−0.006	−0.006*	0.027*				
	(0.004)	(0.014)	(0.004)	(0.016)				
Week hours	0.004**	0.004	0.004**	0.001				
	(0.002)	(0.006)	(0.002)	(0.007)				
Startup experience	0.075***	0.114	0.077***	0.019				
	(0.026)	(0.085)	(0.025)	(0.106)				

Table 4 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.030	0.146**	0.045**	0.237***				
	(0.020)	(0.069)	(0.019)	(0.085)				
Male	0.046	1.012***	0.010	0.833*				
	(0.106)	(0.382)	(0.102)	(0.467)				
U.S. born	−0.168	−0.050	−0.171	0.217				
	(0.106)	(0.341)	(0.105)	(0.419)				
Macroeconomic								
Crisis	−0.172*	0.221	−0.171**	0.476	−0.144*	0.499	−0.142*	0.685*
	(0.089)	(0.308)	(0.087)	(0.378)	(0.087)	(0.318)	(0.085)	(0.392)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	112.185**	121.459	121.298***	−357.481	116.006***	−72.563	119.801***	−316.959
	(44.131)	(157.095)	(42.243)	(190.019)	(43.377)	(166.079)	(41.492)	(200.649)
#	5822	186	5822	186	5822	186	5822	186
Chi2	410.44***	153.40***	370.59***	51.41***	377.23***	120.78***	335.38***	32.23***
Pseudo R2	0.249		0.225		0.229		0.204	
Log likelihood	−618.29		−638.22		−634.90		−655.83	
Lambda		−0.743***		−1.199***		−0.881***		−1.384***
		(0.232)		(0.261)		(0.228)		(0.251)
Rho		−0.440		−0.536		−0.481		−0.570
Sigma		1.688		2.239		1.832		2.430

are divided into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions. As can be observed from these tables, our variables of interest trade debt and financial debt are positively and significantly related to the probability of attracting external equity at the 1% confidence level. In addition, trade debt is not significantly related to the amount of external equity and financial debt is negatively and significantly related to the amount of external equity at the 5% confidence level. Focusing further on Table 9, the combination of trade debt and financial debt is positively and significantly related to the amount of external equity at the 5% confidence level but negatively and significantly related to the probability of external equity at the 10% level of confidence as in columns I.1. and II.1, and nonsignificantly related to the probability of attracting external equity as in columns III.1 and IV.1. Table 12 reports the findings for the variation in trade debt. As can be observed, the findings cease being in line with those reported in Table 11.

Tables 13 and 15 set out the results of regressions substituting financial debt by bank debt. It can be observed from these tables that bank debt is not significantly related to the probability of attracting external equity and the amount of external equity. Tables 14, 15, and 16 set out the results of regressions substituting trade debt by variation in trade debt and maintaining bank debt. Again, it can be observed from these tables that bank debt is not significantly related to the probability of attracting external equity and the amount of external equity.

Table 5 Two-stage least squares (2SLS) model regressions to test reverse causality of hypotheses H1a and H1b. The table presents 2SLS model regressions on a sample of firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. All variables are described in Table 2. The instrumental variable used is lines of credit measured by the logarithm of one plus the amount in USD of lines of credit received; and the endogenous variable is trade debt. The results of the first-stage are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-stage are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Trade debt	External Equity (Dummy)	Trade debt	External Equity (Dummy)	Trade debt	External Equity (Dummy)	Trade debt	External Equity (Dummy)
Independent								
Main								
Trade debt		**0.009*****		**0.003****		**0.009*****		**0.003****
		(0.003)		**(0.002)**		**(0.003)**		**(0.002)**
Lines of credit	**0.174*****		**0.341*****		**0.174*****		**0.361*****	
	(0.015)		**(0.016)**		**(0.015)**		**(0.016)**	
External equity dummy (t-1)	1.496***	0.273***	2.098***	0.300***	1.538***	0.280***	2.270***	0.309***
	(0.288)	(0.012)	(0.321)	(0.012)	(0.287)	(0.012)	(0.324)	(0.011)
Firm characteristics								
Revenues	0.079***	−0.003***			0.083***	−0.003***		
	(0.015)	(0.001)			(0.015)	(0.001)		
Cash	0.006	0.003***			0.005	0.003***		
	(0.018)	(0.001)			(0.018)	(0.001)		
Accounts receivables	0.341***	−0.004***			0.348***	−0.004***		
	(0.013)	(0.001)			(0.013)	(0.001)		
Inventories	0.163***	−0.001			0.173***	−0.001		
	(0.012)	(0.001)			(0.012)	(0.001)		
Tangible assets	0.050***	−0.001			0.059***	−0.001*		
	(0.013)	(0.001)			(0.013)	(0.001)		
Net profit	−0.000***	−0.000***			−0.000***	−0.000***		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.000	0.000			−0.000	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Delinquency risk	0.011	0.002			0.017	0.002		
	(0.061)	(0.002)			(0.061)	(0.002)		
Employees	0.034***	0.000			0.035***	0.000		
	(0.004)	(0.000)			(0.004)	(0.000)		
High tech	−0.212	0.010			−0.331**	0.013**		
	(0.148)	(0.006)			(0.145)	(0.006)		
Owner characteristics								
Age	0.003	0.001**	−0.009	0.001**				
	(0.006)	(0.000)	(0.007)	(0.000)				
Industry experience	−0.010	−0.000*	−0.008	−0.000				
	(0.006)	(0.000)	(0.007)	(0.000)				
Week hours	0.015***	0.000	0.036***	0.000				
	(0.003)	(0.000)	(0.003)	(0.000)				

Table 5 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Trade debt	External Equity (Dummy)	Trade debt	External Equity (Dummy)	Trade debt	External Equity (Dummy)	Trade debt	External Equity (Dummy)
Startup experience	0.034	0.006***	0.175***	0.006***				
	(0.044)	(0.002)	(0.050)	(0.002)				
Education	−0.044	0.003**	−0.028	0.003***				
	(0.029)	(0.001)	(0.032)	(0.001)				
Male	−0.171	0.006	−0.085	0.003				
	(0.238)	(0.006)	(0.164)	(0.006)				
U.S. born	−0.105	−0.008	0.135	−0.012*				
	(0.179)	(0.007)	(0.202)	(0.007)				
Macroeconomic								
Crisis	0.206*	−0.011**	0.332**	−0.011**	0.202*	−0.011**	0.337**	−0.011**
	(0.117)	(0.005)	(0.132)	(0.005)	(0.117)	(0.005)	(0.134)	(0.005)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	−64.925	5.439**	−165.776	6.643***	−47.689	5.759**	−134.164**	6.596***
	(58.402)	(2.274)	(64.632)	(2.236)	(58.459)	(2.270)	(65.511)	(2.227)
#	5822	5822	5822	5822	5822	5822	5,822	5822
F	131.37***		82.84***		184.80***		140.55***	
Wald chi2		1097.86***		961.66***		1,052.91***		914.39***
R-squared	0.343	0.144	0.156	0.143	0.336	0.138	0.127	0.138
Root MSE	4.202	0.163	4.758	0.163	4.216	0.163	4.836	0.163

4.4 Financing constraints

As reviewed in the literature, bank and trade debt do not follow the same rationale, and suppliers might not share the unwillingness of banks to extend debt to financially constrained firms. Suppliers may be willing to extend debt to firms that are unprofitable but with future growth potential due to both their advantages over other debtors such as banks, their ability to salvage the value of their supplies, and use price discrimination.

We test the information content and value relevance hypotheses in a sub-sample of firms that do not have profits and that have positive sales growth. The results of the regressions of the sub-sample are presented in Table 17. This table has four columns, columns I to IV, in which we present findings from our different model specifications. All columns are subdivided into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions. Our variable of interest, trade debt, is positively and significantly related to the probability of attracting external equity, in four different model specifications at the 1% confidence levels; additionally, trade debt is positively and significantly related to the probability of determining the amount of external equity at between 5 and 10% confidence levels in three of the four model specifications used, it is not significantly related in the one with only firm characteristics in column III.2. This leads us not to reject H1a and H1b.

The sub-sample of firms that are non-profitable and with positive sales growth show that trade debt information content and value relevance roles are strengthened, because trade debt simultaneously attracts and positively influences the external equity

Table 6 Two-stage least squares (2SLS) model regressions to test reverse causality of hypotheses H1a and H1b. The table presents 2SLS model regressions on a sample of firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The instrumental variable used is lines of credit measured by the logarithm of one plus the amount in USD of lines of credit received; and the endogenous variable is trade debt. The results of the first-stage are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-stage are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Variation in Trade debt	External Equity (Dummy)	Variation in Trade debt	External Equity (Dummy)	Variation in Trade debt	External Equity (Dummy)	Variation in Trade debt	External Equity (Dummy)
Independent								
Main								
Variation in trade debt		**0.399**		**0.215***		**0.406**		**0.235***
		(0.249)		**(0.125)**		**(0.252)**		**(0.130)**
Lines of credit	**0.004***		**0.005***		**0.004***		**0.005*****	
	(0.002)		**(0.002)**		**(0.002)**		**(0.002)**	
External equity dummy (t-1)	−0.128***	0.338***	−0.055	0.319***	−0.118***	0.342***	−0.041	0.326***
	(0.039)	(0.037)	(0.039)	(0.015)	(0.039)	(0.035)	(0.039)	(0.015)
Firm characteristics								
Revenues	−0.001	−0.002*			−0.001	−0.002*		
	(0.002)	(0.001)			(0.002)	(0.001)		
Cash	0.000	0.003**			0.001	0.003**		
	(0.002)	(0.001)			(0.002)	(0.001)		
Accounts receivables	0.002	−0.001			0.002	−0.001		
	(0.002)	(0.001)			(0.002)	(0.001)		
Inventories	0.001	0.000			0.001	0.001		
	(0.002)	(0.001)			(0.002)	(0.001)		
Tangible assets	−0.002	0.000			−0.002	0.000		
	(0.002)	(0.001)			(0.002)	(0.001)		
Net profit	−0.000***	0.000			−0.000***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.000	0.000			−0.000	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Delinquency risk	−0.017**	0.009			−0.016*	0.009		
	(0.008)	(0.006)			(0.008)	(0.006)		
Employees	0.003***	−0.001			0.003***	−0.001		
	(0.001)	(0.001)			(0.001)	(0.001)		
High tech	−0.023	0.017			−0.010	0.014		
	(0.020)	(0.011)			(0.020)	(0.010)		
Owner characteristics								
Age	−0.001	0.001**	−0.001	0.001**				
	(0.001)	(0.000)	(0.001)	(0.000)				
Industry experience	0.000	−0.001*	0.001	−0.001*				
	(0.001)	(0.000)	(0.001)	(0.000)				
Week hours	−0.001	0.000**	−0.000	0.000**				
	(0.000)	(0.000)	(0.000)	(0.000)				

Table 6 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Variation in Trade debt	External Equity (Dummy)	Variation in Trade debt	External Equity (Dummy)	Variation in Trade debt	External Equity (Dummy)	Variation in Trade debt	External Equity (Dummy)
Startup experience	0.017***	−0.001	0.019***	0.002				
	(0.006)	(0.005)	(0.006)	(0.003)				
Education	0.006	0.000	0.008**	0.002				
	(0.04)	(0.002)	(0.004)	(0.002)				
Male	0.019	−0.004	0.007	0.001				
	(0.020)	(0.011)	(0.020)	(0.007)				
U.S. born	−0.001	−0.009	0.000	−0.011				
	(0.025)	(0.012)	(0.025)	(0.008)				
Macroeconomic								
Crisis	−0.022	−0.001	−0.017	−0.006	0.021	−0.001	−0.016	−0.006
	(0.016)	(0.009)	(0.016)	(0.006)	(0.016)	(0.009)	(0.016)	(0.006)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	21.801***	−3.842	17.912**	2.216	21.613***	−3.452	16.989**	2.139
	(7.989)	(6.594)	(7.910)	(3.434)	(7.976)	(6.643)	(7.894)	(3.500)
#	5822	5822	5822	5822	5822	5822	5822	5822
F	8.52***		2.56***		11.37***		2.78***	
Wald chi2		395.32***		655.99***		371.55***		585.89***
R-squared	0.033	0.000	0.006	0.000	0.030	0.000	0.003	0.000
Root MSE	0.575	0.271	0.582	0.197	0.575	0.275	0.583	0.204

in the full model. Owner characteristics have lower influence on external equity providers vis-à-vis the previous results from our sample. Translating these findings from the full model in the sub sample of non-profitable firms with positive sales growth, in economic terms: an increase of 1% in trade debt, on average 730 USD, increases the probability of a non-profitable firm with positive sales growth receiving external equity by 0.050 percentage points. Additionally, trade debt also influences the amount of external equity with statistical significance: an increase of 1% in the amount of trade debt in firms that received external equity, on average 3820 USD, increases the amount of external equity by 0.052%, on average by 1090 USD to € 2.09 million USD. Table 18 reports findings for variation in trade debt. As can be observed from this table, the findings deviate from those reported in Table 17. Table 19 reports findings for financial debt. It can be observed from the table that financial debt is not significantly related to the probability of attracting external equity and determining its amount. Table 20 reports findings for bank debt. Again, it can be observed that bank debt is not significantly related to the probability of attracting external equity and determining its amount systematically.

4.5 Capital and labor intensities

The nature of the industry, capital or labor-intensive, may potentially influence the role of trade debt in attracting and determining the amount of external equity. Descriptively, the percentage of capital-intensive firms with trade debt that received external equity is larger than in labor-intensive firms. This could lead to the expectation that the role of

Table 7 Two-stage least squares (2SLS) model regressions to test reverse causality of hypotheses H1a and H1b. The table presents 2SLS model regressions on a sample of firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. All variables are described in Table 2. The instrumental variable used is lines of credit measured by the logarithm of one plus the amount in USD of lines of credit received; and the endogenous variable is trade debt. The results of the first-stage are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-stage are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Trade debt	External Equity (Amount)	Trade debt	External Equity (Amount)	Trade debt	External Equity (Amount)	Trade debt	External Equity (Amount)
Independent								
Main								
Trade debt		**0.022**		**0.034**		**0.0453**		**0.016**
		(0.344)		**(0.179)**		**(0.385)**		**(0.256)**
Lines of credit	**0.082**		**0.194****		**0.076**		**0.144****	
	(0.081)		**(0.086)**		**(0.078)**		**(0.086)**	
External equity dummy (t-1)								
Firm characteristics								
Revenues	−0.138*	−0.039			−0.140*	−0.030		
	(0.078)	(0.052)			(0.075)	(0.058)		
Cash	−0.028	0.207***			0.001	0.212***		
	(0.092)	(0.034)			(0.088)	(0.034)		
Accounts receivables	0.384***	0.038			0.410***	0.031		
	(0.082)	(0.137)			(0.078)	(0.163)		
Inventories	0.181**	0.044			0.164**	0.035		
	(0.072)	(0.069)			(0.071)	(0.071)		
Tangible assets	0.060	0.052			0.054	0.021		
	(0.078)	(0.036)			(0.074)	(0.037)		
Net profit	−0.000	−0.000			−0.000	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.031	0.000			−0.038	−0.002		
	(0.036)	(0.017)			(0.035)	(0.020)		
Delinquency risk	−0.222	−0.377**			−0.195	−0.405**		
	(0.386)	(0.156)			(0.375)	(0.162)		
Employees	0.062**	0.019			0.064**	0.029		
	(0.027)	(0.023)			(0.025)	(0.027)		
High tech	0.560	1.161***			0.461	1.135***		
	(0.871)	(0.337)			(0.807)	(0.342)		
Owner characteristics								
Age	−0.022	−0.007	−0.030	−0.009				
	(0.042)	(0.015)	(0.044)	(0.017)				
Industry experience	0.023	−0.013	0.065	0.024				
	(0.040)	(0.016)	(0.042)	(0.020)				
Week hours	0.009	0.005	0.031*	0.001				
	(0.016)	(0.006)	(0.017)	(0.009)				
Startup experience	−0.076	0.179**	0.147	0.165				
	(0.241)	(0.090)	(0.258)	(0.105)				

Table 7 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Trade debt	External Equity (Amount)	Trade debt	External Equity (Amount)	Trade debt	External Equity (Amount)	Trade debt	External Equity (Amount)
Education	0.119	0.195**	0.200	0.369***				
	(0.196)	(0.077)	(0.207)	(0.086)				
Male	0.490	1.263***	0.068	1.076**				
	(1.118)	(0.446)	(1.204)	(0.487)				
U.S. born	−0.690	−0.152	−1.473	0.074				
	(0.981)	(0.418)	(1.051)	(0.510)				
Macroeconomic								
Crisis	0.402	0.095	0.782	0.243	0.560	0.379	1.178	0.425
	(0.886)	(0.338)	(0.959)	(0.414)	(0.851)	(0.391)	(0.943)	(0.512)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	−917.048	3.515	−1,392.127***	−137.281	−821.388*	115.121	−1,095.414**	−8.056
	(446.637)	(352.363)	(478.068)	(325.468)	(435.189)	(357.106)	(490.990)	(350.287)
#	186	186	186	186	186	186	186	186
F	4.37***		2.78***		6.38***		3.78***	
Wald chi2		265.56***		75.15***		201.31***		47.89***
R-squared	0.286	0.591	0.162	0.307	0.360	0.527	0.129	0.219
Root MSE	4.576	1.586	5.128	2.065	4.519	1.706	5.152	2.193

trade debt is stronger in capital-intensive firms. To address this issue, we test the role of trade debt in subsamples of capital and labor-intensive industries for both the selection and outcome models. We report the findings in Tables 21 and 22 for capital-intensive industries and Table 23 for labor-intensive industries. These tables have four columns, columns I to IV, in which we present findings for our different model specifications. All columns are divided further into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions.

In Table 21, capital-intensive firms, our variable of interest, trade debt, is not significantly related to the likelihood of attracting external equity and determining the amount of equity, except for in columns II.1 and IV.2., where trade debt is positively and significantly related, respectively, to attracting and determining the amount of external equity at the 10% confidence level. These findings are in general not in line with those of the baseline. In other words, this again leads us not to accept H1a and H1b for firms in capital-intensive industries. In Table 23, labor-intensive firms, although our variable of interest, trade debt, is positively and significantly related to the likelihood of attracting external equity in all models used at the 1% confidence level, it is not related to determining the amount of external equity at a statistically meaningful level, except for column III.2, where trade debt is positive and significantly related to the amount of external equity at the 10% confidence level. These findings for firms in labor-intensive industries are in line with those of the baseline; in other words, we do not reject H1a and do not accept H1b partially. Translating these findings in economic terms in labor-intensive firms, for the full model, a 1% increase in the amount of trade debt, on average 510 USD, raises the likelihood

Table 8 Two-stage least squares (2SLS) model regressions to test reverse causality of hypotheses H1a and H1b. The table presents 2SLS model regressions on a sample of firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The instrumental variable used is lines of credit measured by the logarithm of one plus the amount in USD of lines of credit received; and the endogenous variable is trade debt. The results of the first-stage are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-stage are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Variation of Trade debt	External Equity (Dummy)	Variation of Trade debt	External Equity (Dummy)	Variation of Trade debt	External Equity (Dummy)	Variation of Trade debt	External Equity (Dummy)
Independent								
Main								
Variation in trade debt		**−0.207**		**−0.336**		**−0.338**		**0.027**
		(3.440)		**(1.993)**		**(2.812)**		**(1.068)**
Lines of credit	**−0.009**		**−0.020**		**−0.012**		**−0.035**	
	(0.039)		**(0.037)**		**(0.038)**		**(0.036)**	
External equity dummy (t-1)								
Firm characteristics								
Revenues	−0.039	−0.050			−0.026	−0.046		
	(0.037)	(0.140)			(0.037)	(0.084)		
Cash	0.021	0.211***			0.018	0.218***		
	(0.045)	(0.081)			(0.044)	(0.064)		
Accounts receivables	0.007	0.047			−0.007	0.050		
	(0.040)	(0.037)			(0.038)	(0.041)		
Inventories	0.001	0.048*			−0.002	0.043		
	(0.035)	(0.027)			(0.035)	(0.032)		
Tangible assets	−0.002	0.053*			−0.025	0.015		
	(0.037)	(0.031)			(0.036)	(0.081)		
Net profit	−0.000	−0.000			−0.000	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	0.002	0.000			0.002	−0.004		
	(0.017)	(0.015)			(0.017)	(0.016)		
Delinquency risk	−0.276	−0.439			−0.334*	−0.528		
	(0.185)	(0.956)			(0.184)	(0.949)		
Employees	0.012	0.023			0.019	0.039		
	(0.013)	(0.044)			(0.012)	(0.055)		
High tech	0.125	1.199**			0.098	1.192***		
	(0.418)	(0.567)			(0.396)	(0.457)		
Owner characteristics								
Age	−0.026	−0.013	−0.034	−0.021				
	(0.020)	(0.092)	(0.019)	(0.073)				
Industry experience	−0.003	−0.014	0.010	0.030				
	(0.019)	(0.018)	(0.018)	(0.029)				
Week hours	−0.014*	0.002	−0.016**	−0.003				
	(0.008)	(0.048)	(0.007)	(0.033)				
Startup experience	0.230**	0.225	0.262**	0.258				
	(0.116)	(0.803)	(0.111)	(0.547)				

Table 8 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	Variation of Trade debt	External Equity (Dummy)	Variation of Trade debt	External Equity (Dummy)	Variation of Trade debt	External Equity (Dummy)	Variation of Trade debt	External Equity (Dummy)
Education	0.074	0.213	0.151*	0.426				
	(0.094)	(0.269)	(0.089)	(0.325)				
Male	0.366	1.238	0.152	1.129*				
	(0.537)	(1.261)	(0.517)	(0.581)				
U.S. born	0.115	−0.143	0.253	0.109				
	(0.471)	(0.538)	(0.451)	(0.710)				
Macroeconomic								
Crisis	−0.368	0.028	−0.248	0.186	−0.348	0.291	−0.265	0.555
	(0.425)	(1.308)	(0.412)	(0.664)	(0.418)	(1.051)	(0.411)	(0.513)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	69.553	−2.104	57.915	−165.034	64.751	93.828	32.299	−99.387
	(214.525)	(290.473)	(205.318)	(252.386)	(213.676)	(260.958)	(207.582)	(217.356)
#	186	186	186	186	186	186	186	186
F	1.38		1.63*		1.32		0.88***	
Wald chi2		238.78***		59.51***		156.48***		28.23***
R-squared	0.043	0.545	0.102	0.125	0.104	0.391	0.024	0.139
Root MSE	2.198	1.673	2.202	2.320	2.219	1.9354	2.251	2.302

of attracting external equity by 0.052 percentage points. In Tables 22 and 24 we report our findings for the variation in trade debt. It can be observed from these tables that variation in trade debt attracts external equity in capital intensive firms while it does not attract external equity in labor intensive firms.

4.6 Simple and complex technologies

The type of technology, complex or simple, may influence the role of trade debt in attracting and determining the amount of external equity. Indeed, prior findings show that reducing information asymmetries on simple technologies may be more effective than on complex technologies (Heeley et al., 2007). To address this issue, we test the role of trade debt in attracting and determining the amount of external equity in subsamples of firms using complex and simple technologies in capital-intensive industries.

We report the findings in Tables 25 and 26 for capital-intensive industries with complex technologies and Table 27 for capital-intensive industries with simple technologies. These tables have four columns, columns I–IV, in which we present findings for our different model specifications. All columns are again divided into two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions.

In Table 25, for complex technologies, our variable of interest, trade debt, is not significantly related to attracting external equity or determining the

Table 9 Heckman two-step model regressions for testing hypothesis H1a and H1b (with financial debt). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and financial debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.041*****	**0.038**	**0.027*****	**0.078****	**0.042*****	**0.039**	**0.029*****	**0.085****
	(0.009)	**(0.029)**	**(0.008)**	**(0.032)**	**(0.009)**	**(0.031)**	**(0.008)**	**(0.034)**
Financial debt	**0.040*****	**−0.012**	**0.029*****	**−0.031**	**0.041*****	**−0.021**	**0.029*****	**−0.050**
	(0.009)	**(0.026)**	**(0.008)**	**(0.030)**	**(0.009)**	**(0.027)**	**(0.008)**	**(0.032)**
External equity dummy (t-1)	1.313***		1.418***		1.397***		1.513***	
	(0.102)		(0.098)		(0.100)		(0.096)	
Firm characteristics								
Revenues	−0.029***	−0.014			−0.027***	−0.005		
	(0.009)	(0.028)			(0.008)	(0.029)		
Cash	0.045***	0.181***			0.046***	0.176***		
	(0.013)	(0.034)			(0.012)	(0.035)		
Accounts receivables	−0.029***	0.027			−0.030***	0.032		
	(0.009)	(0.030)			(0.009)	(0.031)		
Inventories	−0.002	0.036			−0.003	0.030		
	(0.008)	(0.026)			(0.008)	(0.027)		
Tangible assets	−0.008	0.056**			−0.011	0.032		
	(0.008)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000***	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004	0.006			−0.004*	0.002		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.056	−0.406***			0.051	−0.443***		
	(0.043)	(0.133)			(0.041)	(0.141)		
Employees	0.001	0.011			0.002	0.020**		
	(0.002)	(0.009)			(0.002)	(0.010)		
High tech	0.123	0.968***			0.151	0.883***		
	(0.100)	(0.306)			(0.096)	(0.310)		
Owner characteristics								
Age	0.011**	−0.013	0.009**	−0.016				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.008*	−0.008	−0.006	0.022				
	(0.004)	(0.014)	(0.004)	(0.016)				
Week hours	0.003*	0.004	0.002	−0.003				
	(0.002)	(0.005)	(0.002)	(0.007)				

Table 9 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	0.077***	0.136	0.074***	0.076				
	(0.027)	(0.084)	(0.026)	(0.102)				
Education	0.037*	0.146**	0.056***	0.255***				
	(0.021)	(0.069)	(0.020)	(0.084)				
Male	0.046	1.010***	0.001	0.864*				
	(0.109)	(0.377)	(0.105)	(0.460)				
U.S. born	−0.176	−0.018	−0.173	0.391				
	(0.108)	(0.339)	(0.107)	(0.414)				
Macroeconomic								
Crisis	−0.211**	0.186	−0.206**	0.362	−0.181**	0.448	−0.178**	0.530
	(0.093)	(0.305)	(0.089)	(0.374)	(0.090)	(0.317)	(0.087)	(0.390)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	111.352**	−49.407	135.317***	−188.366	115.219**	7.203	134.467**	−146.767
	(46.099)	(157.465)	(43.792)	(193.767)	(45.341)	(166.932)	(43.130)	(205.533)
#	5,822	186	5,822	186	5,822	186	5,822	186
Chi2	460.92***	163.33***	400.42***	58.06***	430.03***	129.01***	367.78***	36.92***
Pseudo R2	0.280		0.243		0.261		0.223	
Log likelihood	−593.06		−623.31		−608.50		−639.63	
Lambda		−0.713***		−1.054***		−0.832***		−1.226***
		(0.245)		(0.277)		(0.243)		(0.271)
Rho		−0.429		−0.489		−0.461		−0.522
Sigma		1.662		2.157		1.806		2.350

amount of external equity in all models. However, in Table 27, for simple technologies, trade debt is positive and significantly related to attracting external equity at the 5% to 10% confidence levels in columns I.1. and II.1 but not in columns III.1 and IV.1. In addition, trade debt is also positive and significantly related to the amount of external equity in all models at the 5% to 10% confidence levels. This indicates that trade debt in firms using simple technologies facilitates the attraction and determination of external equity. We thus do not reject H1a and H1b in the case of simple technologies and do not accept H1a and H1b in the case of complex technologies.

Translating these findings in economic terms for simple technologies, in our full model, a 1% increase in the amount of trade debt, on average 2 thousand USD, raises the likelihood of attracting external equity by 0.093 percentage points and increases the amount of external equity by 0.11%, on average by 2 thousand USD to 1.92 million USD. In Tables 26 and 28, we report our findings for variation in trade debt. It can be observed from these tables that variation in trade debt can attract external equity and influence its

Table 10 Heckman two-step model regressions for testing hypothesis H1a and H1b (with financial debt). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and financial debt and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.081***	**0.031**	**0.085*****	**0.103**	**0.084****	**0.064**	**0.092*****	**0.136***
	(0.042)	**(0.060)**	**(0.033)**	**(0.075)**	**(0.041)**	**(0.063)**	**(0.033)**	**(0.078)**
Financial debt	**0.047*****	**−0.011**	**0.037*****	**−0.021**	**0.048*****	**−0.024**	**0.037*****	**−0.041**
	(0.008)	**(0.026)**	**(0.008)**	**(0.031)**	**(0.008)**	**(0.027)**	**(0.007)**	**(0.032)**
External equity dummy (t-1)	1.362***		1.468***		1.445***		1.566***	
	(0.102)		(0.098)		(0.099)		(0.095)	
Firm characteristics								
Revenues	−0.026***	−0.019			−0.025***	−0.010		
	(0.008)	(0.028)			(0.008)	(0.029)		
Cash	0.045***	0.176***			0.047***	0.171***		
	(0.013)	(0.034)			(0.012)	(0.036)		
Accounts receivables	−0.014*	0.042			−0.014*	0.049*		
	(0.009)	(0.028)			(0.008)	(0.029)		
Inventories	−0.004	0.042			−0.009	0.035		
	(0.008)	(0.026)			(0.008)	(0.027)		
Tangible assets	−0.007	0.058**			−0.009	0.037		
	(0.009)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.004			−0.004**	0.001		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.059	−0.408***			0.054	−0.429***		
	(0.042)	(0.135)			(0.041)	(0.143)		
Employees	0.002	0.012			0.002	0.020**		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.136	0.977***			0.156*	0.879***		
	(0.099)	(0.307)			(0.095)	(0.312)		
Owner characteristics								
Age	0.011**	−0.013	0.009**	−0.013				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.008**	−0.007	−0.005	0.026				
	(0.004)	(0.014)	(0.004)	(0.016)				

Table 10 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Week hours	0.003**	0.004	0.003*	0.002				
	(0.002)	(0.006)	(0.002)	(0.007)				
Startup experience	0.073***	0.114	0.073***	0.020				
	(0.027)	(0.086)	(0.026)	(0.106)				
Education	0.037*	0.147**	0.055***	0.234***				
	(0.020)	(0.070)	(0.019)	(0.086)				
Male	0.031	1.019***	0.002	0.837*				
	(0.108)	(0.382)	(0.104)	(0.468)				
U.S. born	−0.184*	−0.062	−0.183*	0.218				
	(0.106)	(0.343)	(0.105)	(0.420)				
Macroeconomic								
Crisis	−0.187**	0.225	−0.187**	0.490	−0.158*	0.510	−0.158*	0.710*
	(0.091)	(0.308)	(0.088)	(0.380)	(0.089)	(0.319)	(0.086)	(0.393)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	94.430**	−107.774	115.413***	−344.424*	98.499**	−55.534	113.296**	−307.710
	(45.372)	(156.648)	(43.087)	(190.784)	(44.662)	(165.781)	(42.399)	(201.800)
#	5822	186	5822	186	5822	186	5822	186
Chi2	444.32***	156.35***	395.38***	52.05***	412.85***	123.94***	361.83***	33.88***
Pseudo R2	0.270		0.240		0.251		0.220	
Log likelihood	−601.36		−625.83		−617.09		−642.60	
Lambda		−0.756***		−1.232***		−0.895***		−1.414***
		(0.239)		(0.269)		(0.236)		(0.260)
Rho		−0.447		−0.547		−0.487		−0.578
Sigma		1.692		2.152		1.839		2.445

amount in capital intensive firms with complex technologies while it does not attract external equity or influence its amount in capital intensive firms with simple technologies.

4.7 Size

The size of the firms may influence the role of trade debt in attracting and determining the amount of external equity. Indeed, prior findings show that micro innovative firms can behave distinctly from their small, medium, and large peers (Farè, 2022). To address this issue, we test the role of trade debt in attracting and determining the amount of external equity in micro, small, and medium and large firms.

We report the findings in Tables 29 and 30. These tables have four columns, columns I–IV, in which we present findings for our different model specifications. All columns are again divided into

Table 11 Heckman two-step model regressions for testing hypothesis H1a and H1b (with financial debt and interaction). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and financial debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt (1)	**0.064*** **	**−0.036**	**0.047*** **	**−0.026**	**0.060*** **	**−0.072**	**0.043*** **	**−0.054**
	(0.014)	**(0.045)**	**(0.013)**	**(0.053)**	**(0.015)**	**(0.046)**	**(0.013)**	**(0.055)**
Financial debt (2)	**0.059*** **	**−0.089** **	**0.047*** **	**−0.141*** **	**0.056*** **	**−0.135*** **	**0.041*** **	**−0.192*** **
	(0.013)	**(0.044)**	**(0.012)**	**(0.053)**	**(0.013)**	**(0.044)**	**(0.012)**	**(0.054)**
(1)x(2)	**−0.003***	**0.010** **	**−0.003***	**0.014** **	**−0.002**	**0.015*** **	**−0.002**	**0.019*** **
	(0.002)	**(0.005)**	**(0.001)**	**(0.006)**	**(0.001)**	**(0.005)**	**(0.001)**	**(0.006)**
External equity dummy (t-1)	1.321***		1.427***		1.406***		1.521***	
	(0.103)		(0.098)		(0.100)		(0.096)	
Firm characteristics								
Revenues	−0.029***	−0.015			−0.027***	−0.007		
	(0.009)	(0.027)			(0.008)	(0.028)		
Cash	0.045***	0.179***			0.046***	0.171***		
	(0.013)	(0.033)			(0.012)	(0.034)		
Accounts receivables	−0.030***	0.034			−0.030***	0.039		
	(0.009)	(0.030)			(0.009)	(0.031)		
Inventories	−0.001	0.029			0.003	0.021		
	(0.008)	(0.026)			(0.008)	(0.024)		
Tangible assets	−0.009	0.051*			−0.011	0.027		
	(0.009)	(0.026)			(0.009)	(0.027)		
Net profit	−0.000***	−0.000			−0.000***	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.006			−0.004*	0.004		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.059	−0.427***			0.053	−0.474***		
	(0.043)	(0.132)			(0.041)	(0.137)		
Employees	0.002	0.010			0.002	0.017*		
	(0.002)	(0.009)			(0.002)	(0.010)		
High tech	0.125	0.940***			0.158*	0.840***		
	(0.100)	(0.301)			(0.096)	(0.302)		
Owner characteristics								
Age	0.011**	−0.013	0.009**	−0.018				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.008*	−0.009	−0.006	0.022				
	(0.004)	(0.014)	(0.004)	(0.016)				

Table 11 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Week hours	0.003*	0.003	0.002	−0.004				
	(0.002)	(0.005)	(0.002)	(0.007)				
Startup experience	0.078***	0.128	0.075***	0.069				
	(0.027)	(0.083)	(0.026)	(0.101)				
Education	0.041**	0.128*	0.059***	0.230***				
	(0.021)	(0.069)	(0.020)	(0.083)				
Male	0.053	0.920**	0.005	0.743				
	(0.110)	(0.376)	(0.105)	(0.456)				
U.S. born	−0.182*	0.047	−0.144*	0.452				
	(0.108)	(0.337)	(0.107)	(0.408)				
Macroeconomic								
Crisis	−0.210**	0.203	−0.206**	0.378	−0.180**	0.421	−0.178**	0.496
	(0.093)	(0.301)	(0.089)	(0.368)	(0.090)	(0.309)	(0.087)	(0.380)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	109.759**	−52.689	134.134**	−191.730	113.726**	−10.280	133.326***	−161.706
	(46.304)	(155.646)	(43.957)	(190.785)	(45.501)	(162.601)	(43.235)	(199.899)
#	5822	186	5822	186	5822	186	5822	186
Chi2	464.73***	177.02***	403.72***	67.90***	432.55***	150.54***	369.49***	50.29***
Pseudo R2	0.282		0.245		0.263		0.224	
Log likelihood	−591.15		−621.65		−607.24		−638.77	
Lambda		−0.652***		−0.964***		−0.720***		−1.071***
		(0.242)		(0.273)		(0.237)		(0.265)
Rho		−0.400		−0.459		−0.415		−0.477
Sigma		1.629		2.100		1.733		2.245

two, I.1-0.2, II.1-0.2, III.1-0.2, and IV.1-0.2 to report the findings for the first and second-step regressions.

In Table 29, our variable of interest, trade debt is positive and significantly related to the likelihood of attracting external equity in all the model specifications at the 1% confidence levels. This leads us to not reject our hypothesis H1a, while it is not significantly related to the amount of external equity. These results are in line with the baseline model. The variables of interest between micro firms and small firms are not significantly related to the likelihood of attracting external equity. The variable small firms is not related to the amount of external investment in columns I.2 and III.2 and is negatively and significantly related, at 5% confidence levels, in the other models, while the variable micro firms is negatively and significantly related to the amount of external investment at 1% to 5% confidence levels. In Table 16B we report our findings for the variation in trade debt. As can be observed, these findings are fully in line with trade debt.

Table 12 Heckman two-step model regressions for testing hypothesis H1a and H1b (with financial debt and interaction). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and financial debt and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt (1)	**0.307**	**−0.074**	**0.259**	**−0.240**	**0.303**	**−0.035**	**0.265**	**−0.294**
	(0.245)	**(0.235)**	**(0.197)**	**(0.290)**	**(0.250)**	**(0.252)**	**(0.201)**	**(0.310)**
Financial debt (2)	**0.048*****	**−0.011**	**0.038*****	**−0.026**	**0.048*****	**−0.024**	**0.038*****	**−0.047**
	(0.008)	**(0.026)**	**(0.008)**	**(0.308)**	**(0.008)**	**(0.027)**	**(0.008)**	**(0.032)**
(1)x(2)	**−0.017**	**0.010**	**−0.014**	**0.033**	**−0.016**	**0.010**	**−0.014**	**0.041**
	(0.018)	**(0.022)**	**(0.014)**	**(0.027)**	**(0.018)**	**(0.024)**	**(0.015)**	**(0.029)**
External equity dummy (t-1)	1.360***		1.468***		1.444***		1.565***	
	(0.102)		(0.098)		(0.099)		(0.095)	
Firm characteristics								
Revenues	−0.026***	−0.020			−0.025***	−0.010		
	(0.009)	(0.028)			(0.008)	(0.029)		
Cash	0.045***	0.177***			0.046***	0.171***		
	(0.013)	(0.034)			(0.012)	(0.036)		
Accounts receivables	−0.015*	0.042			−0.015*	0.049*		
	(0.009)	(0.028)			(0.008)	(0.029)		
Inventories	0.004	0.041			0.009	0.034		
	(0.008)	(0.026)			(0.008)	(0.024)		
Tangible assets	−0.006	0.057**			−0.009	0.037		
	(0.009)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.004			−0.004**	0.001		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.060	−0.409***			0.054	−0.430***		
	(0.042)	(0.135)			(0.041)	(0.143)		
Employees	0.002	0.012			0.002	0.020**		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.138	0.988***			0.158*	0.886***		
	(0.099)	(0.308)			(0.095)	(0.312)		
Owner characteristics								
Age	0.011***	−0.013	0.009**	−0.014				
	(0.004)	(0.014)	(0.004)	(0.017)				

Table 12 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Industry experience	−0.008*	−0.007	−0.005	0.026				
	(0.004)	(0.014)	(0.004)	(0.016)				
Week hours	0.003**	0.004	0.003*	0.002				
	(0.002)	(0.006)	(0.002)	(0.007)				
Startup experience	0.074***	0.117	0.072***	0.023				
	(0.027)	(0.086)	(0.026)	(0.106)				
Education	0.037*	0.146**	0.055***	0.230***				
	(0.020)	(0.070)	(0.019)	(0.086)				
Male	0.031	1.022***	−0.003	0.844*				
	(0.108)	(0.382)	(0.104)	(0.467)				
U.S. born	−0.182*	−0.066	−0.182*	0.208				
	(0.107)	(0.344)	(0.106)	(0.420)				
Macroeconomic								
Crisis	−0.188**	0.227	−0.187**	0.491	−0.158*	0.514	−0.157*	0.706*
	(0.091)	(0.309)	(0.088)	(0.379)	(0.089)	(0.320)	(0.086)	(0.392)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	95.769**	−107.759	116.528***	−353.246*	99.651**	−55.044	114.331***	−321.372
	(45.493)	(157.464)	(43.172)	(190.749)	(44.778)	(166.770)	(42.486)	(201.545)
#	5822	186	5822	186	5822	186	5822	186
Chi2	445.40***	157.55***	396.58***	53.70***	413.81***	124.95***	362.97***	35.98***
Pseudo R2	0.270		0.241		0.251		0.220	
Log likelihood	−600.82		−625.23		−616.61		−642.03	
Lambda		−0.741***		−1.217***		−0.885***		−1.398***
		(0.239)		(0.269)		(0.236)		(0.259)
Rho		−0.439		−0.543		−0.482		−0.575
Sigma		1.688		2.242		1.836		2.431

5 Discussion

While the empirical literature on the capital structure continues to debate the puzzling preference of early-stage firms for external equity rather than debt (Vaznyte & Andries, 2019), it is relevant to identify the factors that facilitate the attraction and determination of the amount of external equity in these firms, particularly for firms with low profit but high growth potential.

The existing literature that lays the foundations for the role of trade debt in alleviating the financing frictions of small firms is quite useful here. Of particular interest are the distinct rationales of bank and trade debt that generate divergent information content for investors (Petersen & Rajan, 1994). Banks

Table 13 Heckman two-step model regressions for testing hypothesis H1a and H1b (with bank debt). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and bank debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.050*****	**0.028**	**0.038*****	**0.060***	**0.051*****	**0.026**	**0.040*****	**0.061***
	(0.009)	**(0.029)**	**(0.008)**	**(0.033)**	**(0.009)**	**(0.031)**	**(0.008)**	**(0.035)**
Bank debt	**0.002**	**0.025**	**−0.004**	**0.023**	**0.002**	**0.029**	**−0.005**	**0.022**
	(0.008)	**(0.025)**	**(0.008)**	**(0.029)**	**(0.008)**	**(0.026)**	**(0.008)**	**(0.031)**
External equity dummy (t-1)	1.320***		1.428***		1.407***		1.522***	
	(0.102)		(0.098)		(0.100)		(0.096)	
Firm characteristics								
Revenues	−0.026***	−0.014			−0.025***	−0.006		
	(0.009)	(0.027)			(0.008)	(0.029)		
Cash	0.038***	0.186***			0.039***	0.183***		
	(0.012)	(0.033)			(0.012)	(0.035)		
Accounts receivables	−0.027***	0.027			−0.028***	0.031		
	(0.009)	(0.030)			(0.009)	(0.031)		
Inventories	0.003	0.033			0.008	0.025		
	(0.008)	(0.026)			(0.008)	(0.028)		
Tangible assets	−0.005	0.048*			−0.007	0.023		
	(0.009)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000**	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.003	0.005			−0.004*	0.003		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.050	−0.401***			0.045	−0.436***		
	(0.042)	(0.132)			(0.041)	(0.140)		
Employees	0.002	0.009			0.002	0.017*		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.103	1.022***			0.128	0.927***		
	(0.099)	(0.306)			(0.094)	(0.309)		
Owner characteristics								
Age	0.011***	−0.015	0.009**	−0.019				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.008**	−0.008	−0.007*	0.023				
	(0.004)	(0.014)	(0.004)	(0.016)				
Week hours	0.003*	0.003	0.002	−0.003				
	(0.002)	(0.005)	(0.002)	(0.007)				

Table 13 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	0.079***	0.137	0.078***	0.072				
	(0.026)	(0.084)	(0.025)	(0.102)				
Education	0.033	0.151**	0.048**	0.271***				
	(0.020)	(0.068)	(0.019)	(0.083)				
Male	0.055	0.924**	0.012	0.795*				
	(0.108)	(0.384)	(0.104)	(0.466)				
U.S. born	−0.161	−0.027	−0.160	0.370				
	(0.107)	(0.338)	(0.106)	(0.413)				
Macroeconomic								
Crisis	−0.201**	0.186	−0.197**	0.346	−0.172**	0.437	−0.171**	0.518
	(0.091)	(0.305)	(0.088)	(0.373)	(0.089)	(0.316)	(0.086)	(0.391)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	127.211***	−70.743	144.030***	−202.100	130.766***	−21.338	143.436***	−160.119
	(45.161)	(158.043)	(43.273)	(194.216)	(44.372)	(167.470)	(42.583)	(206.261)
#	5822	186	5822	186	5822	186	5822	186
Chi2	437.77***	162.39***	386.47***	56.46***	405.59***	128.25***	353.77***	33.91***
Pseudo R2	0.266		0.235		0.246		0.215	
Log likelihood	−604.63		−630.28		−620.72		−646.63	
Lambda		−0.735***		−1.072***		−0.861***		−1.258***
		(0.242)		(0.274)		(0.239)		(0.268)
Rho		−0.442		−0.496		−0.475		−0.532
Sigma		1.665		2.162		1.811		2.364

rationalize their debt from the long-term perspective, ground it on formal credit scoring, covenants and collateral to alleviate information and incentive problems, and monitor discretionary management of cash and assets. Suppliers rationalize their debt from the short-term perspective, ground it on their implicit assessments, potential salvage value and price discrimination to alleviate information and incentive problems, and monitor the discretionary management of operations. This view of the distinct roles of bank and trade debts blends neatly with the view of their complementary roles in the financing of unconstrained small firms, and substitutive roles in the financing of constrained firms (Fabbri & Menichini, 2010). The distinct information content generated by bank and trade debts is quite well documented in the case of listed firms where it is found that trade debt not only improves stock market return predictability but also returns and market value, and that these findings are even more noticeable for the more constrained and opaque firms (Aktas et al., 2012; Goto et al., 2015).

The information content generated from the trade debt framework can be extremely costly to simulate

Table 14 Heckman two-step model regressions for testing hypothesis H1a and H1b (with bank debt). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and bank debt and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.093****	**0.033**	**0.098*****	**0.103**	**0.095****	**0.063**	**0.104*****	**0.136***
	(0.041)	**(0.059)**	**(0.034)**	**(0.075)**	**(0.041)**	**(0.062)**	**(0.034)**	**(0.078)**
Bank debt	**0.009**	**0.032**	**0.006**	**0.042**	**0.009**	**0.035**	**0.007**	**0.043**
	(0.008)	**(0.025)**	**(0.007)**	**(0.028)**	**(0.008)**	**(0.026)**	**(0.007)**	**(0.029)**
External equity dummy (t-1)	1.383***		1.496***		1.469***		1.594***	
	(0.101)		(0.097)		(0.099)		(0.095)	
Firm characteristics								
Revenues	−0.023***	−0.017			−0.022***	−0.010		
	(0.009)	(0.028)			(0.008)	(0.029)		
Cash	0.038***	0.181***			0.039***	0.178***		
	(0.012)	(0.034)			(0.012)	(0.035)		
Accounts receivables	−0.008	0.037			−0.009	0.043		
	(0.009)	(0.028)			(0.008)	(0.029)		
Inventories	0.011	0.037			0.016**	0.027		
	(0.008)	(0.025)			(0.008)	(0.027)		
Tangible assets	−0.003	0.048*			−0.004	0.026		
	(0.009)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000**	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.004			−0.004*	0.001		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.051	−0.399***			0.046	−0.417***		
	(0.041)	(0.134)			(0.040)	(0.142)		
Employees	0.002	0.009			0.003	0.016		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.115	1.045***			0.129	0.935***		
	(0.097)	(0.308)			(0.093)	(0.310)		
Owner characteristics								
Age	0.011***	−0.016	0.009**	−0.017				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.009**	−0.007	−0.006*	0.026				
	(0.004)	(0.014)	(0.004)	(0.016)				
Week hours	0.004**	0.004	0.004**	0.001				
	(0.002)	(0.005)	(0.002)	(0.007)				

Table 14 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	0.075***	0.116	0.077***	0.019				
	(0.026)	(0.085)	(0.025)	(0.105)				
Education	0.031	0.151**	0.047**	0.251***				
	(0.021)	(0.069)	(0.019)	(0.085)				
Male	0.039	0.894**	0.006	0.699				
	(0.106)	(0.388)	(0.102)	(0.470)				
U.S. born	−0.169	−0.069	−0.172	0.222				
	(0.106)	(0.340)	(0.105)	(0.416)				
Macroeconomic								
Crisis	−0.174*	0.215	−0.174**	0.451	−0.146*	0.489	−0.145**	0.660*
	(0.089)	(0.306)	(0.087)	(0.376)	(0.087)	(0.317)	(0.085)	(0.389)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	110.759**	−130.307	121.684***	−343.928*	114.627***	−84.814	120.121***	−302.833
	(44.189)	(156.518)	(42.287)	(188.912)	(43.439)	(165.341)	(41.545)	(199.394)
#	5822	186	5822	186	5822	186	5822	186
Chi2	411.74***	154.33***	371.31***	53.57***	378.54***	122.44***	336.24***	34.45***
Pseudo R2	0.250		0.225		0.230		0.204	
Log likelihood	−617.64		−637.86		−634.24		−655.40	
Lambda		−0.785***		−1.226***		−0.923***		−1.404***
		(0.234)		(0.261)		(0.229)		(0.251)
Rho		−0.464		−0.548		−0.502		−0.579
Sigma		1.694		2.236		1.838		2.424

and replicate. External equity providers can read the information embedded in this framework to alleviate information asymmetries relating to the future growth potential and to appraise the potential value of early-stage firms. We investigate the extent to which trade debt attracts and determines the value of external equity. To do so, we develop hypotheses relating to the information content and value relevance of trade debt, test these hypotheses recurring to the multi-step empirical framework of Heckman and to the confidential data on early-stage firms in the U.S. between 2004 and 2011 obtained from the Kauffman Firm Survey. Our findings indicate that trade debt attracts external equity, which means it carries information content, and determines its value in unprofitable but growing firms. Tests of reverse causality confirm that the relationship run from trade debt to external equity and not the other way round. The findings are even more pronounced in firms that are labor-intensive, deploy simple technologies and operate with large trade debt levels.

Our findings are summarized in Table 31 and point towards the crucial role of the trade debt of early-stage firms in carrying information content to

Table 15 Heckman two-step model regressions for testing hypothesis H1a and H1b (with bank debt and interaction). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and bank debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt (1)	**0.051*****	**0.032**	**0.039*****	**0.072****	**0.051*****	**0.032**	**0.040*****	**0.078****
	(0.010)	**(0.031)**	**(0.009)**	**(0.036)**	**(0.010)**	**(0.033)**	**(0.009)**	**(0.038)**
Bank debt (2)	**0.005**	**0.044**	**−0.002**	**0.071**	**0.004**	**0.052**	**−0.005**	**0.086**
	(0.015)	**(0.053)**	**(0.015)**	**(0.064)**	**(0.015)**	**(0.055)**	**(0.015)**	**(0.067)**
(1)x(2)	**−0.000**	**−0.002**	**−0.000**	**−0.005**	**−0.002**	**−0.003**	**0.000**	**−0.007**
	(0.002)	**(0.005)**	**(0.002)**	**(0.006)**	**(0.002)**	**(0.005)**	**(0.002)**	**(0.006)**
External equity dummy (t-1)	1.320***		1.429***		1.407***		1.522***	
	(0.102)		(0.098)		(0.100)		(0.096)	
Firm characteristics								
Revenues	−0.026***	−0.014			−0.025***	−0.006		
	(0.009)	(0.027)			(0.008)	(0.029)		
Cash	0.038***	0.185***			0.039***	0.181***		
	(0.012)	(0.033)			(0.012)	(0.035)		
Accounts receivables	−0.027***	0.027			−0.028***	0.032		
	(0.009)	(0.030)			(0.009)	(0.031)		
Inventories	0.003	0.034			0.008	0.026		
	(0.008)	(0.026)			(0.008)	(0.027)		
Tangible assets	−0.005	0.047*			−0.007	0.023		
	(0.009)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000**	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.003	0.005			−0.004*	0.003		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.050	−0.390***			0.045	−0.433***		
	(0.042)	(0.135)			(0.041)	(0.143)		
Employees	0.002	0.009			0.002	0.017*		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.103	1.031***			0.129	0.936***		
	(0.099)	(0.307)			(0.094)	(0.309)		
Owner characteristics								
Age	0.011***	−0.014	0.009**	−0.017				
	(0.004)	(0.014)	(0.004)	(0.017)				
Industry experience	−0.008**	−0.009	−0.007*	0.021				
	(0.004)	(0.014)	(0.004)	(0.016)				

Table 15 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Week hours	0.003*	0.004	0.002	−0.002				
	(0.002)	(0.005)	(0.002)	(0.007)				
Startup experience	0.079***	0.130	0.077***	0.057				
	(0.026)	(0.085)	(0.025)	(0.104)				
Education	0.033	0.151**	0.048**	0.271***				
	(0.020)	(0.069)	(0.019)	(0.083)				
Male	0.056	0.924**	0.012	0.797*				
	(0.108)	(0.384)	(0.104)	(0.465)				
U.S. born	−0.162	0.029	−0.160	0.362				
	(0.108)	(0.338)	(0.106)	(0.413)				
Macroeconomic								
Crisis	−0.201**	0.179	−0.197**	0.343	−0.172*	0.441	−0.171**	0.525
	(0.091)	(0.304)	(0.088)	(0.373)	(0.089)	(0.316)	(0.086)	(0.390)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	126.881***	−74.402	143.784***	−213.270	130.577***	−25.238	143.494***	−171.314
	(45.196)	(158.267)	(43.301)	(194.526)	(44.407)	(167.629)	(42.607)	(206.284)
#	5822	186	5822	186	5822	186	5822	186
Chi2	437.81***	162.27***	386.50***	57.06***	405.60***	128.40***	353.77***	35.16***
Pseudo R2	0.267		0.235		0.246		0.215	
Log likelihood	−604.61		−630.27		−620.72		−646.63	
Lambda		−0.750***		−1.117***		−0.879***		−1.311***
		(0.245)		(0.279)		(0.241)		(0.272)
Rho		−0.449		−0.513		−0.484		−0.551
Sigma		1.670		2.176		1.816		2.381

alleviate information asymmetries and in facilitating appraisal on the grounds of its value relevance for external equity providers. These twin roles of trade debt show significant potential in reducing adverse selection and losses for investors intending to provide external equity to early-stage firms. These findings reinforce the distinct information content and value relevance of trade and bank debts, complementing the findings on the role of the latter in disincentivizing perquisites, empire building and wasteful management through tight covenants, collateral and monitoring (Epure & Guasch, 2020). The findings also extend and blend with the wider literature on the financing of small and medium size firms (Beck and Demirguc-Kunt, 2006; Cowling & Sclip, 2023; De Blick et al., 2024; Dejardin et al., 2024; Farè et al., 2024).

The link between trade debt and equity is not only of relevance for academics but also for practitioners. Our findings indicate that debt and equity markets

Table 16 Heckman two-step model regressions for testing hypothesis H1a and H1b (with bank debt and interaction). The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and bank debt and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt (1)	**0.146****	**0.032**	**0.146*****	**0.091**	**0.156*****	**0.060**	**0.159*****	**0.119**
	(0.060)	**(0.060)**	**(0.055)**	**(0.077)**	**(0.060)**	**(0.064)**	**(0.055)**	**(0.081)**
Bank debt (2)	**0.010**	**0.039**	**0.007**	**0.049***	**0.010**	**0.042**	**0.008**	**0.048**
	(0.008)	**(0.026)**	**(0.007)**	**(0.029)**	**(0.008)**	**(0.026)**	**(0.007)**	**(0.030)**
(1)x(2)	**−0.010**	**−0.055**	**−0.010**	**−0.053**	**−0.011**	**−0.057**	**−0.011**	**−0.045**
	(0.009)	**(0.047)**	**(0.008)**	**(0.059)**	**(0.010)**	**(0.050)**	**(0.008)**	**(0.062)**
External equity dummy (t-1)	1.385***		1.498***		1.471***		1.596***	
	(0.101)		(0.097)		(0.099)		(0.095)	
Firm characteristics								
Revenues	−0.023***	−0.020			−0.022***	−0.012		
	(0.00)	(0.028)			(0.008)	(0.029)		
Cash	0.037***	0.179***			0.038***	0.178***		
	(0.012)	(0.034)			(0.012)	(0.035)		
Accounts receivables	−0.010	0.036			−0.009	0.042		
	(0.009)	(0.028)			(0.008)	(0.029)		
Inventories	0.011	0.039			0.017**	0.029		
	(0.008)	(0.026)			(0.008)	(0.027)		
Tangible assets	−0.003	0.049*			−0.005	0.028		
	(0.009)	(0.027)			(0.009)	(0.028)		
Net profit	−0.000***	−0.000			−0.000**	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.004			−0.004*	0.000		
	(0.002)	(0.012)			(0.002)	(0.013)		
Delinquency risk	0.051	−0.388***			0.045	−0.405***		
	(0.042)	(0.134)			(0.040)	(0.142)		
Employees	0.003	0.009			0.003	0.016		
	(0.002)	(0.010)			(0.002)	(0.010)		
High tech	0.117	1.052***			0.131	0.935***		
	(0.097)	(0.308)			(0.093)	(0.309)		
Owner characteristics								
Age	0.011***	−0.018	0.010**	−0.019				
	(0.004)	(0.015)	(0.004)	(0.017)				

Table 16 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Industry experience	−0.008**	−0.006	−0.006*	0.027				
	(0.004)	(0.014)	(0.004)	(0.016)				
Week hours	0.004**	0.004	0.004**	0.001				
	(0.002)	(0.005)	(0.002)	(0.001)				
Startup experience	0.073***	0.105	0.075***	0.008				
	(0.026)	(0.086)	(0.025)	(0.106)				
Education	0.032	0.153**	0.046**	0.252***				
	(0.020)	(0.069)	(0.019)	(0.085)				
Male	0.040	0.887**	0.005	0.683				
	(0.106)	(0.387)	(0.102)	(0.469)				
U.S. born	−0.170	−0.059	−0.173*	0.234				
	(0.106)	(0.340)	(0.105)	(0.417)				
Macroeconomic								
Crisis	−0.174*	0.190	−0.173**	0.430	−0.146*	0.459	−0.145**	0.639
	(0.089)	(0.307)	(0.087)	(0.376)	(0.087)	(0.317)	(0.085)	(0.390)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	110.834**	−151.328	121.801***	−362.463*	114.604***	−105.593	120.275***	−318.092
	(44.202)	(157.043)	(42.312)	(189.512)	(43.465)	(165.686)	(41.584)	(199.805)
#	5822	186	5822	186	5822	186	5822	186
Chi2	413.39***	154.99***	373.46***	53.45***	380.72***	123.11***	339.00***	34.28***
Pseudo R2	0.251		0.227		0.231		0.206	
Log likelihood	−616.82		−636.78		−633.16		−654.02	
Lambda		−0.851***		−1.297***		−0.990***		−1.465***
		(0.239)		(0.270)		(0.235)		(0.259)
Rho		−0.497		−0.573		−0.533		−0.599
Sigma		1.670		2.176		1.816		2.381

Table 17 Heckman two-step model regressions for testing hypothesis H1a and H1b in unprofitable firms. The table presents Heckman two-step model regressions on a sub-sample of firms that suffered losses. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.050*****	**0.052***	**0.043*****	**0.084****	**0.050*****	**0.046**	**0.046*****	**0.089****
	(0,016)	**(0,029)**	**(0.012)**	**(0.037)**	**(0.015)**	**(0.032)**	**(0.012)**	**(0.039)**
External equity dummy (t-1)	1.263***		1.441***		1.291***		1.540***	
	(0.161)		(0.146)		(0.155)		(0.138)	
Firm characteristics								
Revenues	−0.045***	0.016			−0.044***	0.017		
	(0.015)	(0.033)			(0.015)	(0.033)		
Cash	0.066***	0.195***			0.066***	0.191***		
	(0.020)	(0.038)			(0.019)	(0.042)		
Accounts receivables	−0.001	−0.045			−0.001	−0.020		
	(0.017)	(0.037)			(0.016)	(0.040)		
Inventories	0.003	−0.010			0.009	−0.001		
	(0.014)	(0.027)			(0.013)	(0.029)		
Tangible assets	−0.012	0.067**			−0.018	0.044		
	(0.015)	(0.026)			(0.014)	(0.028)		
Net profit	−0.000	−0.000			−0.000**	−0.000*		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.003	−0.033			−0.004	−0.030		
	(0.012)	(0.042)			(0.011)	(0.044)		
Delinquency risk	−0.021	−0.292**			−0.016	−0.309**		
	(0.073)	(0.141)			(0.072)	(0.155)		
Employees	0.003	0.020*			0.005	0.022*		
	(0.005)	(0.011)			(0.005)	(0.012)		
High tech	0.264	0.070			0.240	0.269		
	(0.159)	(0.302)			(0.150)	(0.303)		
Owner characteristics								
Age	0.007	0.002	0.004	−0.016				
	(0.007)	(0.016)	(0.005)	(0.021)				
Industry experience	−0.018***	0.025	−0.011*	0.051**				
	(0.007)	(0.017)	(0.006)	(0.022)				
Week hours	0.001	0.003	0.000	−0.001				
	(0.002)	(0.005)	(0.003)	(0.008)				
Startup experience	0.081*	0.041	0.092**	0.003				
	(0.045)	(0.087)	(0.041)	(0.124)				

Table 17 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.050	0.049	0.113***	−0.087				
	(0.036)	(0.079)	(0.034)	(0.114)				
Male	0.013	1.468***	0.008	1.378**				
	(0.167)	(0.394)	(0.160)	(0.590)				
U.S. born	−0.126	0.139	−0.092	0.777				
	(0.177)	(0.352)	(0.172)	(0.505)				
Macroeconomic								
Crisis	0.005	0.561*	0.005	0.221	0.046	0.546	0.042	0.042
	(0.168)	(0.320)	(0.160)	(0.476)	(0.164)	(0.351)	(0.155)	(0.511)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	105.857	−3.188	116.119	−278.468	117.812	26.625	113.867	−328.137
	(93.382)	(186.688)	(86.320)	(263.757)	(92.288)	(206.078)	(84.530)	(287.991)
#	1132	105	1132	105	1132	105	1132	105
Chi2	230.09***	163.66***	194.24***	47.00***	213.25***	100.82***	170.40***	22.78***
Pseudo R2	0.329		0.278		0.305		0.244	
Log likelihood	−234.59		−252.52		−243.02		−264.44	
Lambda		−0.716**		−1.109***		−0.871***		−1.271***
		(0.281)		(0.345)		(0.299)		(0.338)
Rho		−0.566		−0.571		−0.602		−0.583
Sigma		1.265		1.943		1.447		2.180

Table 18 Heckman two-step model regressions for testing hypothesis H1a and H1b in unprofitable firms. The table presents Heckman two-step model regressions on a sub-sample of firms that suffered losses. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.089**	**−0.045**	**0.093****	**0.109**	**0.076**	**−0.033**	**0.102*****	**0.116**
	(0.059)	**(0.055)**	**(0.044)**	**(0.070)**	**(0.055)**	**(0.059)**	**(0.040)**	**(0.074)**
External equity dummy (t-1)	1.271***		1.495***		1.313***		1.623***	
	(0.161)		(0.144)		(0.155)		(0.137)	
Firm characteristics								
Revenues	−0.041***	0.002			−0.039***	0.000		
	(0.015)	(0.033)			(0.014)	(0.337)		
Cash	0.068***	0.195***			0.069***	0.189***		
	(0.020)	(0.039)			(0.019)	(0.043)		
Accounts receivables	0.019	−0.009			0.019	0.018		
	(0.016)	(0.036)			(0.015)	(0.038)		
Inventories	0.011	−0.006			0.018	0.002		
	(0.013)	(0.028)			(0.013)	(0.029)		
Tangible assets	−0.008	0.073***			−0.014	0.049*		
	(0.014)	(0.026)			(0.014)	(0.028)		
Net profit	−0.000	−0.000**			−0.000	−0.000**		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004	−0.021			−0.005	−0.017		
	(0.012)	(0.043)			(0.011)	(0.045)		
Delinquency risk	−0.013	−0.341**			−0.005	−0.352**		
	(0.073)	(0.145)			(0.072)	(0.160)		
Employees	0.004	0.020*			0.006	0.023*		
	(0.005)	(0.011)			(0.005)	(0.012)		
High tech	0.283	0.165			0.258*	0.287		
	(0.151)	(0.309)			(0.148)	(0.308)		
Owner characteristics								
Age	0.007	−0.001	0.005	−0.009				
	(0.007)	(0.016)	(0.006)	(0.022)				
Industry experience	−0.019***	0.025	−0.110*	0.061***				
	(0.007)	(0.017)	(0.006)	(0.022)				
Week hours	0.002	0.003	0.002	0.007				
	(0.003)	(0.006)	(0.003)	(0.008)				
Startup experience	0.078*	0.062	0.097**	−0.034				
	(0.045)	(0.089)	(0.041)	(0.131)				

Table 18 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.053	0.080	0.108***	0.016				
	(0.036)	(0.084)	(0.033)	(0.120)				
Male	0.007	1.489***	0.018	1.374**				
	(0.165)	(0.407)	(0.159)	(0.605)				
U.S. born	−0.145	−0.046	−0.112	0.328				
	(0.174)	(0.355)	(0.168)	(0.500)				
Macroeconomic								
Crisis	0.041	0.641**	0.043	0.459	0.084	0.626	0.089	0.321
	(0.166)	(0.324)	(0.157)	(0.484)	(0.162)	(0.354)	(0.152)	(0.520)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	103.106	60.758	97.451	−388.676	116.757***	66.172	96.565	−441.862
	(92.598)	(192.204)	(84.120)	(267.905)	(91.461)	(210.207)	(82.334)	(290.417)
#	1132	105	1132	105	1132	105	1132	105
Chi2	221.72***	165.56***	187.29***	44.92***	240.00***	101.11***	162.45***	21.80***
Pseudo R2	0.317		0.268		0.292		0.232	
Log likelihood	−238.78		−256.00		−247.64		−268.413	
Lambda		−0.469		−1.157***		−0.712**		−1.352***
		(0.293)		(0.344)		(0.302)		(0.326)
Rho		−0.383		−0.579		−0.501		−0.602
Sigma		1.223		1.199		1.423		2.244

Table 19 Heckman two-step model regressions for testing hypothesis H1a and H1b in unprofitable firms. The table presents Heckman two-step model regressions on a sub-sample of firms that suffered losses. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and financial debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Financial debt	**0.022**	**−0.013**	**0.011**	**0.017**	**0.021**	**−0.008**	**0.012**	**0.016**
	(0.014)	**(0.025)**	**(0.012)**	**(0.034)**	**(0.013)**	**(0.027)**	**(0.012)**	**(0.037)**
External equity dummy (t-1)	1.246***		1.471***		1.285***		1.601***	
	(0.158)		(0.144)		(0.153)		(0.137)	
Firm characteristics								
Revenues	−0.045***	0.005			−0.043***	0.001		
	(0.015)	(0.033)			(0.015)	(0.034)		
Cash	0.070***	0.190***			0.071***	0.188***		
	(0.020)	(0.040)			(0.020)	(0.044)		
Accounts receivables	0.017	−0.013			0.017	0.015		
	(0.016)	(0.036)			(0.015)	(0.038)		
Inventories	0.008	−0.002			0.015	0.005		
	(0.014)	(0.027)			(0.013)	(0.030)		
Tangible assets	−0.010	0.076***			−0.016	0.051*		
	(0.014)	(0.027)			(0.014)	(0.029)		
Net profit	−0.000	−0.000**			−0.000	−0.000**		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004	−0.016			−0.006	−0.015		
	(0.012)	(0.043)			(0.011)	(0.045)		
Delinquency risk	−0.008	−0.329**			−0.002	−0.339**		
	(0.074)	(0.146)			(0.072)	(0.160)		
Employees	0.004	0.021*			0.005	0.023*		
	(0.005)	(0.011)			(0.005)	(0.012)		
High tech	0.276*	0.108*			0.251	0.274		
	(0.157)	(0.311)			(0.148)	(0.310)		
Owner characteristics								
Age	0.007	0.001	0.004	−0.019				
	(0.007)	(0.016)	(0.006)	(0.022)				
Industry experience	−0.018***	0.028	−0.010	0.066***				
	(0.007)	(0.017)	(0.006)	(0.022)				
Week hours	0.002	0.004	0.002	0.001				
	(0.002)	(0.006)	(0.003)	(0.008)				
Startup experience	0.074*	0.049	0.102**	0.038				
	(0.045)	(0.089)	(0.041)	(0.129)				

Table 19 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.057	0.057	0.118***	0.108				
	(0.036)	(0.082)	(0.033)	(0.121)				
Male	−0.006	1.490***	0.017	1.425**				
	(0.166)	(0.407)	(0.159)	(0.620)				
U.S. born	−0.147	−0.024	−0.114	0.366				
	(0.174)	(0.357)	(0.168)	(0.511)				
Macroeconomic								
Crisis	0.019	0.673**	0.020	0.340	0.064	0.633*	0.064	0.125
	(0.166)	(0.330)	(0.157)	(0.501)	(0.163)	(0.359)	(0.151)	(0.543)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	88.533	51.500	94.126	−356.681	102.036	66.359	92.188	−453.523
	(93.549)	(191.962)	(84.076)	(272.836)	(92.417)	(212.024)	(82.062)	(300.347)
#	1132	105	1132	105	1132	105	1132	105
Chi2	222.17***	160.70***	182.64***	42.06***	204.62***	98.02***	155.36***	17.93***
Pseudo R2	0.318		0.261		0.293		0.222	
Log likelihood	−238.55		−258.32		−247.33		−271.96	
Lambda		−0.587**		−1.008***		−0.782***		−1.227***
		(0.286)		(0.349)		(0.302)		(0.339)
Rho		−0.468		−0.508		−0.541		−0.541
Sigma		1.256		1.986		1.445		2.267

Table 20 Heckman two-step model regressions for testing hypothesis H1a and H1b in unprofitable firms. The table presents Heckman two-step model regressions on a sub-sample of firms that suffered losses. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and bank debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Bank debt	**−0.008**	**0.041**	**−0.009**	**0.080****	**−0.013**	**0.059****	**−0.012**	**0.083****
	(0.014)	**(0.027)**	**(0.012)**	**(0.035)**	**(0.013)**	**(0.028)**	**(0.012)**	**(0.037)**
External equity dummy (t-1)	1.244***		1.481***		1.284***		1.614***	
	(0.159)		(0.144)		(0.153)		(0.137)	
Firm characteristics								
Revenues	−0.040***	0.005			−0.037***	0.001		
	(0.015)	(0.033)			(0.014)	(0.033)		
Cash	0.066***	0.202***			0.066***	0.203***		
	(0.020)	(0.039)			(0.019)	(0.043)		
Accounts receivables	0.020	−0.018			0.021	0.008		
	(0.016)	(0.036)			(0.015)	(0.037)		
Inventories	0.013	−0.009			0.020	−0.008		
	(0.014)	(0.028)			(0.013)	(0.029)		
Tangible assets	−0.008	0.065***			−0.013	0.038		
	(0.014)	(0.027)			(0.014)	(0.028)		
Net profit	−0.000	−0.000**			−0.000	−0.000**		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004	−0.019			−0.005	−0.022		
	(0.012)	(0.042)			(0.011)	(0.044)		
Delinquency risk	−0.021	−0.288**			−0.016	−0.297*		
	(0.073)	(0.144)			(0.072)	(0.156)		
Employees	0.004	0.018*			0.006	0.019		
	(0.005)	(0.011)			(0.004)	(0.012)		
High tech	0.261*	0.251			0.235	0.363		
	(0.156)	(0.317)			(0.148)	(0.306)		
Owner characteristics								
Age	0.007	−0.006	0.004	−0.027				
	(0.007)	(0.016)	(0.006)	(0.022)				
Industry experience	−0.018***	0.025	−0.010	0.067***				
	(0.007)	(0.017)	(0.006)	(0.022)				
Week hours	0.002	0.003	0.002	−0.002				
	(0.002)	(0.006)	(0.003)	(0.008)				
Startup experience	0.077*	0.057	0.108***	0.047				
	(0.045)	(0.088)	(0.041)	(0.127)				

Table 20 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.053	0.093	0.111***	0.154				
	(0.036)	(0.083)	(0.033)	(0.119)				
Male	0.016	1.358***	0.030	1.263**				
	(0.164)	(0.412)	(0.159)	(0.614)				
U.S. born	−0.140	−0.007	−0.107	0.386				
	(0.174)	(0.353)	(0.168)	(0.439)				
Macroeconomic								
Crisis	0.035	0.607*	0.030	0.305	0.076	0.572	0.074	0.077
	(0.166)	(0.324)	(0.156)	(0.484)	(0.162)	(0.350)	(0.151)	(0.528)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	112.220	18.337	102.163	−326.832	127.124	66.359	102.252	−439.169
	(92.859)	(189.621)	(83.583)	(268.199)	(91.838)	(212.024)	(81.627)	(295.491)
#	1132	105	1132	105	1132	105	1132	105
Chi2	219.93***	170.13***	182.23***	49.86***	203.03***	111.65***	155.51***	23.94***
Pseudo R2	0.315		0.261		0.290		0.222	
Log likelihood	−239.67		−258.52		−248.12		−271.89	
Lambda		−0.549**		−0.969***		−0.735**		−1.185***
		(0.283)		(0.339)		(0.297)		(0.330)
Rho		−0.444		−0.499		−0.521		−0.534
Sigma		1.237		1.942		1.412		2.221

Table 21 Heckman two-step model regressions for testing hypotheses H1a and H1b in capital-intensive firms. The table presents Heckman two-step model regressions on a sub-sample of firms in capital-intensive industries. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.030**	**0.035**	**0.024***	**0.069**	**0.031**	**0.043**	**0.022**	**0.076***
	(0.021)	**(0.040)**	**(0.014)**	**(0.042)**	**(0.020)**	**(0.041)**	**(0.014)**	**(0.043)**
External equity dummy (t-1)	1.246***		1.428***		1.460***		1.647***	
	(0.102)		(0.162)		(0.175)		(0.152)	
Firm characteristics								
Revenues	−0.044**	0.022			−0.040**	0.035		
	(0.019)	(0.040)			(0.018)	(0.038)		
Cash	0.059**	0.148***			0.059**	0.124***		
	(0.026)	(0.050)			(0.024)	(0.047)		
Accounts receivables	−0.000	−0.051			−0.011	−0.057		
	(0.024)	(0.050)			(0.022)	(0.047)		
Inventories	0.021	−0.011			0.026	−0.015		
	(0.018)	(0.037)			(0.017)	(0.038)		
Tangible assets	−0.016	0.036			−0.023	0.018		
	(0.018)	(0.037)			(0.017)	(0.037)		
Net profit	−0.000***	−0.000			0.000	0.000*		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.011	0.011			0.026	−0.030		
	(0.012)	(0.049)			(0.048)	(0.044)		
Delinquency risk	0.142	−0.349*			0.111	−0.305*		
	(0.088)	(0.183)			(0.086)	(0.181)		
Employees	−0.010	0.028**			−0.008	0.031**		
	(0.007)	(0.013)			(0.007)	(0.013)		
High tech	−0.101	−0.029			0.024	−0.160		
	(0.178)	(0.368)			(0.160)	(0.343)		
Owner characteristics								
Age	0.008	0.003	−0.001	−0.043*				
	(0.009)	(0.021)	(0.008)	(0.026)				
Industry experience	−0.007	0.003	0.000	0.067***				
	(0.008)	(0.020)	(0.007)	(0.024)				
Week hours	0.005	−0.002	0.003	−0.006				
	(0.004)	(0.007)	(0.003)	(0.010)				
Startup experience	0.051	0.131	0.064	0.182				
	(0.055)	(0.117)	(0.049)	(0.155)				

Table 21 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.144***	−0.052	0.176***	0.036				
	(0.045)	(0.110)	(0.040)	(0.150)				
Male	−0.027	0.109	−0.217	−0.289				
	(0.249)	(0.572)	(0.221)	(0.787)				
U.S. born	−0.011	−0.484	−0.024	−0.030				
	(0.208)	(0.402)	(0.197)	(0.555)				
Macroeconomic								
Crisis	−0.256	0.738*	−0.232	0.847	−0.156	0.903	−0.143	0.569
	(0.182)	(0.183)	(0.168)	(0.548)	(0.174)	(0.385)	(0.158)	(0.529)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	127.579***	166.799	99.494	152.360	36.544	198.230	71.466	160.609
	(45.141)	(212.955)	(82.577)	(265.139)	(88.108)	(215.960)	(78.969)	(272.996)
#	1040	75	1040	75	1040	75	1040	75
Chi2	210.26***	54.99***	170.81***	14.40	194.81***	43.22***	146.58***	6.15
Pseudo R2	0.390		0.317		0.362		0.272	
Log likelihood	−164.31		−184.03		−172.04		−196.15	
Lambda		−1.249***		−1.381***		−1.311***		−1.092***
		(0.345)		(0.422)		(0.285)		(0.337)
Rho		−0.851		−0.701		−0.845		−0.556
Sigma		1.467		1.971		1.551		1.964

Table 22 Heckman two-step model regressions for testing hypotheses H1a and H1b in capital-intensive firms. The table presents Heckman two-step model regressions on a sub-sample of firms in capital-intensive industries. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.234***	**0.048**	**0.233***	**0.067**	**0.239***	**0.058**	**0.248***	**0.080**
	(0.136)	**(0.060)**	**(0.126)**	**(0.085)**	**(0.138)**	**(0.060)**	**(0.129)**	**(0.076)**
External equity dummy (t-1)	1.300***		1.497***		1.507***		1.702***	
	(0.186)		(0.162)		(0.176)		(0.153)	
Firm characteristics								
Revenues	−0.047**	0.001			−0.042**	0.015		
	(0.019)	(0.039)			(0.018)	(0.037)		
Cash	0.065**	0.156***			0.064***	0.134***		
	(0.026)	(0.051)			(0.024)	(0.047)		
Accounts receivables	0.018	−0.022			0.006	−0.025		
	(0.020)	(0.040)			(0.024)	(0.039)		
Inventories	0.024	−0.004			0.029*	−0.007		
	(0.018)	(0.037)			(0.017)	(0.038)		
Tangible assets	−0.014	0.050			−0.020	0.035		
	(0.018)	(0.036)			(0.017)	(0.037)		
Net profit	−0.000***	−0.000			−0.000***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.013	0.001			−0.009	0.021		
	(0.012)	(0.051)			(0.010)	(0.050)		
Delinquency risk	−0.147*	−0.346*			0.116	−0.290		
	(0.089)	(0.186)			(0.086)	(0.185)		
Employees	−0.011	0.031**			−0.009	0.032**		
	(0.007)	(0.013)			(0.007)	(0.013)		
High tech	−0.088	−0.039			0.046	−0.088		
	(0.177)	(0.373)			(0.160)	(0.346)		
Owner characteristics								
Age	0.008	0.013	0.001	−0.027				
	(0.009)	(0.021)	(0.008)	(0.028)				
Industry experience	−0.008	0.001	0.001	0.058**				
	(0.008)	(0.020)	(0.007)	(0.026)				
Week hours	0.005	−0.002	0.004	−0.002				
	(0.004)	(0.008)	(0.003)	(0.010)				

Table 22 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	0.052	0.116	0.053	0.023				
	(0.054)	(0.122)	(0.050)	(0.171)				
Education	0.147***	−0.012	0.167***	−0.102				
	(0.045)	(0.112)	(0.040)	(0.155)				
Male	−0.049	−0.047	−0.216	−0.450				
	(0.247)	(0.585)	(0.220)	(0.803)				
U.S. born	0.013	−0.508	−0.035	−0.132				
	(0.209)	(0.408)	(0.197)	(0.573)				
Macroeconomic								
Crisis	−0.261	0.776*	−0.216	1.178**	−0.157	0.979	−0.124	0.822
	(0.183)	(0.415)	(0.169)	(0.560)	(0.174)	(0.394)	(0.159)	(0.528)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	30.495	176.597	71.874	63.658	15.653	183.094	47.225	42.820
	(90.555)	(209.426)	(81.619)	(260.327)	(87.764)	(210.935)	(78.464)	(261.018)
#	1040	75	1040	75	1040	75	1040	75
Chi2	212.00***	57.36***	176.69***	11.67	196.26***	45.33***	154.95***	5.37
Pseudo R2	0.393		0.328		0.364		0.288	
Log likelihood	−163.44		−181.10		−171.31		−191.962	
Lambda		−1.159***		−1.678***		−1.239***		−1.273***
		(0.330)		(0.416)		(0.274)		(0.319)
Rho		−0.805		−0.786		−0.808		−0.629
Sigma		1.440		2.134		1.533		2.024

Table 23 Heckman two-step model regressions for testing hypotheses H1a and H1b in labor-intensive firms. The table presents Heckman two-step model regressions on a sub-sample of firms in labor-intensive industries. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.052*****	**0.059**	**0.039*****	**0.053**	**0.050*****	**0.081***	**0.041*****	**0.071**
	(0.011)	**(0.042)**	**(0.009)**	**(0.044)**	**(0.010)**	**(0.044)**	**(0.009)**	**(0.046)**
External equity dummy (t-1)	1.234***		1.295***		1.307***		1.361***	
	(0.135)		(0.131)		(0.133)		(0.130)	
Firm characteristics								
Revenues	−0.018*	−0.041			−0.017*	−0.034		
	(0.010)	(0.040)			(0.010)	(0.039)		
Cash	0.025*	0.172***			0.025*	0.202***		
	(0.015)	(0.046)			(0.014)	(0.047)		
Accounts receivables	−0.028***	0.053			−0.030***	0.036		
	(0.011)	(0.040)			(0.010)	(0.040)		
Inventories	−0.003	0.049			0.002	0.037		
	(0.010)	(0.037)			(0.010)	(0.036)		
Tangible assets	−0.001	0.054			0.000	0.026		
	(0.011)	(0.037)			(0.010)	(0.038)		
Net profit	−0.000	−0.000			−0.000	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004	0.005			−0.004*	0.003		
	(0.002)	(0.014)			(0.002)	(0.014)		
Delinquency risk	0.038	−0.477***			0.036	−0.484***		
	(0.049)	(0.179)			(0.048)	(0.186)		
Employees	0.004*	−0.000			0.002*	0.013		
	(0.002)	(0.014)			(0.002)	(0.013)		
High tech	0.097	1.526***			0.067	1.830***		
	(0.138)	(0.504)			(0.133)	(0.509)		
Owner characteristics								
Age	0.013***	−0.006	0.013***	−0.001				
	(0.005)	(0.021)	(0.005)	(0.022)				
Industry experience	−0.009*	−0.017	−0.009**	−0.007				
	(0.005)	(0.019)	(0.004)	(0.022)				
Week hours	0.003	0.004	0.002	0.004				
	(0.002)	(0.008)	(0.002)	(0.009)				
Startup experience	0.089***	0.124	0.091***	0.022				
	(0.031)	(0.114)	(0.030)	(0.135)				

Table 23 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	−0.011	0.133	−0.007	0.288***				
	(0.024)	(0.096)	(0.023)	(0.105)				
Male	0.097	1.259***	0.083	1.450***				
	(0.123)	(0.479)	(0.121)	(0.556)				
U.S. born	−0.181	0.379	−0.189	0.565				
	(0.132)	(0.519)	(0.130)	(0.589)				
Macroeconomic								
Crisis	−0.189*	0.197	−0.196*	0.291	−0.170	0.293	−0.178*	0.525
	(0.109)	(0.411)	(0.107)	(0.490)	(0.106)	(0.423)	(0.104)	(0.518)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	127.579***	−86.815	167.561***	−442.559*	161.678***	9.921	169.582***	−341.009
	(45.141)	(227.677)	(52.938)	(262.294)	(53.460)	(226.272)	(51.682)	(274.888)
#	4782	111	4782	111	4782	111	4782	111
Chi2	210.97***	101.79***	191.77***	31.41***	185.86***	81.73***	165.73***	11.02*
Pseudo R2	0.200		0.182		0.176		0.157	
Log likelihood	−421.92		−431.52		−434.47		−444.54	
Lambda		−0.244		−1.109***		−0.061		−0.843**
		(0.384)		(0.345)		(0.377)		(0.418)
Rho		−0.149		−0.571		−0.036		−0.367
Sigma		1.635		1.943		1.727		2.298

Table 24 Heckman two-step model regressions for testing hypotheses H1a and H1b in labor-intensive firms. The table presents Heckman two-step model regressions on a sub-sample of firms in labor-intensive industries. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.066**	**0.141**	**0.068**	**0.256**	**0.068**	**0.166**	**0.072**	**0.335***
	(0.051)	**(0.151)**	**(0.048)**	**(0.171)**	**(0.050)**	**(0.160)**	**(0.047)**	**(0.185)**
External equity dummy (t-1)	1.308***		1.358***		1.384***		1.430***	
	(0.132)		(0.129)		(0.130)		(0.128)	
Firm characteristics								
Revenues	−0.013	−0.033			−0.012	−0.025		
	(0.010)	(0.040)			(0.010)	(0.039)		
Cash	0.209	0.150***			0.022	0.179***		
	(0.144)	(0.046)			(0.014)	(0.048)		
Accounts receivables	−0.011	0.067*			−0.011	0.061		
	(0.010)	(0.039)			(0.009)	(0.038)		
Inventories	0.005	0.057			0.011	0.047		
	(0.010)	(0.036)			(0.009)	(0.036)		
Tangible assets	0.003	0.053			0.004	0.023		
	(0.011)	(0.038)			(0.010)	(0.039)		
Net profit	−0.000	−0.000**			0.000	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004*	0.004			−0.004*	0.001		
	(0.002)	(0.014)			(0.002)	(0.014)		
Delinquency risk	0.036	−0.482***			0.031	−0.484**		
	(0.048)	(0.181)			(0.047)	(0.189)		
Employees	0.005**	−0.002			0.004**	0.012		
	(0.002)	(0.014)			(0.002)	(0.014)		
High tech	0.096	1.466***			0.055	1.792***		
	(0.135)	(0.508)			(0.129)	(0.516)		
Owner characteristics								
Age	0.013***	−0.006	0.012***	0.001				
	(0.005)	(0.208)	(0.005)	(0.022)				
Industry experience	−0.009**	−0.015	−0.009**	−0.003				
	(0.005)	(0.019)	(0.004)	(0.021)				
Week hours	0.004*	0.007	0.004**	0.008				
	(0.002)	(0.008)	(0.002)	(0.009)				

Table 24 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	0.092***	0.100	0.097***	−0.005				
	(0.030)	(0.115)	(0.030)	(0.136)				
Education	−0.013	0.147	−0.009	0.280				
	(0.024)	(0.097)	(0.022)	(0.105)				
Male	0.095	1.305***	0.084	1.458***				
	(0.121)	(0.484)	(0.119)	(0.558)				
U.S. born	−0.184	0.324	−0.184	0.446				
	(0.129)	(0.524)	(0.128)	(0.591)				
Macroeconomic								
Crisis	−0.158	0.270	−0.166	0.364	−0.140	0.429	−0.146	0.680
	(0.106)	(0.416)	(0.104)	(0.491)	(0.104)	(0.427)	(0.102)	(0.528)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	149.887	−210.867	150.523	−598.227	149.229***	−106.836	152.040***	501.679*
	(53.455)	(223.310)	(51.567)	(252.897)	(51.916)	(226.598)	(50.192)	(269.559)
#	4782	111	4782	111	4782	111	4782	111
Chi2	186.78***	97.88***	174.38***	33.20***	158.31***	76.38***	144.27***	12.10**
Pseudo R2	0.177		0.165		0.150		0.137	
Log likelihood	−434.02		−440.22		−448.25		−455.268	
Lambda		−0.380		−0.912**		−0.230		−0.961**
		(0.361)		(0.391)		(0.357)		(0.397)
Rho		−0.227		−0.424		−0.130		−0.409
Sigma		1.673		2.150		1.766		2.347

Table 25 Heckman two-step model regressions for testing hypotheses H1a and H1b in firms with complex technologies. The table presents Heckman two-step model regressions on a sub-sample of firms with complex technologies. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity and debt represents their yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.026**	**−0.016**	**0.021**	**−0.034**	**0.022**	**−0.020**	**0.019**	**−0.003**
	(0.025)	**(0.056)**	**(0.018)**	**(0.084)**	**(0.024)**	**(0.055)**	**(0.017)**	**(0.068)**
External equity dummy (t-1)	0.795***		1.163***		0.882***		1.351***	
	(0.248)		(0.208)		(0.242)		(0.195)	
Firm characteristics								
Revenues	−0.039*	−0.024			−0.036*	0.013		
	(0.022)	(0.053)			(0.021)	(0.049)		
Cash	0.076**	0.194*			0.080**	0.154*		
	(0.035)	(0.108)			(0.034)	(0.091)		
Accounts receivables	−0.003	−0.006			−0.005	−0.008		
	(0.028)	(0.058)			(0.027)	(0.057)		
Inventories	0.024	0.025			0.026	0.020		
	(0.020)	(0.045)			(0.020)	(0.045)		
Tangible assets	−0.030	0.099			−0.034*	0.062		
	(0.022)	(0.049)			(0.020)	(0.049)		
Net profit	−0.000**	0.000			−0.000***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.003	−0.115			−0.004	−0.050		
	(0.018)	(0.163)			(0.015)	(0.0170)		
Delinquency risk	0.084	−0.625**			0.058	−0.661***		
	(0.104)	(0.275)			(0.100)	(0.236)		
Employees	−0.004	0.048*			−0.003	0.044**		
	(0.006)	(0.027)			(0.006)	(0.021)		
High tech	0.150	1.243*			0.241	1.336*		
	(0.243)	(0.709)			(0.226)	(0.695)		
Owner characteristics								
Age	−0.009	0.048	−0.014	0.048				
	(0.012)	(0.043)	(0.011)	(0.051)				
Industry experience	0.004	−0.014	0.010	−0.000				
	(0.011)	(0.040)	(0.010)	(0.049)				
Week hours	0.003	0.006	0.002	0.009				
	(0.004)	(0.010)	(0.004)	(0.017)				
Startup experience	0.081	0.111	0.098	−0.313				
	(0.067)	(0.165)	(0.059)	(0.271)				

Table 25 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.076	−0.129	0.109**	−0.210				
	(0.050)	(0.139)	(0.046)	(0.238)				
Male	−0.229	−0.125	−0.265	0.716				
	(0.294)	(0.812)	(0.271)	(1.119)				
U.S. born	0.026	−0.482	−0.118	1.063				
	(0.274)	(0.705)	(0.251)	(1.105)				
Macroeconomic								
Crisis	−0.361	0.891	0.349*	2.324**	−0.331	0.743	−0.303	1.881**
	(0.223)	(0.655)	(0.208)	(0.939)	(0.218)	(0.652)	(0.195)	(0.822)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	61.156***	489.635	103.736	−201.283	46.301	397.815	69.396	−65.719
	(104.714)	(303.296)	(95.798)	(418.359)	(101.810)	(267.973)	(91.922)	(371.271)
#	795	44	795	44	795	44	795	44
Chi2	109.15***	58.21***	84.68***	11.16	105.00***	40.45***	74.85***	7.71
Pseudo R2	0.321		0.249		0.309		0.220	
Log likelihood	−115.52		−127.76		−117.60		−132.68	
Lambda		−0.912		−3.169***		−0.964		−2.593***
		(0.776)		(0.885)		(0.721)		(0.639)
Rho		−0.728		−0.999		−0.713		−0.922
Sigma		1.253		3.173		1.352		2.811

Table 26 Heckman two-step model regressions for testing hypotheses H1a and H1b in firms with complex technologies. The table presents Heckman two-step model regressions on a sub-sample of firms with complex technologies. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.384**	**−1.047****	**0.335***	**−1.477***	**0.380**	**−1.086****	**0.358***	**−1.281****
	(0.239)	**(0.460)**	**(0.189)**	**(0.801)**	**(0.236)**	**(0.477)**	**(0.189)**	**(0.744)**
External equity dummy (t-1)	0.828***		1.204***		0.910***		1.378***	
	(0.248)		(0.205)		(0.242)		(0.193)	
Firm characteristics								
Revenues	−0.043**	−0.015			−0.040*	0.018		
	(0.022)	(0.051)			(0.021)	(0.048)		
Cash	0.078**	0.192*			0.082**	0.166*		
	(0.035)	(0.104)			(0.035)	(0.087)		
Accounts receivables	0.012	−0.041			0.007	−0.031		
	(0.024)	(0.056)			(0.023)	(0.051)		
Inventories	0.026	0.040			0.027	0.035		
	(0.020)	(0.044)			(0.019)	(0.044)		
Tangible assets	−0.029	0.097**			−0.033	0.065		
	(0.022)	(0.047)			(0.020)	(0.047)		
Net profit	−0.000***	0.000			−0.000***	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.005	−0.068			−0.005	−0.013		
	(0.016)	(0.155)			(0.014)	(0.161)		
Delinquency risk	0.100	−0.735***			0.073	−0.718***		
	(0.105)	(0.265)			(0.101)	(0.228)		
Employees	−0.005	0.055**			−0.005	0.047**		
	(0.006)	(0.026)			(0.006)	(0.020)		
High tech	0.142	1.352**			0.229	1.392		
	(0.244)	(0.668)			(0.227)	(0.654)		
Owner characteristics								
Age	−0.008	0.038	−0.014	0.045				
	(0.012)	(0.041)	(0.011)	(0.052)				
Industry experience	0.004	−0.002	−0.010	0.007				
	(0.011)	(0.038)	(0.010)	(0.048)				
Week hours	0.003	0.003	0.002	0.007				
	(0.004)	(0.010)	(0.004)	(0.017)				

Table 26 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	0.073	0.120	0.088	−0.322				
	(0.066)	(0.156)	(0.058)	(0.264)				
Education	0.077	−0.135	0.105**	−0.202				
	(0.050)	(0.131)	(0.046)	(0.231)				
Male	−0.211	−0.066	−0.234	0.793				
	(0.293)	(0.772)	(0.268)	(1.125)				
U.S. born	0.033	−0.764	−0.136	0.959				
	(0.275)	(0.663)	(0.249)	(1.120)				
Macroeconomic								
Crisis	−0.350	0.967*	−0.327	2.369***	−0.324	0.822	−0.287	1.977**
	(0.223)	(0.611)	(0.207)	(0.911)	(0.218)	(0.615)	(0.200)	(0.520)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	28.035	514.337*	77.462	−247.359	17.556	393.354	48.848	−168.765
	(104.627)	(287.834)	(93.279)	(387.663)	(101.900)	(251.145)	(90.129)	(346.500)
#	795	44	795	44	795	44	795	44
Chi2	110.69***	75.55***	86.34***	13.71	106.72***	54.12***	77.16***	10.11*
Pseudo R2	0.325		0.254		0.314		0.227	
Log likelihood	−114.76		−126.93		−116.74		−131.521	
Lambda		−0.994		−3.250***		−1.102		−2.780***
		(0.718)		(0.814)		(0.681)		(0.607)
Rho		−0.789		−1.000		−0.794		−0.945
Sigma		1.260		3.250		1.388		2.941

Table 27 Heckman two-step model regressions for testing hypotheses H1a and H1b in firms with simple technologies. The table presents Heckman two-step model regressions on a sub-sample of firms with simple technologies. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.093***	**0.210*****	**0.076****	**0.132****	**0.039**	**0.158*****	**0.041**	**0.100***
	(0.056)	**(0.044)**	**(0.038)**	**(0.061)**	**(0.041)**	**(0.050)**	**(0.027)**	**(0.056)**
External equity dummy (t-1)	1.522***		1.788***		2.228***		2.044***	
	(0.442)		(0.323)		(0.353)		(0.284)	
Firms characteristics								
Revenues	−0.173**	0.052*			−0.104**	0.049		
	(0.078)	(0.030)			(0.042)	(0.042)		
Cash	0.093	0.185***			0.062*	0.184***		
	(0.058)	(0.029)			(0.043)	(0.035)		
Accounts receivables	0.090	−0.347***			0.007	−0.212***		
	(0.077)	(0.047)			(0.049)	(0.059)		
Inventories	0.047	−0.026			0.018	−0.003		
	(0.068)	(0.041)			(0.047)	(0.043)		
Tangible assets	0.001	−0.106			0.022	−0.068		
	(0.053)	(0.038)			(0.046)	(0.046)		
Net profit	−0.000	−0.000***			−0.000	−0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.050	0.058*			−0.021	0.087**		
	(0.036)	(0.030)			(0.017)	(0.040)		
Delinquency risk	0.369	0.334			−0.041	−0.020		
	(0.300)	(0.418)			(0.194)	(0.356)		
Employees	−0.028	0.154***			0.008	0.125***		
	(0.043)	(0.033)			(0.028)	(0.041)		
High tech	−0.908	−1.621***			0.332	0.788*		
	(0.642)	(0.565)			(0.418)	(0.474)		
Owner characteristics								
Age	0.069**	−0.060*	0.027	−0.044				
	(0.033)	(0.033)	(0.022)	(0.054)				
Industry experience	−0.024	−0.064***	−0.012	0.063				
	(0.023)	(0.020)	(0.017)	(0.043)				
Week hours	−0.003	0.001	0.000	−0.018*				
	(0.010)	(0.009)	(0.008)	(0.011)				
Startup experience	−0.238	0.300**	−0.151	0.004				
	(0.178)	(0.124)	(0.140)	(0.301)				

Table 27 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Education	0.583***	−0.454***	0.492***	0.177				
	(0.206)	(0.156)	(0.129)	(0.281)				
Male	0.976	−0.311	0.252	0.412				
	(0.761)	(0.594)	(0.540)	(1.233)				
U.S. born	−0.110	0.387***	0.470	−0.395				
	(0.510)	(0.090)	(0.397)	(0.956)				
Macroeconomic								
Crisis	0.068	−0.793	−0.075	0.527	0.046	0.125	0.069	−0.214
	(0.473)	(0.363)	(0.389)	(0.666)	(0.373)	(0.402)	(0.312)	(0.703)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	303.315	−760.055***	182.872	18.105	80.190	−207.829	90.912***	−105.775
	(286.929)	(184.211)	(213.368)	(432.026)	(221.837)	(232.865)	(172.324)	(435.021)
#	245	31	245	31	245	31	245	31
Chi2	120.57***	409.33***	101.74***	25.55**	101.84***	107.83***	79.27***	4.59
Pseudo R2	0.648		0.547		0.547		0.426	
Log likelihood	−32.75		−42.17		−42.114		−53.40	
Lambda		−0.317		−0.181		−0.845***		0.263
		(0.365)		(0.528)		(0.291)		(0.415)
Rho		−0.817		−0.161		−0.993		0.179
Sigma		0.388		1.129		0.851		1.474

Table 28 Heckman two-step model regressions for testing hypotheses H1a and H1b in firms with simple technologies. The table presents Heckman two-step model regressions on a sub-sample of firms with simple technologies. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and I All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. V.1, while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote, respectively, significance at the 1%, 5%, and 10% confidence levels

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.208**	**−0.167**	**0.220**	**0.098**	**0.231**	**0.036**	**0.166**	**0.131****
	(0.174)	**(0.119)**	**(0.172)**	**(0.093)**	**(0.141)**	**(0.076)**	**(0.127)**	**(0.056)**
External equity dummy (t-1)	1.888***		1.943***		2.493***		2.179***	
	(0.490)		(0.325)		(0.394)		(0.287)	
Firms characteristics								
Revenues	−0.163**	0.008			−0.114***	−0.015		
	(0.073)	(0.049)			(0.045)	(0.038)		
Cash	0.106*	0.156***			0.076*	0.147***		
	(0.057)	(0.042)			(0.044)	(0.035)		
Accounts receivables	0.136*	−0.333***			0.042	−0.084		
	(0.076)	(0.078)			(0.046)	(0.054)		
Inventories	0.048	−0.063			0.029	0.027		
	(0.065)	(0.068)			(0.050)	(0.046)		
Tangible assets	0.021	−0.006			0.040	0.009		
	(0.056)	(0.054)			(0.049)	(0.047)		
Net profit	−0.000	−0.000			−0.000	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.048	0.058			−0.025	0.007		
	(0.040)	(0.045)			(0.018)	(0.049)		
Delinquency risk	0.259	−1.586***			−0.063	−0.613		
	(0.284)	(0.574)			(0.202)	(0.589)		
Employees	−0.019	0.272***			−0.002	0.182***		
	(0.042)	(0.045)			(0.031)	(0.045)		
High tech	−0.274	−0.445			0.649	0.106		
	(0.583)	(0.673)			(0.441)	(0.505)		
Owner characteristics								
Age	0.055*	−0.105	0.017	−0.080				
	(0.032)	(0.060)	(0.020)	(0.054)				
Industry experience	−0.023	0.041	−0.004	0.015				
	(0.023)	(0.038)	(0.017)	(0.050)				
Week hours	−0.001	−0.006	0.004	−0.015				
	(0.010)	(0.016)	(0.008)	(0.013)				

Table 28 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Startup experience	−0.146	0.628*	−0.34	−0.017				
	(0.177)	(0.381)	(0.124)	(0.386)				
Education	0.521***	−0.939***	0.409***	0.024				
	(0.197)	(0.250)	(0.119)	(0.271)				
Male	0.502	−1.172	−0.106	−0.483				
	(0.782)	(0.921)	(0.494)	(1.277)				
U.S. born	0.115	−1.861**	0.348	1.321				
	(0.501)	(0.939)	(0.395)	(1.048)				
Macroeconomic								
Crisis	−0.066	−1.080*	−0.054	0.392	−0.060	−0.329	0.083	0.176
	(0.488)	(0.566)	(0.387)	(0.711)	(0.386)	(0.429)	(0.320)	(0.671)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	252.292	1,222.735***	160.298	−439.650	65.688	−357.823	67.665	−172.056
	(283.925)	(284.265)	(214.840)	(448.976)	(228.806)	(239.924)	(177.918)	(419.134)
#	245	31	245	31	245	31	245	31
Chi2	119.45***	167.91***	102.09***	20.06*	104.49***	86.51***	83.73***	6.59
Pseudo R2	0.642		0.549		0.561		0.450	
Log likelihood	−33.31		−41.99		−40.79		−51.17	
Lambda		−0.592		−0.065		−0.382		0.056
		(0.491)		(0.564)		(0.334)		(0.383)
Rho		−0.944		−0.054		−0.503		0.040
Sigma		0.626		1.195		0.759		1.413

Table 29 Heckman two-step model regressions hypotheses H1a and H1b in firms with different sizes. The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year. The amount of external equity represents its yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1 while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote significance at the 1%, 5%, and 10% confidence levels respectively

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Trade debt	**0.047*****	**0.017**	**0.032*****	**0.028**	**0.047*****	**0.015**	**0.032*****	**0.026**
	(0.009)	**(0.029)**	**(0.008)**	**(0.031)**	**(0.009)**	**(0.030)**	**(0.008)**	**(0.032)**
Micro firms	**0.019**	**−2.051****	**−0.048**	**−2.324*****	**−0.106**	**−2.131****	**−0.132**	**−2.625*****
	(0.285)	**(0.969)**	**(0.192)**	**(0.643)**	**(0.271)**	**(0.997)**	**(0.185)**	**(0.675)**
Small firms	**0.252**	**−1.156**	**0.171**	**−1.301****	**0.168**	**−1.145**	**0.116**	**−1.481****
	(0.258)	**(0.832)**	**(0.193)**	**(0.636)**	**(0.247)**	**(0.857)**	**(0.188)**	**(0.667)**
External equity dummy (t-1)	1.304***		1.407***		1.387***		1.493***	
	(0.103)		(0.099)		(0.101)		(0.097)	
Firms characteristics								
Revenues	−0.027***	−0.020			−0.025***	−0.012		
	(0.009)	(0.027)			(0.008)	(0.028)		
Cash	0.034***	0.174***			0.034***	0.172***		
	(0.012)	(0.033)			(0.012)	(0.034)		
Accounts receivables	−0.028***	0.027			−0.029***	0.034		
	(0.009)	(0.029)			(0.009)	(0.030)		
Inventories	0.004	0.042*			0.008	0.034		
	(0.008)	(0.025)			(0.008)	(0.027)		
Tangible assets	−0.008	0.049*			−0.010	0.024		
	(0.009)	(0.026)			(0.009)	(0.027)		
Net profit	−0.000***	−0.000			−0.000**	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.003	0.005			−0.004	0.003		
	(0.002)	(0.012)			(0.002)	(0.012)		
Delinquency risk	0.049	−0.421***			0.044	−0.450***		
	(0.042)	(0.130)			(0.041)	(0.136)		
Employees	0.001	−0.017			0.001	0.010		
	(0.003)	(0.015)			(0.003)	(0.016)		
High tech	0.097	0.943***			0.124	0.842***		
	(0.099)	(0.295)			(0.095)	(0.300)		
Owner characteristics								
Age	0.011***	−0.017	0.009**	−0.016				
	(0.004)	(0.014)	(0.004)	(0.016)				
Industry experience	−0.009**	−0.003	−0.007*	0.020				
	(0.004)	(0.014)	(0.004)	(0.015)				

Table 29 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Week hours	0.003*	0.004	0.002	−0.002				
	(0.002)	(0.005)	(0.002)	(0.006)				
Startup experience	0.074***	0.130	0.072***	0.041				
	(0.026)	(0.082)	(0.026)	(0.097)				
Education	0.034*	0.127**	0.048**	0.234***				
	(0.020)	(0.068)	(0.019)	(0.079)				
Male	0.054	0.967***	0.004	0.792*				
	(0.107)	(0.369)	(0.104)	(0.437)				
U.S. born	−0.165	−0.097	−0.170	0.247				
	(0.108)	(0.332)	(0.107)	(0.391)				
Macroeconomic								
Crisis	−0.196**	0.202	−0.194**	0.385	−0.168*	0.443	−0.169*	0.547
	(0.091)	(0.298)	(0.088)	(0.354)	(0.089)	(0.316)	(0.086)	(0.366)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	133.063***	7.920	151.463***	−39.008	137.282***	72.891	152.562***	25.234
	(45.427)	(156.687)	(43.697)	(188.436)	(44.670)	(165.595)	(43.070)	(197.959)
#	5822	186	5822	186	5822	186	5822	186
Chi2	443.47***	175.31***	391.62***	76,84***	412.77***	140.84***	360.55***	55.91***
Pseudo R2	0.269		0.234		0.251		0.219	
Log likelihood	−601.78		−627.71		−617.13		−643.24	
Lambda		−0.735***		−0,899***		−0.842***		−1.052***
		(0.248)		(0.267)		(0.244)		(0.261)
Rho		−0.450		−0,447		−0.477		−0.485
Sigma		1.635		2,010		1.767		2.167

Table 30 Heckman two-step model regressions hypotheses H1a and H1b in firms with different sizes. The table presents Heckman two-step model regressions on a sample of early-stage firms. All variables represent the value of each variable surveyed at the end of each year, with the exception of the amount of external equity and the variation in trade debt. The amount of external equity represents its yearly value. All variables are described in Table 2. The results of the first-step probit regressions are presented in columns I.1, II.1, III.1, and IV.1 while the results of the second-step OLS regressions are presented in columns I.2, II.2, III.2, and IV.2. Standard errors in parenthesis. ***, **, and * denote significance at the 1%, 5%, and 10% confidence levels respectively

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Independent								
Main								
Variation in trade debt	**0.093****	**0.020**	**0.089*****	**0.072**	**0.092****	**0.048**	**0.091*****	**0.097**
	(0.042)	**(0.058)**	**(0.034)**	**(0.069)**	**(0.041)**	**(0.060)**	**(0.033)**	**(0.071)**
Micro firms	**−0.001**	**−2.065****	**−0.173**	**−2.340*****	**−0.121**	**−2.121****	**−0,257**	**−2.559*****
	(0.286)	**(0.970)**	**(0.190)**	**(0.632)**	**(0.272)**	**(0.996)**	**(0.183)**	**(0.661)**
Small firms	**0.312**	**−1.108**	**0.144**	**−1.275****	**0.234**	**−1.113**	**0.096**	**−1.433****
	(0.261)	**(0.835)**	**(0.195)**	**(0.635)**	**(0.249)**	**(0.858)**	**(0.190)**	**(0.663)**
External equity dummy (t-1)	1.361***		1.454***		1.441***		1.538***	
	(0.102)		(0.099)		(0.100)		(0.097)	
Firms characteristics								
Revenues	−0.024***	−0.024			−0.023***	−0.016		
	(0.009)	(0.027)			(0.008)	(0.028)		
Cash	0.032***	0.170***			0.032***	0.168***		
	(0.012)	(0.033)			(0.012)	(0.034)		
Accounts receivables	−0.010	0.033			−0.011	0.041		
	(0.008)	(0.028)			(0.008)	(0.028)		
Inventories	0.011	0.046			0.015**	0.037		
	(0.008)	(0.025)			(0.008)	(0.026)		
Tangible assets	−0.006	0.049*			−0.008	0.027		
	(0.009)	(0.026)			(0.009)	(0.027)		
Net profit	−0.000***	−0.000			−0.000**	0.000		
	(0.000)	(0.000)			(0.000)	(0.000)		
Return on assets	−0.004	0.004			−0.004*	0.002		
	(0.002)	(0.012)			(0.002)	(0.012)		
Delinquency risk	0.050	−0.423***			0.045	−0.436***		
	(0.042)	(0.131)			(0.040)	(0.138)		
Employees	0.002	0.016			0.002	−0.011		
	(0.003)	(0.015)			(0.003)	(0.016)		
High tech	0.102	0.944***			0.118	0.839***		
	(0.098)	(0.296)			(0.093)	(0.300)		
Owner characteristics								
Age	0.011***	−0.017	0.009**	−0.012				
	(0.004)	(0.014)	(0.004)	(0.016)				

Table 30 (continued)

Dependent	Column I		Column II		Column III		Column IV	
	I.1	I.2	II.1	II.2	III.1	III.2	IV.1	IV.2
	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)	External Equity (Dummy)	External Equity (Amount)
Industry experience	−0.009**	−0.002	−0.007*	0.021				
	(0.004)	(0.014)	(0.004)	(0.015)				
Week hours	0.004**	0.004	0.003*	0.002				
	(0.002)	(0.005)	(0.002)	(0.006)				
Startup experience	0.069***	0.114	0.068***	0.005				
	(0.026)	(0.083)	(0.026)	(0.098)				
Education	0.031	0.127*	0.044**	0.215***				
	(0.020)	(0.068)	(0.019)	(0.079)				
Male	0.042	0.963***	0.003	0.763*				
	(0.106)	(0.371)	(0.103)	(0.437)				
U.S. born	−0.172	−0.129	−0.183*	0.157				
	(0.106)	(0.332)	(0.105)	(0.389)				
Macroeconomic								
Crisis	−0.169*	0.228	−0.172**	0.457	−0.143	0.487	−0.145*	0.638*
	(0.090)	(0.299)	(0.087)	(0.352)	(0.088)	(0.309)	(0.085)	(0.362)
Fixed effects								
Legal status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	119.722***	−24.012	136.344***	−104.503	124.385***	34.801	137.760***	−43.694
	(44.578)	(156.009)	(43.049)	(185.695)	(43.867)	(164.573)	(41.431)	(194.015)
#	5822	186	5822	186	5822	186	5822	186
Chi2	420.95***	169.35***	382.82***	74.92***	390.07***	136.01***	351.77***	56.12***
Pseudo R2	0.256		0.232		0.237		0.214	
Log likelihood	−613.04		−631.11		−628.48		−647.63	
Lambda		−0.744***		−0.958***		−0.868***		−1.112***
		(0.239)		(0.259)		(0.235)		(0.251)
Rho		−0.452		−0.472		−0.488		−0.511
Sigma		1.645		2.029		1.778		2.176

Table 31 Summary of confirming hypotheses by sample and subsamples

Sample and subsamples/hypotheses	H1a	H1b
Baseline		
Model with trade debt (Table 3)	Fully	Partially
Model with variation of trade debt (Table 4)	Fully	Partially
Sub sample of firms that are non-profitable and with positive sales growth		
Model with trade debt (Table 17)	Fully	Partially
Model with variation of trade debt (Table 18)	Partially	–
Sub sample of firms in capital-intensive industries		
Model with trade debt (Table 21)	Partially	Partially
Model with variation of trade debt (Table 22)	Fully	–
Sub sample of firms in labor-intensive industries		
Model with trade debt (Table 23)	Fully	Partially
Model with variation of trade debt (Table 23)	–	Partially)
Sub sample of manufacturing firms with complex technologies		
Model with trade debt (Table 24)	–	–
Model with variation of trade debt (Table 25)	Partially	Fully
Sub sample of manufacturing firms with simple technologies		
Model with trade debt (Table 26)	Partially	Fully
Model with variation of trade debt (Table 27)	–	Partially

are interlinked despite the distinct informational advantages of short-term creditors, whose focus is often on the limitation of their downside risks and liquidity, and external equity providers, whose focus is on growth potential and solvability, and that this link runs from debt markets to equity markets. External equity investors can benefit from reading information from short-term debt markets to complement their appraisal of the long-term growth potential of early-stage firms. Policymakers interested in facilitating access of early-stage firms to external equity providers can design financial instruments that facilitate supplier–buyer transactions. Trade debt insured through credit instruments such as those commonly used in international trade could further reduce information asymmetries and heighten its value relevance and consequently mitigate adverse selection and losses for external equity providers.

Understanding further the link between debt and equity markets in the context of early-stage firms in particular those that are often turned down when attempting to secure external equity (Lee et al., 2015) is crucial for reducing their financing frictions. Future research endeavors could focus on exploring distinct local or regional contexts in particular those like the European that are bank-dominated (Cassia & Vismara, 2009) and sources of financing such as crowdfunding and other decentralized methods that are increasingly becoming popular (Block et al., 2018; Meoli et al., 2022; Vismara, 2018) to add to our findings. The link between debt and equity markets can also be explored further by looking at hybrid financing that bridges the two markets and deploying quasi-natural- experiments.

Author contributions All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by [full name], [full name], and [full name]. The first draft of the manuscript was written by [full name] and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data availability We use the confidential and detailed version of the Kauffman Firm Survey Data (KFSD). This data set is only available to researchers using a secure remote access data enclave provided by the National Opinion Research Center (NORC) based at the University of Chicago.

Declarations

Ethics approval All principles of ethical and professional conduct have been followed.

Competing interests Authors and institutions are listed in alphabetical order. The views expressed in this paper are those of the authors and do not necessarily represent the views of the institutions with which they are affiliated.

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