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IS THE COST OF DEBT CAPITAL HIGHER FOR YOUNGER FIRMS?

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ABSTRACT: While the negative qualitative relation between the cost of debt capital and firm age is rather well established in the financial economics literature, there are few, if any, quantitative estimates available of the magnitude of the age effect. This study analyses this effect by utilizing a large dataset of Finnish firms. The data consists of 56432 firms and 119259 observations from 2000-2002. Our fixed-effect estimations show that for small businesses, the effect of getting older on the cost of debt finance is economically large: The semi-elasticity of the cost of debt capital is from 3 to 4.5 percent. That is, the cost of debt capital is about 30-45% higher for a new firm than it is for the same firm when it reaches middle-age (i.e., when it is about ten years old). We also find that the cost of debt capital is higher for young firms even after (changes in) observable creditworthiness, as measured by a commercial credit score, is controlled for. We conclude that the return to maturing one more year is not negligible in the market for small business (debt) finance.

JEL: G14, G31, G32.

KEYWORDS: small business finance, cost of debt capital, firm age.

HYYTINEN, Ari – **PAJARINEN,** Mika, **OVATKO (VIERAAN) PÄÄOMAN KUSTANNUKSET KORKEAMMAT NUORILLA YRITYKSILLÄ?** Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2004, 17 s. (Keskusteluaiheita, Discussion Papers, ISSN, 0781-6847; No. 946).

TIIVISTELMÄ: Yritysrahoituskirjallisuudessa esitetään usein, että kun yritys vanhenee ja vakiintuu, sen ulkoisen rahoituksen kustannukset laskevat. Tämän ”ikä-vaikutuksen” suuruutta ei kuitenkaan ole juurikaan yritetty mitata. Tässä tutkimuksessa analysoidaan ikä-vaikutusta käyttäen laajaa suomalaista yritystason aineistoa. Aineisto kattaa kaikkiaan 56432 suomalaista yritystä, joista käytössämme on yhteensä 119250 havaintoa vuosilta 2000-2002. Tutkimuksen tulokset osoittavat, että yrityksen iän vaikutus rahoituskustannuksiin on taloudellisesti merkittävä: Estimointitulostemme mukaan aloittelevan yrityksen rahoituskustannukset saattavat olla keskimäärin jopa noin 30-45 prosenttia korkeammat kuin kymmenen vuotta vanhan yrityksen. Tämä tulos löytyy, vaikka analyysissa otetaan huomioon ns. ei-havaittavat yrityskohtaiset tekijät (fixed effects) ja mm. luottoluokitusyhtiön arvio yritysten luottokelpoisuudesta.

JEL-luokittelu: G14, G31, G32.

AVAINSANAT: yritysrahoitus, pk-yritykset, vieraan pääoman kustannukset, yrityksen ikä.

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1 Introduction

Young firms are typically more prone to default and more dependent on external financing than mature firms. There also is relatively little information available about young firms that can be used to separate the less creditworthy from the creditworthy (Berger and Udell 1998). This opacity of small businesses means that information is often asymmetric between them and lenders. Economic theory predicts that the worse the informational asymmetry is, the higher is the cost of external finance. Adverse selection problems, such as those considered by Stiglitz and Weiss (1981), or borrower moral hazard, may explain why the cost of external finance increases. Taken together, this financial economics research generates the prediction that the cost of (debt) capital is higher for younger than for established firms.

While the negative qualitative relation between the cost of debt capital and firm age is quite well established, there are few, if any, studies that focus on estimating the *magnitude* of the age effect. The objective of this paper is to provide such an estimate for small businesses. We focus in particular on the following questions: When a firm ages by one year, how much does the cost of debt capital go down? Is the cost of debt capital higher for young firms even after observable creditworthiness is controlled for? If so, how much higher is it?

The answers to these questions have implications for government interventions, which often aim at rectifying capital market failures in the market for small business finance. The aim is not modest: When governments issue direct loans to the small business sector and run various types of loan guarantee schemes, government failure lurks. They may either end up crowing out profitable private activity or to supporting unviable ventures. Reflecting (possibly) this, the available international evidence for the success of the governments' small business finance schemes is, at best, mixed (see, e.g., Parker, 2004, pp. 239-242). The question of obvious interest is, at whom should the governmental financing schemes be targeted? The obvious problem is that firms that suffer from opacity, adverse selection and moral hazard are hard, if not impossible, to identify reliably. Therefore, the age (or size) of firms often serve as a proxy for these financing frictions when

the public sector tries to mitigate capital market imperfections.[1] Theoretical problems aside, the case for government intervention on the basis of firm age is the stronger, the better predictor it is of firms' debt financing costs. If the effect of age on the cost were negligible, it would be harder to justify the allocation of government funding (support) to young firms.

Our panel data estimations show that for small businesses, the effect of getting older on the cost of debt finance is economically large: The semi-elasticity of the cost of debt capital is from 3 to 4.5 percent. That is, the cost of debt capital is about 30-45% higher for a firm that is very young than it is for the same firm when it is middle-aged. We also find that the cost of debt capital is higher for young firms even after observable creditworthiness, as measured by a commercial credit score, is controlled for. We conclude that the return to maturing one more year is not negligible in the market for small business (debt) finance.

The rest of the paper is organized as follows: In the next section we briefly outline the theoretical framework of our empirical analysis. In section 3 we discuss the data. In section 4 we present the results of our empirical analysis. Section 5 contains a brief summary.

2 Theoretical background

The received theory suggests that agency problems can stem both from the manager-shareholder conflict (i.e. separation of ownership and control) and from the lender-borrower conflict (see, e.g., Jensen and Meckling 1976, Berger and Udell 1998). The vast majority of firms in our data are small and medium-sized firms, if not micro-firms. Such firms are typically closely held, which means that ownership and control are not, as a general rule, separated to a significant extent. If agency considerations are empirically relevant in our data, we take that the lender-borrower conflict is their primary source. It is the lender-borrower conflict, then,

[1] What, if anything, the government that has no expertise over the market can do about adverse selection and especially about the moral hazard problem is not clear. There is, for example, no consensus in the economics literature what the role of government could be. Even in very simplified settings, both a loan guarantee scheme and a policy of using loans to reduce credit rationing can be counter-productive, because they may result in, e.g., crowding out of private activity (see, e.g., Parker 2002 and 2004 for a review of this literature).

which is the primary underlying source of the negative relation between the cost of debt finance and firm age.

Why would getting older alleviate the lender-borrower conflict? There are quite a few reasons for it, but for brevity, we only consider some of them: First, the amount of information available about a firm increases the longer it has been in the business. The pieces of information that are garnered over time and that are relevant for lenders are, for example, the accumulation of a repayment history, periodic submissions of financial statements, and informal information about managerial performance. These pieces of information reduce the scope for adverse selection, for the more there is information available about young firms, the easier it is to separate the less creditworthy from the creditworthy. Better financial statements data also reduce the scope for borrower moral hazard, for they make (accounting-based) covenant violations more difficult. Second, as a firm gets older, it has had the opportunity to build relationships with financial institutions (e.g., Petersen and Rajan, 1994, Berger and Udell, 1995). If the firm and financial institutions are in continuous contact, information that can be gathered in these relationships can be used to make more accurate evaluations of the firm's creditworthiness, as well as to monitor the firm more cost-effectively.

Direct information about the propensity to default is also disclosed over time. The longer a firm survives, the less likely that it is prone to default. Adverse selection problems, such as those considered by Stiglitz and Weiss (1981), may thus reduce over time. This is important for the lender-borrower conflict, because adverse selection may exaggerate borrower moral hazard problems. Diamond (1989) provides a theoretical explanation for the link: In his model, the joint influence of adverse selection and moral hazard reduces the ability of an infant firm to raise external finance. These problems are most severe when the firm is young and has only a short track record, because then a severe enough adverse selection (leading to high interest rates) undermines the firm's incentives to behave diligently (i.e. to choose a low risk investment project). If the firm survives to next period despite its risky investment decision, adverse selection is less of a problem, for those that survive are, on average, of better quality. Once adverse selection is less of a problem, the interest rates that lenders demand will be lower. This increases the firm's incentive to choose a less risky project, for it has more to lose, if the project fails. The implication of this dynamic evolution of incentives is that reputation that is built over time enhances firm's incentives to behave diligently

and avoid moral hazard. Building of reputation over time thus reduces the lender-borrower conflict.[2]

Summing up, there are a number of reasons why getting older might alleviate the lender-borrower conflict. If it does, we expect to uncover a negative relation between the age of firm and its cost of debt capital. In what follows, we estimate the magnitude of this age effect. Anticipating, we show that once unobserved firm-heterogeneity *and* changes in observable creditworthiness are controlled for, the effect is both statistically and economically significant.

3 Data

3.1 Sample description

The data used in this study comes from a database compiled by Asiakastieto Ltd, a commercial vendor of financial data and a credit information company. The raw database available to us contains financial data on tens of thousands Finnish firms per year, and covers the years 1999-2002. In addition to financial data, the database includes indicators of firms' creditworthiness (rating, number of unsettled debt payments, etc.), and information on firms' auditors and auditing reports.

We focus on firms that are limited liability companies. We therefore exclude firms that assume other legal forms, such as partnerships and cooperatives. We exclude them in order to cope with differences in financial reporting standards between the different legal forms of firms. An additional reason to exclude them is that the financial status of a limited liability company can, at least in principle, be separated and considered independent from its owners. While the complications that arise from the interconnection of the firm's creditworthiness with its owners' personal reputations and financial affairs cannot be fully avoided, it

[2] Additional examples of the link between the information asymmetry and firm age can be found from the accounting literature. Lang (1991) shows, for example, that the gradual revelation of firm-specific information reduces the effect of earnings announcements on stock price reactions, while Datta, Iskandardatta and Patel (1999), Pittman and Fortin (2004) and others have linked firm age to the cost of external finance via the role of external auditors. Pittman and Fortin (2004) argue, for example, that a high quality auditor benefits disproportionately firms with short track records.

should be less of a problem for limited liability companies than it is for partnerships and the like.[3]

Dropping firms or observations is a means to deal with outliers that are the result from using generated accounting ratios with very small denominators (see, e.g., Dechow, 1994 and Pittman and Fortin 2004). To limit the effect of such outliers, we drop 1 percent of the observations in the upper tail of our dependent variable (see below). We also lose a cross-section, because we have to use averages of the debt and assets – variables that we use to scale our debt cost – variables. A number of observations are also lost because there are no data on some of the control variables for some firms. The construction of the dependent and control variables is explained in detail below.

As a result of this data gathering process and measurement issues, our final sample consists of 56432 firms and 119250 observations, covering three years. As these numbers suggest, the final estimating sample is a rather short panel, which also is unbalanced. We believe that having such a panel is better than having only a cross-section, for the key to the identification of the age effect is to have time-series variation in the data. Had we no such variation, we could not address the question of how much the cost of debt capital goes down when a firm ages by one year.

3.2 Dependent variable

Our main interest is in the cost of debt capital. As we do not observe the cost directly, we have to estimate it. To this end, we use (scaled) financial expenses, as accrued during a fiscal year. In our data, reported financial expenses can consist of interest and other financial expenses and of foreign exchange losses. However, we know that for all practical purposes, these expenses relate to the costs of debt capital. The reason for this is that the vast majority (more than 94%) of the firms in our sample are small or medium-sized. Most of the firms are, in fact, micro-firms, for the turnover (sales) of the median firm is only 400 000 euros. Such micro-firms issue external equity only very rarely and seldom have foreign-currency

[3] While the interconnection of a firm's creditworthiness with its owners' personal reputations and financial affairs is certainly problematic also in the case of limited liability companies, we can to an extent control for it: The measure of creditworthiness that we will use explicitly takes into account the creditworthiness of top management and members of the board of directors.

dominated debt (or other such exposures on financial markets). In any event, the measurement error in the dependent variable (that follows when we use this proxy) does not destroy the unbiasedness property of the standard estimators that we will use.

There is no agreed way of measuring the costs of debt finance when only accounting data are available. We scale the financial expenses in two different ways, which means that we generate two versions of the dependent variable. The first version of the dependent variable is defined as the ratio of interest costs (as proxied by financial expenses) to total debt, FCDEBT. The denominator is the average of the beginning and end total debt for the fiscal period during which the financial costs accrue. The second one is the ratio of interest costs to total assets, FCASSETS. The denominator, i.e., total assets, is the average of the beginning and end total assets.

Measuring the effect of aging on the cost of debt capital is not very meaningful for firms that have *no* debt finance and/or *no* financial expenses. We therefore limit our sample to firms that have a positive amount of financial expenses.[4] In the basic estimations, we also drop observations outside the 99^{th} percentiles of the distribution of both FCDEBT and FCASSETS. We illustrate later that this trimming procedure does not drive our main results: Alternative trimming criteria and use of robust estimation methods (and untrimmed sample) also result in the same qualitative conclusions.

3.3 Control variables

The main explanatory variable is the age of firm in years (AGE). Another important explanatory variable is (observable) creditworthiness. We measure it using a credit score (rating) that ranges from 3 to 100 and that has been generated by Asiakastieto Ltd, a leading credit information company in Finland and our source of data. Lower score indicates better rating and thus better creditworthiness.

[4]Why have some firms no debt? First, it may be that they do not have demand for it. In such a case, measuring the effect of age on the cost of debt is not very meaningful. Second, some firms may forego raising debt, if the cost of debt is very high, even if they had a need. In this case, we should not assume that the cost of debt finance is zero for these firms. This assumption would implicitly be made, if we included firms with zero debt/financial expenses in our sample, and (incorrectly) assumed that for such firms, FCDEBT and FCASSETS = 0.

Other control variables include SALES = net sales of the firm in million of euros, SME = 1 if the firm is a small or medium-sized firm (i.e., has less than 250 employees and its turnover is less than 40 million euros or total assets are less than 27 million euros) and 0 otherwise, DEFAULT = number of unsettled debt payments, AUDITOR = 1 if the firm uses an authorized auditor (as specified in the Finnish law) and 0 otherwise, AUDIT = 1 if the firm's auditor has issued an auditing note before approving of the firm's financial statements and 0 otherwise, PROFIT = the ratio of net result to net sales and GR_SALES = percentage sales growth during *t*-1.[5] We also have controls for year effects (YEAR).

4 Empirical Results

4.1 Descriptive statistics

Table 1 shows descriptive statistics (mean, median, standard deviation, minimum and maximum) for the main variables used in our analysis. The mean of FCDEBT in the sample is 3.3 percent and FCASSET 2.2 percent, respectively. On average, the age of firms is 13 years and net sales 5 million euros. The corresponding medians are lower. A large majority of firms uses an authorized auditor. The auditor has issued an auditing note before approving of the firm's financial statements in 7.7 percent of the firm-year observations. The number of unsettled debt payments ranges from 0 to 25. The median PROFIT is 4 percent, which indicates moderate profitability. The median of GR_SALES is 5 percent.

[Insert Table 1 here]

Table 2 depicts pair-wise correlations. We can see that both FCDEBT and FCASSETS correlate negatively with AGE and positively with RATING. These unconditional correlations support the conventional wisdom that as firms mature their financial costs decrease. They also show that as creditworthiness weakens, the financial costs increase.[6]

[5] We have winsorized PROFIT and GR_SALES (1 percent in each tail) to limit the effects of outliers (see, e.g., Barnett and Lewis 1994 for the description of the method). Our main results are, however, robust to not winsorizing the data in this way.

[6] Recall that lower RATING indicates better creditworthiness.

[Insert Table 2 here]

4.2 Estimation results

4.2.1 Basic results: Fixed-effect estimations

When a firm ages by one year, how much does the cost of debt capital go down? To address the question, we begin with simple estimation specification in which we regress FCDEBT and FCASSETS only on AGE and year-effects. We allow, however, for fixed firm effects that control for unobserved firm heterogeneity. The effect of AGE on FCDEBT and FCASSETS that we identify arises thus solely from within-firm dynamics. The results of these estimations are presented in the first column of Table 3 (Panels A and B). We can see that AGE obtains a negative and significant coefficient in both regressions. The estimate suggests that when a firm matures by one year, the cost of debt capital goes down by 0.1 percentage points. Before we discuss whether this is a large effect, we illustrate that the result is robust.

An obvious question to ask is whether the cost of debt capital is higher for young firms even after observable changes in creditworthiness are controlled for. In the second column we add our creditworthiness control (RATING) to Model 1. The results show that AGE remains negative and highly significant. As expected, RATING obtains positive and significant coefficient.

The results presented in the remaining columns of Table 3 echo our basic finding: To analyze whether the effect of AGE might be non-linear, we add its square (AGE2) to Model 2. We find that there is a weak negative non-linear effect on FCDEBT but not on FCASSETS. To better control for observable time-varying heterogeneity, we add a set of new regressors (SALES, SME, DEFAULT, AUDIT, AUDITOR, PROFIT, GR_SALES) to Model 2. The fourth column shows that our basic results remain: the effect of AGE is still negative, and RATING has a positive coefficient in both Panel A and B. As to the new regressors, we can see that the coefficients of DEFAULT, AUDIT and GR_SALES are positive and statistically significant and the coefficient of PROFIT negative and significant. These findings support the conventional wisdom that if one defaults on payments and/or ignores accounting regulations, the costs of external finance in-

crease. They also suggest that more profitable firms pay less for their external finance and that growth-orientation increases the costs of external finance. Our size control SALES has a statistically significant negative effect on FCDEBT but not on FCASSETS. Finally, the SME dummy obtains a positive but insignificant coefficient in both regressions. The finding suggests that after controlling for a number of observable firm-characteristics and fixed-effects, we cannot reliably argue that the cost of debt is higher for SMEs than it is for other firms.

[Insert Table 3 here]

4.2.2 Magnitude of the age effect

The foregoing results are consistent with the view that the lender-borrower conflict is empirically relevant. However, is the magnitude of the age effect economically significant? To address this question, we calculate the age semi-elasticity of financial costs, i.e., $\partial \log y / \partial x$, where y denotes financial costs (FCDEBT or FCASSETS) and x is AGE. We evaluate the semi-elasticities both at the mean and median values. We use in these elasticity calculations the coefficient estimates from model (4) of Table 3.

The semi-elasticities and their standard errors are presented in Table 4. As can be seen from the table, the financial costs of a firm decrease 3 percent when it gets one year older. The effect of getting one year older is about 4.5 percent, if we use the ratio of financial costs to total assets.

Extrapolating these results a bit, we can say that when compared to the cost of debt finance when a firm is mid-aged (i.e. about 10 years), the costs of debt finance when the same firm was founded were about 30-45 percents higher. The effect is economically large, which suggest that the return to surviving (aging) one more year is not negligible in the market for debt finance.

We represent in Table 4 also the magnitude of RATING effect. The results indicate that for median firm 10 points increase in RATING means 1 percent increase in the ratio of financial costs to total debt and 5 percent increase in the ratio of financial costs to total assets.

[Insert Table 4 here]

4.3 Robustness tests

In the following, we consider and try to rule out alternative explanations for our empirical results. Taking each robustness test in turn:

Robustness test 1: We regress FCDEBT and FCASSETS on AGE and year effects by using 1) standard OLS with robust standard errors and 2) median regression model (also known as the least-absolute value model). In these estimations, firm heterogeneity is only poorly controlled for. However, the coefficient of AGE remains negative and significant in all estimations. Its absolute value is a little smaller though.

Robustness test 2: To demonstrate that the trimming procedure (used to construct our estimating sample) does not drive our main results we drop 5% of observations in the upper tail of FCDEBT and FCASSETS. We then rerun the estimations presented in Table 3. We do not report the estimations in detail but only note that the results remain qualitatively unchanged. For example, the coefficient of AGE is -0.001 (with standard error 4.73E-05) when model 4 of Table 3 is used.

Robustness test 3: Continuing the previous robustness tests, we regress FCDEBT and FCASSETS on AGE and year effects using the same median regression model as above (which is robust to outliers), but use – instead of the trimmed sample – a larger, untrimmed sample. To construct this sample, we drop no observations from the upper tail of the dependent variables. The results (unreported) show that the coefficient of AGE remains negative and statistically significant.

Robustness test 4: Our panel is short, and for some firms, we only have one observation or have few adjacent observations. In the fixed-effects estimations, such firms effectively "drop out" from the estimating sample. However, firms with multiple but no adjacent observations do not drop out. To illustrate that they drive in no way our empirical findings, we re-estimate the models presented in Table 3, using a more balanced panel where each firm has, at minimum, at least two adjacent observations. Again, the results (unreported) show that the coefficient of AGE remains negative and statistically significant.

Robustness test 5: Could omitted variables be driving the negative relation between the cost of debt finance and firm age? We hope that they do not drive the relation, for the regression variables of our model (4) in Table 3 correspond

closely to those used by Pittman and Fortin (2004), who also study the determinants of the cost of debt capital for firms. We expand upon their set of control variables, because we also control for the observable creditworthiness (RATING). However, unlike Pittman and Fortin, we have not so far controlled for the asset structure of small businesses. To show that this omission does not drive our results, we follow Pittman and Fortin and include the ratio of property, plant and equipment to total assets into the regression model (4) in Table 3. The results show that the coefficient of AGE remains negative and statistically significant.[7] Like in Pittman and Fortin, the asset structure variable obtains a statistically significant and positive coefficient. An explanation for the finding is that if riskier firms are required to provide security for their loans, such firms anticipate the requirement and accumulate assets that they then pledge as collateral.[8] We have also experimented with other combinations of the control variables, but the results indicate that our basic finding remains intact.

Summing up, our main results do not seem to depend on the way we trim the data, on the method of estimation, nor on the chosen set of control variables.

5 Conclusions

The negative qualitative relation between the cost of debt capital and firm age is quite well established in the financial economics literature. However, there are few, if any, studies that focus on estimating the magnitude of the age effect. The objective of this paper was to provide such an estimate for small businesses.

Our panel data estimations show that for small businesses, the effect of getting older on the cost of debt finance is economically large: The semi-elasticity of the cost of debt capital is from 3 to 4.5 percent. That is, the cost of debt capital is about 30-45% higher for a new firm than it is for the same firm when middle-aged (i.e. when it is about ten-year-old firm). We also find that the cost of debt capital is higher for young firms even after changes in observable creditworthiness are controlled for. We conclude that these results are consistent with the view that the

[7] The coefficient of AGE is -0.00102 and its standard error is 0.00004.

[8] See also for example Berger and Udell (1990), who report a positive correlation between project risk and the amount of collateral pledged, implying that secured loans are typically made to borrowers that are considered ex-ante riskier. Pledging collateral need not be sufficient to offset the higher credit risk, which means that the interest rates on collateralized loans can be on average higher than those on loans that are not secured.

lender-borrower conflict is empirically relevant and that the return to aging, which for various reasons alleviate the conflict, is not negligible in the market for small business (debt) finance.

An implication of this finding is that a case for allocating government funding especially to (very) young firms can be made, albeit only with a caveat. The caveat is that it is somewhat unclear what a government agency can do, if the high costs of debt to young firms are driven by the informational problems, such as adverse selection or moral hazard that the received economy theory identifies to hamper small business finance. The available Finnish evidence suggests that such information problems are potentially empirically relevant for Finnish young small businesses (Hyytinen and Väänänen 2004a, 2004b, Hyytinen and Pajarinen 2004). The other side of our findings is that government support for established small businesses is harder to justify: When a firm matures, its cost of debt capital goes down significantly.

References

Barnett, V. and Lewis, T., 1994, *Outliers in Statistical Data*, Chichester: John Wiley.

Berger, A. N. and Udell, G. F., 1990, Collateral, loan quality, and bank risk", *Journal of Monetary Economics*, Vol. 25, pp. 21-42.

Berger, A. N. and Udell, G. F., 1995, Relationship lending and lines of credit in small firm finance, *Journal of Business*, Vol. 68, pp. 351-382.

Berger, A. N. and Udell, G. F., 1998, The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle, *Journal of Banking and Finance*, Vol. 22, Issues 6-8, pp. 613-673.

Datta, S., Iskandardatta, M. and Patel, A., 1999, Bank monitoring and the pricing of corporate public debt, *Journal of Financial Economics*, Vol. 51, pp. 435-449.

Dechow, P., 1994, Accounting earnings and cash flows as measures of firm performance: the role if accounting accruals, *Journal of Accounting and Economics*, Vol. 18, pp. 3-42.

Diamond, D. W., 1989, Reputation acquisition in debt markets, *Journal of Political Economy*, Vol. 97, No. 4, pp. 828-862.

Hyytinen, A. and Pajarinen, M., 2004, Opacity of young firms: Faith or fact?, Discussion Paper, The Research Institute of the Finnish Economy (ETLA), No. 923.

Hyytinen, A. and Väänänen, L., 2004a, Could Mr. and Mrs. capital market imperfection please step forward? An empirical analysis of adverse selection and moral hazard in capital markets, Discussion Paper, The Research Institute of the Finnish Economy (ETLA), No. 887.

Hyytinen, A. and Väänänen, L., 2004b, Mandatory auditor choice and small firm finance: Evidence from Finland, mimeo, The Research Institute of the Finnish Economy (ETLA).

Jensen, M. C. and Meckling, M. H., 1976, Theory of the firm: managerial behavior, agency costs, and ownership structure, *American Economic Review*, Vol. 3, pp. 305-360.

Lang, M., 1991, Time-varying stock price response to earnings induced by uncertainty about the time-series process of earnings, *Journal of Accounting Research*, Vol. 29, 229-257.

Parker, S. C., 2002, Do banks ration credit to new enterprises? And should governments intervene?, *Scottish Journal of Political Economy*, Vol. 49, pp. 162-195.

Parker, S. C., 2004, *The Economics of Self-Employment and Entrepreneurship*, Cambridge University Press.

Petersen, M. A. and Rajan, R. G., 1994, The benefits of lending relationships: Evidence from small business data, *Journal of Finance*, Vol. 49, pp. 3-37.

Pittman, J. A. and Fortin, S., 2004, Auditor choice and the cost of debt capital for newly public firms, *Journal of Accounting and Economics*, Vol. 37, pp. 113-136.

Stiglitz, J. and Weiss, A., 1981, Credit rationing in markets with imperfect information, *American Economic Review*, Vol. 71, pp. 393-410.

Table 1. Descriptive statistics

	Mean	Median	S.D.	Min	Max	N
FCDEBT	0.033	0.031	0.026	7.93E-08	0.215	119250
FCASSETS	0.022	0.017	0.020	6.04E-08	0.117	119250
AGE	13	10	11.987	0	106	119250
RATING	28.449	24.000	19.812	3	100	119250
SALES	4.959	0.403	93.497	0	21488	119250
SME	0.942	1	0.233	0	1	119250
DEFAULT	0.028	0	0.347	0	25	119250
AUDIT	0.077	0	0.267	0	1	119250
AUDITOR	0.718	1	0.450	0	1	119250
PROFIT	0.024	0.040	0.306	-3.010	0.860	119250
GR_SALES	0.211	0.051	0.883	-0.909	7.012	119250

Notes: The table provides descriptive statistics for the estimation sample of 119250 firm-year observations over the period 2000-2002.

Table 2. Pairwise correlations

	FCDEBT	FCASSETS	AGE	RATING	SALES	SME	DEFAULT	AUDIT	AUDITOR	PROFIT	GR_SALES
FCDEBT	1.000										
FCASSETS	0.762 (0.000)	1.000									
AGE	-0.045 (0.000)	-0.101 (0.000)	1.000								
RATING	0.194 (0.000)	0.460 (0.000)	-0.217 (0.000)	1.000							
SALES	-0.009 (0.003)	-0.014 (0.000)	0.064 (0.000)	-0.034 (0.000)	1.000						
SME	-0.058 (0.000)	-0.026 (0.000)	-0.061 (0.000)	0.026 (0.000)	-0.134 (0.000)	1.000					
DEFAULT	0.043 (0.000)	0.096 (0.000)	-0.020 (0.000)	0.204 (0.000)	-0.003 (0.347)	0.014 (0.000)	1.000				
AUDIT	0.090 (0.000)	0.264 (0.000)	-0.071 (0.000)	0.349 (0.000)	-0.012 (0.000)	0.039 (0.000)	0.109 (0.000)	1.000			
AUDITOR	-0.069 (0.000)	-0.066 (0.000)	0.122 (0.000)	-0.107 (0.000)	0.030 (0.000)	-0.047 (0.000)	-0.016 (0.000)	0.047 (0.000)	1.000		
PROFIT	-0.040 (0.000)	-0.101 (0.000)	0.027 (0.000)	-0.151 (0.000)	0.007 (0.017)	0.010 (0.001)	-0.037 (0.000)	-0.112 (0.000)	-0.014 (0.000)	1.000	
GR_SALES	0.014 (0.000)	0.046 (0.000)	-0.093 (0.000)	0.083 (0.000)	0.009 (0.002)	-0.006 (0.027)	-0.005 (0.109)	0.017 (0.000)	-0.024 (0.000)	0.032 (0.000)	1.000

Notes: The table presents pairwise correlation coefficients; significance levels are in the parentheses.

Table 3. Estimation results

	PANEL A: Dependent variable FCDEBT FIXED EFFECTS (WITHIN) ESTIMATES			
	(1)	(2)	(3)	(4)
AGE	-0.001 ***	-0.001 ***	-9.35E-04 ***	-0.001 ***
	(6.54E-05)	(6.56E-05)	(9.95E-05)	(6.63E-05)
RATING		5.18E-05 ***	5.24E-05 ***	4.96E-05 ***
		(5.83E-06)	(5.84E-06)	(5.85E-06)
AGE2			-5.48E-06 **	
			(2.64E-06)	
SALES				-3.23E-06 ***
				(9.80E-07)
SME				2.73E-04
				(6.87E-04)
DEFAULT				6.77E-04 ***
				(2.38E-04)
AUDIT				9.21E-04 ***
				(3.37E-04)
AUDITOR				-4.42E-05
				(3.01E-04)
PROFIT				-0.002 ***
				(3.20E-04)
GR_SALES				5.05E-04 ***
				(8.48E-05)
YEAR	Yes	Yes	Yes	Yes
Observations	119250	119250	119250	119250
F-statistics	519.10	372.73	280.64	122.33
df	2, 62816	3, 62815	4, 62814	10, 62808
Significance	0.000	0.000	0.000	0.000

	PANEL B: Dependent variable FCASSETS FIXED EFFECTS (WITHIN) ESTIMATES			
	(1)	(2)	(3)	(4)
AGE	-0.001 ***	-0.001 ***	-0.001 ***	-0.001 ***
	(4.01E-05)	(3.99E-05)	(6.06E-05)	(4.02E-05)
RATING		1.15E-04 ***	1.15E-04 ***	1.11E-04 ***
		(3.55E-06)	(3.55E-06)	(3.55E-06)
AGE2			4.20E-07	
			(1.61E-06)	
SALES				-2.00E-07
				(5.90E-07)
SME				1.62E-04
				(4.17E-04)
DEFAULT				9.06E-04 ***
				(1.44E-04)
AUDIT				0.004 ***
				(2.04E-04)
AUDITOR				-4.04E-05
				(1.82E-04)
PROFIT				-0.002 ***
				(1.94E-04)
GR_SALES				5.24E-04 ***
				(5.14E-05)
YEAR	Yes	Yes	Yes	Yes
Observations	119250	119250	119250	119250
F-statistics	861.33	933.22	699.92	341.90
df	2, 62816	3, 62815	4, 62814	10, 62808
Significance	0.000	0.000	0.000	0.000

Notes: The table presents regression results for financial costs (FCDEBT and FCASSETS) using fixed-effects (within) estimation. Standard errors are shown below coefficients in the parentheses. The superscript asterisks indicate statistical significance of coefficients: (***) denotes significance at 1 percent level, (**) at 5 percent level and (*) at 10 percent level.

Table 4. Semi-elasticities

PANEL A: Dependent variable FCDEBT

	AT MEAN		AT MEDIAN	
	SEMI-ELASTICITY (d log y / dx)	S.E.	SEMI-ELASTICITY (d log y / dx)	S.E.
AGE	-0.032	0.002	-0.030	0.002
RATING	0.001	1.80E-04	0.001	1.70E-04

PANEL B: Dependent variable FCASSETS

	AT MEAN		AT MEDIAN	
	SEMI-ELASTICITY (d log y / dx)	S.E.	SEMI-ELASTICITY (d log y / dx)	S.E.
AGE	-0.049	0.002	-0.045	0.001
RATING	0.005	1.60E-04	0.005	1.60E-04

Notes: Semi-elasticities have been calculated by using the estimation specification (4) in Table 3.

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