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FINANCING CONSTRAINTS, CREDIT RATIONING AND FINANCING OBSTACLES: EVIDENCE FROM FIRM-LEVEL DATA IN SOUTH-EASTERN EUROPE

IRAJ HASHI*
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ABSTRACT: Financing constraints have been one of the major impediments to doing business in transition economies in general and South-Eastern Europe in particular. Utilizing firm-level survey data and extensive econometric modelling, the paper provides new evidence on financing constraints, credit rationing and financing obstacles for firms in Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia and Montenegro. The findings suggest that these phenomena are prevalent in the SEE region, especially in the small business sector, a driving force of economic development in these countries. Based on the findings, a number of policy implications aiming at reducing financing constraints for the small business sector are derived.

KEYWORDS: *credit rationing, financing constraints, South-East Europe*

JEL classification: D92, G21

1. INTRODUCTION

The transformation of the banking sector in transition economies has been one of the most dynamic and challenging aspects of the transition process. Reforms in South East European countries (SEE) were long delayed, especially in the first decade of transition. The banking sector was relatively inefficient, with a weak supervisory capacity, and old lending practices paved the way on many occasions for severe crisis and low levels of financial intermediation (Anderson and Kegels, 1998). In the second decade of transition, however, the banking sector in SEE underwent a fundamental restructuring and the

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consolidation. Reforms of the macroeconomic environment and institutions of a market economy were undertaken, which promoted stability and the prospect of financial deepening. Notwithstanding the progress, the level of banking sector credit to enterprises in transition economies in general and SEE in particular has not reached that of countries with comparable levels of economic development (EBRD, 2006). This is because banks have imposed credit rationing on creditworthy enterprises for a variety of reasons: inefficiencies in banks themselves, information asymmetry between borrowers and banks, poorly functioning institutions such as the rule of law, and other institutional and market failures. These concepts are well grounded in the theoretical literature of the last three decades (Stiglitz and Weiss, 1981; Fazzari et al., 1988; and others). Credit rationing of credit worthy firms has important adverse implications for growth of firms and the whole economy. Hence, it is important to investigate this phenomenon in the context of SEE countries where the evidence to date is scarce.

In this paper, the availability of finance is examined by bringing together two strands of the literature (credit rationing and financing constraints) into a single empirical framework, providing new evidence on credit rationing, financing constraints and financing obstacles faced by firms in SEE. The paper focuses on the effects of this phenomenon on specific groups of firms such as SMEs, state-owned and foreign-owned firms, firms with good prospects, etc. Given that small firms are the most dynamic sector of the economy and critical to economic growth in SEE countries, the impact of market imperfections limiting their access to external finance, and therefore their potential growth, is also addressed in the paper. Other firm characteristics such as ownership, past performance, financial disclosure, etc., that may influence the degree of financing constraints are also explored. Other working hypotheses, such as the persistence of soft budget constraints for state-owned enterprises, whether credit rationing is a supply- or demand-driven phenomenon, the ability of banks to distinguish between 'good' and 'bad' borrowers, are also tested. Using a large survey of firms in Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia and Montenegro for 1999, 2002 and 2005, and extensive econometric modelling, the prevalence of financing constraints and credit rationing in the SEE region is confirmed, especially for the small business sector. However, during the period under review there has been a substantial decrease in financing constraints, especially in the category of small firms, implying a shift in the lending technology of banks towards the small business sector. Finally, a number of policy suggestions aiming at reducing financing constraints for the small business sector are presented.

The paper is organized as follows. In the next section, theories of credit rationing and financing constraints and some of the empirical work in the area are critically examined. While much of this literature was developed in the context of mature market economies, there have been a number of attempts to apply these concepts to the more developed transition economies. Section 3 discusses the empirical work of this paper – the data, models and results. Section 4 concludes.

2. REVIEW OF THE LITERATURE

2.1 Credit rationing and financing constraints: the theory

There is a well established literature arguing that imperfections in the credit market stem from information asymmetries, transaction costs and agency issues. Such imperfections may give rise to the credit rationing – a state in which information asymmetries between lenders and borrowers may result in the equilibrium interest rate not clearing the market. Instead, the demand for loans will exceed the supply and banks will deny credit to some borrowers who are observationally indistinguishable from those who receive loans despite their willingness to pay the prevailing interest rate. For example, if the borrower bears no cost when project returns are lower than the debt obligation, the moral hazard argument can lead to credit rationing because the borrower may divert the funds to more risky project *ex post* (Stiglitz and Weiss, 1981), engage in asset substitution (Schwartz, 1981), exert an inappropriate degree of effort on the project (Aghion and Bolton, 1997; Ghosh, et al., 2001) or even falsely declare bankruptcy (Williamson, 1986). Banks cannot distinguish these borrowers from better quality ones because of information asymmetries, hence, they will ration their supply of credit.

The information asymmetry theories of credit rationing have often been criticized for assuming that banks are unable to distinguish between borrowers – given that banks are in the information processing business and have specialized expertise in analyzing credit risk (Riley, 1987; Inderst and Muller, 2007).¹ For example, Riley (1987) criticizes the work of Stiglitz and Weiss by arguing that as long as high risk and high return are positively correlated, the adverse effect of risk may be offset by a favourable effect of returns and, as the number of observationally distinct groups increases, credit rationing may not be an empirically important phenomenon. Milde and Riley (1988) develop the ‘bank screening hypothesis’ in which separating equilibria with no rationing is attained where banks screen their borrowers by offering larger loans to safer borrowers and by sorting out different risk classes. However, banks can separate small firms from large ones, firms in one sector from those in other sectors, etc. Since perfect screening is impossible, within each group some will receive loans while apparently identical firms will not and credit rationing will still occur.

The magnitude of credit rationing depends on the extent to which information asymmetries are more problematic for a specific group such as small firms, as opposed to other groups. If small firms have higher informational problems and are subject to credit rationing, it does not necessarily mean that they have ‘bad’ projects in hand. As Storey (1994) notes, if business proposals are turned down for reasons not connected with the

¹ Some authors refer to the advances in credit scoring as the evidence that banks can distinguish between customers of varying risk. However, credit scoring models used by commercial banks are statistical models based on borrowers’ observable characteristics. Notwithstanding various estimation biases in the credit scoring models (see for example Greene, 1998; Parnitzke, 2005), the rating is made based on some average pattern of observationally distinct risk classes. Despite this, within each risk class, due to information asymmetries and the inability to sort borrowers perfectly, credit rationing may still emerge.

viability of the project itself, e.g., because firms lack track record and collateral or are small, then credit rationing may be a problem in the credit market and may become the subject of government intervention. As Cressy (1996) notes, although the theoretical underpinnings of credit rationing theory may be challenged, its implications seem to have been accepted since in many countries substantial sums of public money have been spent on alleviating this problem.

It is important to recognize that if firms have access to external finance, they may still limit their investments to internally generated funds and underinvest because information and incentive problems may introduce a wedge between the costs of internal and external finance – as the financing constraints literature argues. Financing constraints refer to the inability of firms to finance their desired level of investment that they would have undertaken in a perfect capital market. In perfect capital markets firms are indifferent between what sources they use (internal or external) to finance their investment. They would not find it difficult to raise external finance when profitable investment opportunities arise and, in this framework, internal and external funds are perfect substitutes. However, given market imperfections, reliance on internal funds may be higher since raising external finance is either more costly or impossible. The ‘pecking order theory’ (Myers and Majluf, 1984) or the ‘hierarchy of finance hypothesis’ (Fazzari et al., 1988) suggest that external finance will be more costly than internal funds for financing investment and that firms will not turn to external funds until internal sources are exhausted. This is due to a number of reasons, including monitoring costs (Townsend, 1979; Williamson, 1987), asymmetrical information entailing moral hazard and adverse selection (Jensen and Meckling, 1976; Stiglitz and Weiss, 1981), transaction costs in issuing bank debt, such as costs of application, screening costs, bankruptcy costs, etc. While the empirical literature, almost without exception, refutes the case of perfect capital market, the work on credit rationing has produced ambiguous results. In order to assess the validity of ‘bank screening hypothesis’ and credit rationing if it is important problem, the dispute has to be resolved by testing the two hypotheses empirically. The present study finds that, in the context of transition economies, both theories may hold.

2.2 The empirical literature

The bulk of the empirical studies on credit rationing and financing constraints is based on the experience of firms in developed market economies. In more recent years there have been a number of attempts to apply the theory to the more advanced transition economies. However there has been almost no attempt to assess the nature or extent of credit rationing and financing constraints in the less advanced SEE countries.

The empirical literature on credit rationing and financing constraints has developed in two distinct frameworks. In terms of credit rationing, as Jaffee and Stiglitz (1990) note, the magnitude of this problem in the economy could be measured if the demand and supply for credit was known. However, what is observed is the quantity of credit that is transacted and not the excess demand for credit. Hence, credit rationing may be ex-

tremely difficult to identify, thus empirical tests are mainly indirect (Parker, 2002). One test for credit rationing is when the data allows the researcher to distinguish between firms that have applied for credit and those that have not (the demand effect) and also between firms that have been successful or unsuccessful in their application for credit (the supply effect). Using enterprise survey data from the Czech Republic, Hungary and Poland in the mid-1990s which allowed this distinction, Bratkowski, et al. (2000) tried to determine how banks differentiate between different groups of firms and how do they allocate credit: do they lend to firms with higher profitability; do they provide credit to firms with good prospects but weak track records; or do they treat collateral availability as the most important determinant of offering a loan? The authors found that banks were able to identify successful firms by lending to more profitable ones even without a track record but which were able to provide collateral. They also found that firms with less profit were less likely to apply for loans (e.g., no evidence of adverse selection). Based on these results, the authors conclude that credit rationing was not pervasive in the three countries in the early years of transition.

Studying the credit rationing problem in the housing loans market in the U.S., Jappelli (1990) explores the degree of rejection of applicants for bank loans as a measure of credit rationing. However, the author identified another group, those who did not apply for loans because they perceived that their application will be rejected by the bank. This group may be considered as credit rationed too since they cannot be treated as having had no demand for loans. The exclusion of this group may lead to biased results, because the self-selection of applicants may induce banks to adapt screening rules that differ from those that would prevail if this group of borrowers were also to apply.² Jappelli (1990) classifies this group as ‘discouraged’ borrowers and, together with the rejected group, considers them as ‘credit constrained’ borrowers to distinguish them from the strict definition of credit rationing. Similarly, Levenson and Willard (2000) adopt the definition of Jappelli (1990) for credit rationing and use survey data for investigating the small business sector in the U.S. The authors conclude that credit rationing was not a pervasive phenomenon in the U.S. economy.³

The financing constraints literature, on the other hand, holds that if firms can easily obtain external funds without paying a premium, their investment decisions will be less sensitive to internally generated funds. In contrast, when the premium is high, firms use internally generated funds to fund their investment first and external funds are sought only after their internal resources are exhausted. The empirical question in this line of inquiry is to investigate whether a firm’s investment decision is sensitive to changes in net worth, holding investment opportunities constant. In these models, investment is regressed on some proxies of net worth (e.g., cash flow or liquidity) and other firm char-

² Besanko and Thakor (1987) point out that in some cases the bank’s credit policy discourages borrowers from applying for credit by using non-price mechanisms, e.g., collateral or application procedures, and that the bank need not explicitly reject borrowers to induce them to exit the market.

³ However, contrary to this, the bulk of other empirical studies have found that credit rationing is indeed binding – Perez (1998) for the U.S. economy, Angelini and Generale (2005) for developing economies, and Rizov (2004) for a transition economy.

acteristics. If the coefficient of cash flow is positive and significant, then it is said that firms face financing constraints. In this framework firms are classified a priori as more or less likely to face financing constraints based on the researchers' beliefs about the systematic differences between firms regarding their information opacity, riskiness, etc. For instance, if small firms are perceived to be more financially constrained than large ones, a common feature of almost all investigations is that the sample is divided into sub-samples of small and large firms and then the investment model is estimated for the two sub-samples. If investments by small firms are more sensitive to internally generated funds, as measured by the absolute size of the relevant coefficient, it is suggested that these firms are more financially constrained than their larger counterparts.

There are many a priori criteria on the basis of which firms may be considered to be more or less financially constrained. For example, Gertler (1988), Gilchrist and Zakrajsek (1995) use the size and age of firms as the criteria for financing constraints. As they point out, 'informational frictions' that add to the financing costs, and hence financing constraints, apply mainly to younger firms with a short track record and with a high degree of idiosyncratic risk and firms that are likely to be not well collateralized. Small firms in general are more likely to share these attributes and may be perceived as more risky. Also the screening and monitoring of small firms may be proportionately costlier to the lender. From a bank's point of view, fixed lending costs related to loan appraisals and monitoring make costs per dollar lent relatively higher for small firms (Saito and Villanueva, 1981). Hence, they would be more financially constrained than larger and older firms. Also from the firm's perspective, transaction costs of the application process are relatively higher for small firms. All these attributes may lead small and young firms to face higher financing constraints.

The ownership of firms (particularly state ownership and foreign ownership) have sometimes been used as the a priori criterion to distinguish between more and less financially constrained firms. In the transition context, one may expect that state-owned enterprises (SOEs) face less financing constraints because of the prevalence of soft budget constraints (SBCs) and the variety of government subsidies. Perotti and Carare (1996) and Konings, et al. (2002) have shown that in Bulgaria and Romania, SOEs did not exhibit financing constraints due to the prevailing SBC regimes despite being highly indebted and having negative cash flows. While in developed market economies this finding would be a sign of perfect capital market, in the transition context it is seen as an indication of SBC. However, in later years of transition subsidies to SOEs were cut, often following IMF recommendations, and budget constraints on SOEs hardened. In addition, after the entry of foreign banks access to finance for SOEs was reduced especially because of their delayed restructuring. On the other hand, foreign-owned firms, especially those originating from developed countries, may be expected to face lower financing constraints. This is because of their ability to access financial markets in their home countries, obtain financial resources through foreign direct investments, etc. The possible lower financing constraints faced by foreign firms may be explained by the fact that these firms also bring know-how and new technology, have better governance and may be more transparent to their lenders, and thus, may face less financing constraints from financial markets in their host

countries. Perotti and Vesnaver (2004), for example, show that foreign-owned firms in Hungary face less financing constraints.

Another approach to the study of financing constraints has been recently developed by Beck, et al. (2006). Unlike previous studies that inferred financing constraints from company financial statements, these authors maintain that firms' financing obstacles, which are indicative of financial constraints, can be identified directly by asking firms about these constraints. Using the survey data for 10,000 firms in 80 countries around the world in 1999, they test the severity of self-reported financial obstacles facing firms on the basis of firm and country characteristics. Given that the previous empirical work often relied on balance sheet and income statement data of listed companies, the Beck et al. approach opened up the possibility of extending these investigations to the smaller transition economies of SEE. In these countries stock markets are either in their infancy or non-existent; they are also dominated by small firms which are not listed and more informationally opaque, or their financial statements are difficult or impossible to obtain. Hence, the survey data may be more appropriate for the analysis of financing constraints facing the SME sector. The large-scale Business Environment and Enterprise Performance Surveys (BEEPS), conducted by the World Bank and EBRD, offer the possibility of using this approach for the SEE countries where the evidence on financing constraints, credit rationing and financing obstacles of firms is scarce.

3. FINANCING CONSTRAINTS, CREDIT RATIONING AND FINANCING OBSTACLES IN SEE⁴

3.1 The empirical framework

The empirical work in the remainder of the paper utilizes a survey-based approach to identify the determinants of firms' financing constraints. We use a database derived from three rounds of BEEPS in 1999, 2002 and 2005, focusing on the sub-set of firms in the SEE region. Following the approach employed by Beck, et al. (2006), and extending it in a number of ways, we investigate whether age, size and ownership have any influence on the various dimensions of firms' perceived financing constraints. The study differs from Beck, et al. (2006) in many respects. First, the investigation is specific to transition countries in SEE. Second, the study extends the period of analysis using data from the 2002 and 2005 BEEPS. Third, using both logit and ordered logit models, several dimensions of firm perceptions of financing constraints are considered: a general financing obstacle, specific obstacles such as high interest rates or high collateral requirements, access to long-term and short-term loans, etc. Fourth, more objective variables such as the share

⁴ In the literature, the terms credit rationing, credit constraints, financing constraints, liquidity constraints and recently, financing obstacles are sometimes used interchangeably. In this paper 'financing constraints' will refer to whether firms can use their internal funds to finance their investment or have to rely on external funds (and to what extent) (section 3.3.1); 'credit rationing' will refer to the case of firms which, despite their ability to pay the cost of credit, cannot obtain credit and involves more direct tests of credit rationing (section 3.3.2) and 'financing obstacles' will refer to the firms' self-reported financing obstacles for their operation and growth (section 3.3.3).

of investment that firms finance through internal funds and through bank loans are employed, bringing the estimation model closer to the Fazzari, et al. (1988). Fifth, additional control variables such as firm performance measures (profitability and sales growth) and whether or not firms use accounting standards are introduced. Finally, the analysis contains more direct evidence of credit rationing by explicitly modelling the firm's decision to participate in the credit market and the lender's decision to reject or accept the firm's application for a loan. This is possible because the 2002 and 2005 BEEPS provide more detailed information on financing issues.

To assess the determinants of the likelihood of firms applying for a loan and being denied credit (i.e., direct credit rationing), we use the approach adopted by Bratkowski, et al. (2000). However, unlike Bratkowski, et al. (2000) who used a logit model to estimate two separate equations (the likelihood for applying for a loan and the likelihood being denied the loan), we use the Heckman model which also enables us to deal with the possible selection bias. The model of 'discouraged' borrowers is also tested by employing a logit estimation procedure, following Jappelli's (1990) and Levenson and Willard's (2000) methodology. However, the model here differs from Jappelli's approach in the sense that here, borrowers are firms and not households; whereas the difference of this method to the Levenson and Willard (2000) approach is that they calculate the estimates for discouraged borrowers indirectly based on the parameter estimates of the regression of firms that apply for loans and are denied credit.⁵ In addition, using logit and ordered logit models, the firms' self-reported difficulties in accessing short-term and long-term loans are assessed.⁶ One of the reasons for employing several dimensions of financing constraints is that the firm's self-reported financing constraints are subjective by nature and may not represent the real importance of specific constraints. It is therefore useful to combine these with more objective indicators as explained above. This would also meet the need for 'methodological cross-checking' advocated by Charnes, et al. (1988).

3.2 Data and Models

The BEEPS is a joint World Bank/EBRD project designed to collect firm-level information on the impact of business environment through detailed enterprise surveys at regular intervals. The surveys were conducted in transition economies in 1999, 2002 and 2005 and covered about 4,000-9,000 firms. The survey includes a broad range of questions aimed at evaluating the nature of obstacles faced by firms in important areas such as infrastructure, judiciary, business regulation, crime, corruption, taxation and finance. The entrepreneurs were asked to assess and rank on a 1 to 4 scale how problematic a particular area (e.g. finance) is for the operation and growth of their firms.

⁵ This is because their survey did not provide direct information on whether non-applicants expect to be denied, while the BEEPS provides direct information on the reasons why some firms did not apply for a loan, including firms' expectation of denial.

⁶ This method of measuring credit rationing is similar to Hersch, et al. (1997) though the focus of their study was different – the previous business experience of firms' owners and whether they were members of the *nomenklatura*.

The general model employed in the empirical framework utilizing different specifications and estimation methods can be represented as follows:

$$Y_i = \alpha + \beta X_{1i} + \gamma X_{2i} + \varepsilon_i$$

where Y_i represents various measures of financing constraints; X_{1i} the vector of variables representing different firm characteristics; X_{2i} country dummies; α , β , γ parameters to be estimated; and ε_i the random error. In the following section we use several versions of this model and a variety of econometric estimation methods.

A number of indicators have been used as measures of financing constraints (Y_i). In section 3.3.1, we use the proportion of a firm's investment expenditure financed by the firm (i) internal funds and (ii) bank loans.⁷ Given the nature of the data (with both ratios varying between zero and 100 percent and with many corner solution observations at both ends, the Tobit model ('censored regression model') is used for the purpose of estimation as the most appropriate model.⁸ This approach, as with Fazzari, et al. (1988), posits that firms which rely more on internal funds, as opposed to external funds, to finance their investment are more financially constrained. In section 3.3.2, we focus on the probability of a firm applying for a loan and the probability of it being denied the loan and assess the factors influencing these probabilities. We also assess the model of discouraged borrowers and the determinants of the difficulties of firms' access to short-term and long-term loans. In section 3.3.3, we assess the determinants of not only broad financing obstacles but also specific obstacles such as high interest rates and collateral requirements.

Firm characteristics in all models include the firm's age (logged), size (measured by dummy variables indicating small and medium compared to the base category of large firms), ownership, performance (for example sales growth or profitability⁹ as proxies for credit worthiness or future prospects), accounting method used (to signal transparency of financial reporting), sector and country of origin. It is expected that younger and smaller firms to be more financially constrained, e.g., to finance a higher proportion of their investment through internal funds, and a smaller proportion through bank loans, compared to their older and larger counterparts. Majority foreign ownership are expected to be less financially constrained than private domestic companies. Firms with better

⁷ There are also other sources of funds used by firms to finance their investments such as loans from family and friends. Given that these two sources of funds best demonstrate the presence of constraints in the context of the investigation, other sources of funds used by firms to finance their investments are excluded from the analysis.

⁸ The tobit model is applicable to censored outcomes, i.e., situations in which the dependent variable is not observable for part of the population and corner solution outcomes, i.e., situations in which the dependent variable is an observable outcome but the optimal choice will be a corner solution. For corner solution outcomes, it makes more sense to call the resulting model a 'corner solution model'. Unfortunately, the name 'censored regression model' appears to be firmly entrenched in the literature (see Wooldridge, 2001).

⁹ Because of the nature of the dataset and the fact that some questions have changed from one round of survey to another, two profitability variables are used in the estimations: Profitability1 for the 2002 survey, a dummy variable taking the value of 1 if the firm had positive gross profit to total sales ratio in 2001 and 0 otherwise; and Profitability2 for the 2005 survey, a dummy variable taking the value of 1 if the firm had reinvested some of its 2003 profits in 2004, and 0 otherwise.

performance and prospect may be better placed to use their own funds and also apply for bank credit. Firms with better prospects may be in need of more external finance in order to exploit investment opportunities; hence, may be more likely to apply for external finance. To the extent that banks are able to identify this, they may be more willing to provide credit, thus, firms may be less constrained. At the same time, firms with low profitability may face liquidity problems and turn to banks for funds. This may be a sign of adverse selection allowing poorly performing firms to enter the loan market, worsening the pool of applicants which, in turn, may induce banks to limit credit availability. Profitability may decrease the likelihood of a firm participating in the credit market given the stringent requirements by banks and high costs of external finance. Thus, profitable firms do not turn to banks for funding (the hierarchy of finance hypothesis). On the other hand, to the extent that firm profitability as an indicator of creditworthiness is observable to the bank, viable firms would find it easier to access external finance.

The three BEEP surveys differ from each other in a number of ways, particularly in terms of some questions. This means that the model run for each year, therefore, is slightly different from those run for other years because it may contain one or two different independent variables. But in addition to regressions for each year of the survey, the results also include a pooled regression which includes variables which have been covered in all three surveys. The pooled regressions contain year dummies which explain whether the financing constraints have been relaxed over time given the dynamic changes in the banking sector in the SEE countries.

Table 1 summarises the descriptive statistics of the variables used in the models discussed in the next section. The precise definition of variables is presented in Appendix 1. As Table 1 shows, most variables (except for Internal Funds, Bank Loans, Age and Sales Change which are continuous) are either ordered or dummies. From the summary statistics, it can be observed that, on average, firms rate high interest rates as a greater obstacle in the three rounds of BEEPS compared to other dimensions of financing obstacles. Different dimensions of financing obstacles are significantly correlated, with the coefficients ranging from 0.29 to 0.66 in various years. Interestingly, firms' self-reported obstacles are not correlated with more objective measures such as Internal Funds and Bank Loans.¹⁰

¹⁰ The correlation matrix of variables is available upon request.

Table 1: *Descriptive statistics of variables*

| Variable | Year | Obs | Mean | Std | Min | Max |
|---------------------------------------|------|------|-------|-------|-----|-----|
| Dependent Variables | | | | | | |
| Internal Funds | 1999 | 820 | 62.17 | 39.10 | 0 | 100 |
| | 2002 | 1430 | 60.27 | 37.96 | 0 | 100 |
| | 2005 | 2000 | 61.47 | 36.25 | 0 | 100 |
| Bank Loans | 1999 | 820 | 8.72 | 21.18 | 0 | 100 |
| | 2002 | 1430 | 9.46 | 20.99 | 0 | 100 |
| | 2005 | 2000 | 13.02 | 23.66 | 0 | 100 |
| Difficulty accessing short-term loans | 1999 | na | na | na | na | na |
| | 2002 | 1293 | 2.72 | 2.13 | 1 | 5 |
| | 2005 | na | na | na | na | na |
| Difficulty accessing long-term loans | 1999 | na | na | na | na | na |
| | 2002 | 1260 | 3.07 | 2.14 | 1 | 5 |
| | 2005 | na | na | na | na | na |
| Discouraged borrowers | 1999 | na | na | na | na | na |
| | 2002 | na | na | na | na | na |
| | 2005 | 1426 | 0.32 | 0.47 | 0 | 1 |
| Applicants | 1999 | na | na | na | na | na |
| | 2002 | na | na | na | na | na |
| | 2005 | 2039 | 0.52 | 0.50 | 0 | 1 |
| Rejected borrowers | 1999 | na | na | na | na | na |
| | 2002 | na | na | na | na | na |
| | 2005 | 1021 | 0.05 | 0.22 | 0 | 1 |
| Financing obstacle | 1999 | 855 | 3.09 | 1.10 | 1 | 4 |
| | 2002 | 1362 | 2.42 | 1.19 | 1 | 4 |
| | 2005 | 1949 | 2.35 | 1.14 | 1 | 4 |
| High interest rate obstacle | 1999 | 817 | 3.41 | 0.99 | 1 | 4 |
| | 2002 | 1410 | 2.67 | 1.12 | 1 | 4 |
| | 2005 | 1968 | 2.62 | 1.13 | 1 | 4 |
| Collateral obstacle | 1999 | 734 | 2.58 | 1.24 | 1 | 4 |
| | 2002 | na | na | na | na | na |
| | 2005 | na | na | na | na | na |
| Access to long-term loan obstacle | 1999 | 752 | 3.22 | 1.13 | 1 | 4 |
| | 2002 | na | na | na | na | na |
| | 2005 | na | na | na | na | na |
| Explanatory Variables | | | | | | |
| Age | 1999 | 845 | 16.14 | 22.56 | 1 | 172 |
| | 2002 | 1464 | 16.28 | 19.73 | 3 | 202 |
| | 2005 | 2040 | 17.84 | 20.65 | 4 | 180 |
| Small | 1999 | 873 | 0.58 | 0.49 | 0 | 1 |
| | 2002 | 1464 | 0.66 | 0.48 | 0 | 1 |
| | 2005 | 2040 | 0.68 | 0.47 | 0 | 1 |
| Medium | 1999 | 873 | 0.22 | 0.41 | 0 | 1 |
| | 2002 | 1464 | 0.20 | 0.40 | 0 | 1 |
| | 2005 | 2040 | 0.22 | 0.41 | 0 | 1 |
| Large | 1999 | 873 | 0.21 | 0.41 | 0 | 1 |
| | 2002 | 1464 | 0.15 | 0.36 | 0 | 1 |
| | 2005 | 2040 | 0.11 | 0.31 | 0 | 1 |
| State | 1999 | 873 | 0.22 | 0.41 | 0 | 1 |
| | 2002 | 1349 | 0.14 | 0.36 | 0 | 1 |
| | 2005 | 2016 | 0.10 | 0.29 | 0 | 1 |
| Private domestic | 1999 | 873 | 0.71 | 0.45 | 0 | 1 |
| | 2002 | 1349 | 0.75 | 0.46 | 0 | 1 |
| | 2005 | 2016 | 0.80 | 0.40 | 0 | 1 |
| Foreign | 1999 | 873 | 0.08 | 0.26 | 0 | 1 |
| | 2002 | 1349 | 0.11 | 0.36 | 0 | 1 |
| | 2005 | 2016 | 0.11 | 0.31 | 0 | 1 |
| Sales change | 1999 | 812 | 12.61 | 59.32 | -90 | 700 |
| | 2002 | 1360 | 18.31 | 58.22 | -90 | 600 |
| | 2005 | 1968 | 10.63 | 36.92 | -90 | 310 |
| Profitability1 | 2002 | 1375 | 0.90 | 0.30 | 0 | 1 |
| Profitability2 | 2005 | 1939 | 0.84 | 0.37 | 0 | 1 |
| Accounting standards | 1999 | 788 | 0.56 | 0.50 | 0 | 1 |
| | 2002 | 1294 | 0.49 | 0.50 | 0 | 1 |
| | 2005 | 1972 | 0.60 | 0.54 | 0 | 1 |

Note: a) Sector and country dummies not reported.

3.3 Results

3.3.1 Financing Constraints: Reliance on Internal Funds and Bank Loans

The Tobit model is used to assess the determinants of the proportion of firms' investments financed through internal funds and bank loans (two separate specifications).¹¹ The Tobit estimates are presented in Table 2 (specifications 1–8). For each dependent variable, there are four specifications (one for each of the three years of survey and one for the pooled data). The estimated coefficient on age is positive but insignificant in all but one specification. The exception is specification 4 with internal funds as the dependent variable, indicating that older firms finance a larger proportion of their investment through internal funds, i.e., are more constrained, which is contrary to expectations and what is generally perceived in the literature.¹² However, age is insignificant in the regressions with bank loans as the dependent variable. The change in the structure of the banking sector in the region (e.g., the entry of foreign banks and the closure of domestic banks) may also be an explanation for this outcome, in the sense that all firms were 'new' to foreign banks and the relationships had to be established from scratch.¹³

The coefficients on size (especially small firms) are in most specifications highly significant and have the expected sign, indicating that SMEs may rely more on internal funds and less on bank loans to finance their investment needs, compared to larger firms – in few specifications the coefficients are insignificant at conventional levels. The estimated coefficient on state ownership is negative and significant in all the specifications for bank loans, indicating that the SOEs finance a smaller proportion of their investment through banks. This provides some evidence that hardening of budget constraints, or even credit rationing, has become binding for SOEs. However, they do not seem to rely more on internal funds. This indicates that SOEs may still be receiving subsidies from the government, but not the 'soft' lending from the banks as in the early transition years.

The effect of foreign ownership is rather unclear. The variable is significant at five percent level in only one specification, indicating that foreign firms rely less on bank loans than domestic firms to finance their investments. The evidence from the 'internal funds' specification suggesting that these firms do not rely more on internal funds to finance their investment, may support the view that foreign firms may turn to banks in their

¹¹By comparing the results with a similar probit model, where the dependent variable is a dummy taking the value of one if any percentage of investment is financed by internal funds (or bank loans) and zero otherwise, it can be shown that there is no misspecification in terms of heteroscedasticity and non-normality. This is because the probit parameter estimates are broadly similar in magnitude to Tobit parameter estimates divided by the estimated standard error of the regression – though they cannot be the same due to sampling error (see Wooldridge, 2001). The results are available upon request.

¹² A specification replacing the age variable with a dummy taking the value of one if the firm is less than five years old and zero otherwise (not reported here), produces statistically insignificant results for all specifications.

¹³ Another explanation may be that the definition of this variable is not consistent across years: in the 1999 survey firms were asked about the year when they started their business, while in 2002 and 2005, when they started business in particular country. Furthermore, the later two rounds of BEEPS exclude firms younger than four years from the sample, i.e., new entrants, which presumably face the highest constraints.

home countries or their parent banks for funds (presumably with better conditions). Regarding the performance variables, sales growth is estimated to have a positive effect, but is significant in only two specifications, providing some indication that firms with good prospects use both internal funds and bank loans more than firms with weak prospects. Profitability has a positive sign and is statistically significant at the one percent level suggesting that more profitable firms finance a greater proportion of their investment through internal funds. However, this variable is not significant in the specification with Bank Funds. This may support the 'hierarchy of finance hypothesis' suggesting that because of the premium with external funds, firms finance their investments internally and do not turn to banks for finance until internally generated funds are exhausted.

The use of accounting standards has a statistically significant impact on the proportion of investment that firms finance through bank loans in two specifications. This suggests that firms with clearer financial reporting were able to rely more on banks to finance their investment. This variable has no effect on the use of internal funds (or only marginally as in one specification).

Table 2: *Financing constraints of firms in SEE*

| | Internal Funds [Tobit model] | | | | Bank Loans [Tobit model] | | | |
|-----------------------|------------------------------|---------------------|---------------------|--------------------|--------------------------|---------------------|---------------------|---------------------|
| | 1999 | 2002 | 2005 | Pooled | 1999 | 2002 | 2005 | Pooled |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Age | 11.77 (7.95) | 4.76 (6.71) | 1.45 (5.31) | 7.43* (4.10) | 0.06 (8.81) | 10.10 (7.77) | 2.82 (5.40) | 4.64 (4.31) |
| Small | 37.78*** (10.46) | 21.13*** (6.94) | 7.25 (5.58) | 19.98*** (4.52) | -52.04*** (11.66) | -40.17*** (7.91) | -18.18*** (5.61) | -32.33*** (4.61) |
| Medium | 21.67** (9.67) | 13.91** (7.08) | 4.55 (5.56) | 9.82** (4.54) | -9.14 (9.89) | -17.17** (7.69) | -3.76 (5.48) | -8.76** (4.48) |
| State | 6.37 (9.60) | 0.52 (6.73) | -7.45 (5.68) | -1.63 (4.53) | -19.62* (10.25) | -30.63*** (8.21) | -20.31*** (6.09) | -26.91*** (4.91) |
| Foreign | 3.21 (12.72) | -3.51 (5.97) | 7.59 (4.96) | 1.80 (4.31) | -16.15 (14.91) | 2.13 (6.93) | -12.26** (5.11) | -6.76 (4.49) |
| Sales change | 0.04 (0.05) | 0.06 (0.04) | 0.06 (0.04) | 0.07*** (0.02) | -0.05 (0.07) | 0.04 (0.04) | 0.09** (0.039) | 0.02 (0.02) |
| Profitability1 | | 31.31*** (6.92) | | | | 9.25 (8.44) | | |
| Profitability2 | | | | | | | 5.25 (4.42) | |
| Account. Standards | -13.64* (7.62) | -0.94 (4.36) | -3.72 (3.08) | -0.25 (2.92) | 2.32 (9.11) | 8.53 (5.17) | 7.90*** (3.04) | 5.35* (3.04) |
| Year 1999 | | | | 5.30 (4.08) | | | | -13.77*** (4.37) |
| Year 2002 | | | | -9.49*** (3.72) | | | | -5.00 (3.91) |
| Constant | 6.41 (32.62) | -37.25** (17.09) | 58.46*** (13.32) | 13.01 (11.52) | 2.64 (35.47) | -6.65 (20.37) | -23.43 (14.50) | -11.43 (12.72) |
| Obs. | 674 | 1030 | 1845 | 2769 | 674 | 1030 | 1756 | 2769 |
| Left Censored obs. | 117 | 170 | 226 | 434 | 515 | 762 | 1135 | 1938 |
| Uncensored obs. | 306 | 536 | 1009 | 1436 | 143 | 249 | 596 | 778 |
| Right censored obs. | 251 | 324 | 610 | 899 | 16 | 19 | 25 | 53 |
| Log Likelihood | -2069.87 | -3381.39 | -6311.35 | -9235.35 | -1014.52 | -1683.85 | -3798.00 | -5181.86 |
| LR chi2 | 52.18*** | 201.44*** | 117.27*** | 182.90*** | 71.50*** | 143.52*** | 151.58*** | 279.94*** |
| Pseudo R ² | 0.02 | 0.03 | 0.02 | 0.02 | 0.04 | 0.05 | 0.02 | 0.03 |

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively; standard errors in parentheses.

In terms of the year effect, the dummy for 2002 is negative and statistically significant at five percent level indicating that firms in 2002 relied less on internal funds compared to 2005. On the other hand, in the specification for bank loans, the year dummy for 1999 is negative and statistically significant at the one percent level suggesting that banks increased their role in supporting firms to finance their investment over the period. Overall, the estimates suggest that smaller firms and SOEs face the highest financing constraints. Profitable firms finance a larger proportion of their investment through internal funds, but not bank financing which seem to be in line with the pecking order theory. It also seems that, over time, access to bank loans has improved for firms in SEE.¹⁴

3.3.2. Testing for credit rationing: rejected and discouraged applicants

Table 3 shows the results of the estimations aimed at assessing more directly whether firms in the SEE region experience credit rationing by considering three different indicators of credit rationing. First, the determinants of the likelihood of applying for a loan and being refused a loan are assessed. Second, the model of discouraged borrowers is employed. Third, the determinants of the likelihood of the firm reporting difficulties in accessing short-term and long-term loans are assessed.

i. The likelihood of applying for a loan and being refused

The Heckman model is utilized to assess the determinants of the likelihood of applying for a loan and being refused the loan (specifications 1 and 2). This model with partial maximum likelihood estimation is employed specifically to deal with the selection bias problem given that those who apply may systematically differ from those who do not apply, and the latter group may be influenced by and reflect a response to credit denials. In other words, because applying may be systematically correlated with unobservables that affect the likelihood of being denied, using only those who apply may produce biased estimates in the equation of the likelihood of being denied. For example, firms, including non-applying firms, may anticipate the bank screening procedures and the acceptance criteria, a situation which will result in self-selection in applying for credit based on the perception of success and conditions of a loan offer. Hence, it is likely that the sample is subject to selection bias.

¹⁴ There is no systematic difference among country and sector control variables in any of the models used in the analysis. Given that the focus of the study is on firm characteristics and in order to present more clearly the variables of interest, sector and country specific control variables are not reported, although they are included in all regressions.

The first-stage equation includes the 'Financing Obstacle' variable as the part of selection since it may have an impact on the firm's decision to participate in the credit market but not have an impact on the bank decision to lend.¹⁵ The coefficients in the first step equation show which factors influence the firm's decision to apply for a loan while those in the second step show which factors influence the bank's decision to deny a loan, given that the firm has applied for a loan.

In the first specification estimating the likelihood of applying for a loan the estimates show that small and medium-sized firms are significantly less likely to apply for bank loans compared to their larger counterparts. This may indicate self-selection in the market, i.e., those with little collateral and/or facing high transaction costs of the application process are less likely to enter the loan market. In terms of ownership, both SOEs and foreign firms seem less likely to apply for bank loans compared to private domestic firms. An explanation may be that SOEs do not apply because of the prospects of being denied; while foreign-owned firms do not apply due to the possibilities of receiving funds from their home countries/parent companies. Sales growth is positive and statistically significant at the one percent level suggesting that firms with good prospects, i.e., those in need for more investment, seem to be more likely to apply for bank loans. This may indicate that adverse selection may not be a problem since firms with poor prospects are less likely to participate in the credit market and worsen the pool of applicants. This may also be an additional evidence of self-selection in the credit market in SEE. However, the profitability proxy is positive but insignificant. Firms employing accounting standards seem to have a higher likelihood of applying for a loan. The selection variable (Financing Obstacle) is positive and highly significant, indicating that firms reporting higher financing obstacles to their operation and growth are more likely to turn to banks for loans.

¹⁵ To correct for the sample selection bias, there needs to be a variable that affects the selection equation without affecting the second. In the Heckman estimation, in the selection equation, the inverse Mill's ratio (λ) is estimated for each observation. In all the cases with this type of data, the two-stage estimation procedure is necessary to calculate the Mill's λ in order to infer whether the sample is subject to selection bias (see Heckman, 1979; Wooldridge, 2001 for the methodology). Mill's λ is statistically significant, which suggests that the sample is subject to selection bias. Therefore, the Heckman method is the appropriate technique for estimating the second-stage equation of the likelihood of the bank decision to deny a loan.

Table 3: Tests for credit rationing of firms in SEE in 2005

| | Heckman MLE model | | The model of discouraged borrowers | Access to short-term and long-term loans | |
|-----------------------|---|---|---|--|---|
| | The likelihood of applying for a loan: 1=apply, 0=otherwise (Selection Model) | The likelihood of being rejected a loan: 1=rejected, 0=otherwise (Second Stage Model) | The likelihood being rejected and discouraged from applying for a loan=1; Otherwise=0 (Logit Model) | Impossible/very difficult Accessing Short-Term loans [Logit Model] | Impossible/very difficult Accessing Long-Term loans [Logit Model] |
| | (1) | (2) | (3) | (4) | (5) |
| Age | 0.150 (0.120) | -0.020 (0.028) | -0.162 (0.260) | 0.258 (0.268) | -0.005 (0.245) |
| Small | -0.708*** (0.131) | 0.050** (0.022) | 1.735*** (0.326) | 1.056*** (0.295) | 1.323*** (0.270) |
| Medium | -0.213* (0.130) | 0.014 (0.018) | 0.714** (0.326) | 0.043 (0.315) | 0.313 (0.280) |
| State | -0.570*** (0.132) | 0.016 (0.030) | 0.670** (0.289) | 0.208 (0.262) | 0.346 (0.242) |
| Foreign | -0.264** (0.109) | -0.031* (0.016) | -0.180 (0.268) | -0.389 (0.254) | -0.485** (0.227) |
| Sales change | 0.002*** (0.000) | -0.0002* (0.0001) | -0.004** (0.002) | -0.005*** (0.001) | -0.004** (0.002) |
| Profitability1 | | | | -0.686** (0.269) | -0.455* (0.248) |
| Profitability2 | 0.072 (0.094) | -0.054** (0.026) | -0.673*** (0.182) | | |
| Account. Standards | 0.276*** (0.068) | -0.006 (0.011) | -0.452*** (0.147) | -0.008 (0.170) | 0.074 (0.155) |
| Financing Obstacle | 0.148*** (0.030) | | | | |
| Constant | -0.250 (0.323) | 0.147* (0.075) | -1.103 (0.668) | -2.216*** (0.671) | -1.706*** (0.617) |
| Obs | 1684 | | 1265 | 963 | 947 |
| Log Likelihood | -930.84 | | -682.07 | -493.81 | -565.37 |
| LR chi2 | | | 220.62*** | 147.47*** | 115.81*** |
| Wald chi2 | 244.00*** | | | | |
| Mill's λ | -0.031*** | | | | |
| Pseudo R ² | | | 0.139 | 0.13 | 0.10 |

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively; standard errors in parentheses.

In the equation estimating the likelihood of being denied credit the dummy variable for small firms is statistically significant at the five percent level. The results indicate that it is small firms that face the highest likelihood of being denied credit in the SEE. The dummy variable for foreign firms is negative and statistically significant (at ten percent level) indicating that foreign firms are less likely to be denied credit. The coefficients on sales change and profitability have an estimated negative effect and are statistically significant. Consistent with the 'bank screening hypothesis', this may be interpreted as banks being

able to distinguish ‘good’ from ‘bad’ firms and firms with good prospects are less likely to be denied credit. It seems that banks do screen their applicants’ creditworthiness and viable firms are more likely to receive loans. However, this should be interpreted with a caveat since, *inter alia*, keeping profit, sales change and the use of some accounting standards constant, small firms are still less likely to participate in the credit market and more likely to be denied a loan. This may indicate that some credit rationing is present in the market from both the demand side (which seems more prevalent) and supply side, and that small firms face the highest constraints. Calculations from the BEEPS data reveal that 93.5% of firms that applied obtained the loans they sought. As a result, credit rationing seems to work more through self-selection of firms on the demand side.

ii. A model of discouraged borrowers

As discussed previously, it is inappropriate to treat firms which do not apply for loans as having no demand for loans. Discouraged borrowers who do not apply for a loan because of various reasons should be taken into account too (of all firms in the SEE sample only 51.6 percent of firms applied for bank loans). The BEEPS 2005 dataset provides direct evidence of reasons why firms may not apply for loans. Almost 60 percent of non-applying firms did not apply because they had no need for loans, the rest either considered interest rates too high (11.3 percent), collateral requirements too high (2.8 percent), the procedures for the application complicated (6.3 percent), informal payments required (0.2 percent), did not expect the loan will be approved (1.9 percent), a combination of above reasons (17.1 percent) and others (2.2 percent). Apart from firms that did not need loans and considered interest rates to be high, the rest (30.6 percent of non-applying firms) may be considered as ‘discouraged’ borrowers, which jointly with the group of rejected applicants constitute the sample of credit rationed firms as defined by Jappelli (1990). The data also show that from the sample of applicants, 6.5 percent were denied credit while the remaining 93.5 percent received the loans they sought.¹⁶

In the SEE the rejection rate is higher for small firms – roughly, one in ten small firms are denied credit, while the ratio for medium and large firms is one in twenty. However, if the fact that some firms may not be creditworthy is taken into account, then the credit rationed firms must account for a smaller proportion. Two performance measures were calculated for firms that were denied credit – the proportion of firms that were profitable and the proportion with growing sales. Around 67 percent of rejected firms were profitable and 43 percent had positive sales growth. Therefore, some creditworthy firms appear to be denied credit indicating that some credit rationing is present in the market. In the total sample of firms in the SEE, the rejected and discouraged firms, constituting the upper bound of credit rationing, were around 17 percent which is almost three times

¹⁶ In a sample of small firms only, the corresponding figure for the U.S. economy in 1988 was 2.14 percent (Levenson and Willard, 2000) and for Italy it was 2.7 percent during the economic boom in 1988 and 12.8 percent during the recession in 1993 (Guiso, 1998). In a more conservative approach, using only a sample of start-up firms in the U.K., Cressy (1996) found that only six percent of business start-ups were denied a loan. The results may be very different in developing countries. Bigsten, et al. (2000) find that more than half of the firms in the sample of six African countries had no demand for credit. Of those with a demand, only a quarter obtained a loan and small firms were constrained more.

more than that calculated by Levenson and Willard (2000) for the U.S. economy.¹⁷ Unfortunately, due to data unavailability, it was not possible to assess the share of these firms in total employment and sales of the sample.

In the model of discouraged borrowers, credit rationed firms are identified by a dummy variable taking the value of one if the firm was refused a loan or if it was a 'discouraged borrower', and zero otherwise. Table 3 (specification 3) presents the logit estimates of the likelihood of a firm being credit rationed. As in most previous models, age is insignificant. The results show that SMEs are significantly more likely to be credit rationed than their larger counterparts. In this specification the coefficient on foreign firms is negative but not significant, while that for SOEs is positive and statistically significant at one percent level, indicating that SOEs are more likely to be credit rationed. Firms' good prospects, as proxied by the change in the firm's sales, have a negative and statistically significant effect on the likelihood of credit rationing. Profitability is also statistically significant at one percent level, indicating that more profitable firms are less likely to be credit rationed. The 'use of accounting standards' enters with a negative sign and statistically significant at one percent level suggesting that if firms are able to provide proper information to their lenders, the likelihood of being credit rationed will be reduced. In all, the results broadly suggest that being large, performing well and using some accounting standards reduce the likelihood of being credit rationed.

iii. Difficulties of obtaining short-term and long-term loans

We consider the determinants of the likelihood of the firm reporting difficulties in obtaining short-term and long-term loans on a 1 to 5 scale, with 1 being very easy and 5 impossible, using both the logit and ordered logit models. Some studies, e.g., Hersch, et al. (1997) and Batra, et al. (2002), transform the ordered dependent variable: 'how difficult is it to get a long-term loan from a bank' ranking from 1, very easy, to 4, very difficult, into a dichotomous dummy variable (by amalgamating the top two rankings into 1 and bottom two rankings into 0) and employ the logit model. Using BEEPS data from 2002, in this section the group of firms facing the highest difficulties in accessing loans is modeled using logit estimation. A dummy dependent variable is utilized taking value of one if the firm reports that it is impossible or very difficult to access short-term and long-term loans, and zero otherwise (Table 3, specification 4 and 5). In order to pick up all the variation in the data, an ordered logit model is also estimated for a dependent variable ranging from 1, very easy, to 5, impossible, indicating the difficulty experienced by firms in accessing loans. The results for an ordered logit model are largely consistent with logit estimates and are presented in Appendix 2.

¹⁷ It should be noted that the approach taken here may result in some underestimation as the work of Levenson and Willard (2000) focused on a sample of small businesses only. However, it may also represent an overestimation since unlike Jappelli (1990) and Levenson and Willard (2000) that take into account only firms that expect to be turned down, here all reasons for non-application are taken into account – apart from 'no need for loans' or 'interest rates considered too high'. The group of firms that consider interest rates to be high are excluded in order to approximate more closely the definition of credit rationing, i.e., the demand for loans will exceed the supply at prevailing interest rates. However, the results are basically the same if this group is included in the regression analysis.

As in most of previous specifications, age is insignificant. The reporting of greater difficulties in accessing either short- or long-term loans is statistically significant at one percent level for the group of small firms. However, the coefficient on medium-sized firms is insignificant. State-owned firms do not report significantly higher difficulties in accessing either long- or short-term loans, although the estimated coefficients have a positive sign. Being a foreign-owned firm decreases the likelihood of reporting difficulties in accessing long-term loans compared to private domestic firms and the estimated effect of sales change and profitability are negative and statistically significant in both specifications. This indicates that firms with good prospects are less likely to be credit rationed. The results also suggest that firms using some accounting standards have no statistically significant effect on difficulties in accessing short- and long-term loans for the sample of firms in 2002. However, as shown previously, in later years (with 2005 data) these firms financed a greater proportion of their investment through bank funds and were less likely to be credit rationed, suggesting the financing environment for firms with better information availability has improved.

3.3.3 The importance of financing obstacles for firms' operation and growth

In this section the dependent variables indicate the firm's perceived severity of several financing obstacles for the operation and growth of their business on a 1 to 4 scale: general financing obstacle (Financing Obstacle), high interest rates (High Interest Rates Obstacle), high collateral requirements (Collateral Obstacle) and access to long-term loans (Long-term Loan Obstacle). To better discriminate firms that report various dimensions of finance as a major obstacle, a logit model is employed for the dependent variable taking one if firm reports finance as a major obstacle and zero otherwise. As previously, the ordered logit models are also employed so that all the variation in the data is picked up. The estimates from the ordered logit models are broadly consistent with the logit estimates and are presented in Appendix 2.

i. General financing obstacle

In this section the determinants of the general financing obstacle are assessed, using the three rounds of BEEPS and a pooled regression. Results are presented in Table 4 (specifications 1–4). The estimates indicate that age generally does not have explanatory power for firms reporting finance as a higher obstacle. The estimated coefficient on small firms is positive and highly significant in all specifications indicating that small firms face greater financing obstacles compared to larger firms. The estimated effect of being a medium-sized firm is positive and significant in 1999 and in the model with pooled data. This provides some evidence that the medium-sized firms too face greater financing obstacles than their larger counterparts. Regarding the firm ownership, the dummy variable for SOEs is not significant in any specification (except in specification 1 at ten percent level). This does not support the assertion that SOEs may have had access to 'soft' lending, hence may report lower financing obstacles. The dummy variable for foreign-owned firms is negative and statistically significant in all specifications (except in

specification 2). This may support the previous claim that foreign firms may have lower financing constraints because they have better governance and banks are more willing to lend to this group, they may have access to finance from banks in their parent countries, or foreign direct investments from their parent companies.

Regarding other explanatory variables, sales change is estimated to have a negative and statistically significant effect in nearly all specifications. This supports the previous finding that firms with good prospects may face lower financing obstacles. Profitability has an estimated negative sign and is statistically significant at the one percent level in 2005, but in 2002 is insignificant. It is important to note here that profitable firms may report lower financing obstacles either because this implies creditworthiness which may be identified by the lenders and have lower difficulties in accessing external finance, or they may report lower obstacles because their profits suffice for the needed investments to be undertaken. As shown previously, profitable firms do not finance a higher proportion of investment through bank loans and are not more likely to apply for bank loans. However, the evidence suggests that if they turn to banks for finance, they are less likely to be denied. The variable indicating if the firm uses some accounting standards is not significant in any of the specifications. In terms of the year effect, in the regression with pooled data, the coefficients for 1999 and 2002 are statistically significant and positive. This suggests that the financing obstacles seem to have decreased over time for the firms in SEE (more so in the 1999-2002 period than in the 2002-2005 period), which is in line with the deepening of the financial markets in these countries.

Table 4. Financing obstacles of firms in SEE

| | Financing Obstacle [Logit Model] | | | | High Interest Rates Obstacle [Logit Model] | | | | High collateral requirements and access to long-term loans as an obstacle to firm operation and growth | |
|-----------------------|----------------------------------|---------------------|----------------------|----------------------|--|----------------------|----------------------|----------------------|--|--|
| | 1999 | 2002 | 2005 | Pooled | 1999 | 2002 | 2005 | Pooled | Collateral Obstacle [Logit Model] | Access to Long-Term Loans Obstacle [Logit Model] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Age | -0.161 (0.200) | 0.264 (0.251) | 0.230 (0.225) | 0.199 (0.137) | 0.147 (0.238) | 0.082 (0.235) | 0.403* (0.207) | 0.411*** (0.134) | -0.066 (0.229) | -0.051 (0.217) |
| Small | 0.651** (0.267) | 0.584** (0.272) | 0.650*** (0.256) | 0.620*** (0.162) | 0.635** (0.312) | 0.360 (0.243) | 0.637*** (0.233) | 0.485*** (0.152) | 1.191*** (0.311) | 1.115*** (0.283) |
| Medium | 0.461* (0.248) | 0.015 (0.286) | 0.296 (0.253) | 0.371** (0.162) | 0.336 (0.294) | -0.170 (0.259) | 0.262 (0.232) | 0.192 (0.154) | 0.515* (0.287) | 0.474* (0.258) |
| State | 0.427* (0.244) | -0.032 (0.249) | 0.045 (0.240) | 0.118 (0.151) | -0.356 (0.287) | -0.126 (0.237) | -0.801*** (0.247) | -0.438*** (0.152) | 0.333 (0.277) | 0.214 (0.256) |
| Foreign | -0.573* (0.341) | -0.222 (0.235) | -0.640*** (0.249) | -0.456*** (0.167) | -0.105 (0.393) | -0.198 (0.211) | -0.423** (0.203) | -0.212 (0.145) | -0.263 (0.407) | -0.144 (0.351) |
| Sales change | -0.002 (0.002) | -0.004** (0.002) | -0.004** (0.002) | -0.004*** (0.001) | 0.001 (0.001) | 0.001 (0.001) | 0.000 (0.001) | -0.001 (0.001) | -0.002 (0.002) | 0.001 (0.001) |
| Profitability1 | | -0.262 (0.253) | | | | 0.189 (0.241) | | | | |
| Profitability2 | | | -0.540*** (0.163) | | | | -0.509*** (0.153) | | | |
| Account. Standards | -0.111 (0.191) | -0.007 (0.164) | 0.144 (0.128) | -0.113 (0.103) | 0.094 (0.228) | -0.167 (0.218) | 0.106 (0.119) | -0.020 (0.098) | 0.443* (0.228) | 0.393* (0.211) |
| Year 1999 | | | | 1.708*** (0.141) | | | | 2.132*** (0.139) | | |
| Year 2002 | | | | 0.505*** (0.137) | | | | 0.373*** (0.125) | | |
| Constant | 1.238 (1.116) | -1.534* (0.627) | -2.029*** (0.592) | -2.127*** (0.404) | 0.392 (1.011) | -1.868*** (0.605) | -2.978*** (0.575) | -2.446*** (0.398) | -2.713** (1.175) | -1.177 (0.975) |
| Obs | 696 | 988 | 1713 | 2722 | 687 | 1021 | 1728 | 2729 | 601 | 619 |
| Log Likelihood | -457.17 | -521.55 | -835.77 | -1454.78 | -305.79 | -595.17 | -969.11 | -1581.58 | -357.27 | -391.82 |
| LR chi2 | 50.52*** | 72.43** | 116.11*** | 340.59*** | 130.61*** | 53.52*** | 147.93*** | 450.32*** | 65.71*** | 49.83*** |
| Pseudo R ² | 0.05 | 0.07 | 0.065 | 0.1048 | 0.176 | 0.07 | 0.071 | 0.1246 | 0.09 | 0.07 |

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively; standard errors in parentheses.

ii. High interest rates as an obstacle

Firms may have access to external finance, but this does not imply that they are not paying a risk premium associated with asymmetrical information and other credit market frictions. Using a similar approach, in this section the focus is on another dimension of the financing obstacle, namely the degree to which firms perceive the high interest rates as an obstacle to growth and operation of their businesses. Results are presented in Table 4 (specifications 5–8). As can be seen, age has an estimated positive sign and is statistically significant in two specifications.¹⁸ The coefficient on small firms is statistically significant and positive in all the specifications, except in specification 6, and the coefficient on medium-sized firms is not significant. This indicates that, apart from the general financing obstacle, belonging to the group of small firms increases the likelihood of reporting higher obstacles for operation and growth due to high interest rates. Being state-owned firm has an estimated negative and statistically significant effect on perceiving high interest rates as an obstacle, except in two specifications. An explanation may be that either SOEs receive cheaper credit, or if they are credit rationed do not perceive high interest rates as an obstacle. As shown in the previous sections, the evidence suggests that SOEs are more likely to be credit rationed. The dummy variable for foreign firms is negative and statistically significant in the 2005 sample, giving some evidence that foreign firms may have access to cheaper loans than their domestic counterparts. The other explanatory variables, sales change and accounting standards are not significant. As in the previous model, the estimated coefficient on profitability is negative and statistically significant at the one percent level in 2005, but it is insignificant in 2002. In the pooled sample, the year dummies are positive and statistically significant, suggesting that in the earlier years firms perceived high interest rates as a greater obstacle for their operation and growth compared to 2005, broadly in line with the downward trend in lending rates in the SEE.

iii. Collateral requirements and access to long-term loans as an obstacle

In this section the determinants of firms' self-reported obstacles for their operation and growth due to high collateral requirements and access to long-term loans are explored and the data is available for 1999 sample only. The estimates do not indicate a significant effect of age on firms perceiving collateral requirements and access to long-term loans as an impediment to their operation and growth (Table 4, specification 9 and 10). Small and medium-sized firms report significantly higher obstacles compared to the base group of large firms. Neither SOEs or foreign-owned firms are significantly different from private domestic firms in reporting these obstacles, although in all the specifications the state dummy is positive and foreign dummy is negative. The coefficient on sales growth is insignificant in all specifications. The estimated coefficient on accounting standards is positive and significant at the ten percent level only, suggesting that firms that use an accounting standard are more likely to perceive access to short- and long-term loans as a

¹⁸ As previously, the specification replacing age with dummy variable taking value of one if the firm is less than five years old and zero otherwise is estimated. The newly defined age variable is not significant in either specification.

major obstacle compared to firms that do not use any standards, i.e., consider themselves as better quality borrowers.

To summarize, in terms of firms' self-reported financing obstacles, size appears to matter as a determinant of various dimensions of finance as an obstacle to firms' operation and growth. Small firms are more likely to face higher financing obstacles than large firms, while the evidence for medium-sized firms is weaker. The ownership effect also is an important determinant in various dimensions of financing obstacles. The regression results provide some evidence that foreign-owned firms are likely to face lower obstacles compared to their domestic counterparts. Evidence is not found that state-owned firms are likely to face lower financing obstacles compared to private companies, indicating that a hardening of budget constraints may have been put in place in the SEE. In general, firms with better prospects and good performance seem to face less financing obstacles. The firm's age and whether the company uses accounting standards do not seem to have an impact on firms reporting lower financing obstacles, being insignificant in most of the regressions.

3.3.4 Quantifying the effects: some examples

For all models discussed above, it is possible to quantify the probabilities of financing constraints or financial obstacles for different subgroups of firms. In this section we provide example of the predicted probabilities for two of these models. First, using the model with pooled data (Table 4, specification 4), we demonstrate the effect of size, ownership and time on the likelihood of the firm reporting finance as a major obstacle. Second, using the model of discouraged borrowers (Table 3, specification 3), we show the impact of profitability and the use of accounting standards on the likelihood of the firm being a discouraged borrower. The results, presented in Table 5, show that over time, in all firm categories (by size and ownership) there is a substantial decrease in the probability of reporting finance as a major obstacle.

Table 5: *Credit rationing of firms in SEE: quantifying the effects*

| | Predicted probabilities of reporting finance as a major obstacle | | | Predicted probabilities of credit rationing: the model of 'discouraged' borrowers | | | |
|------------------|--|-------|-------|---|---|---|---|
| | 1999 | 2002 | 2005 | Profitability=1; Accounting Standards=1 | Profitability=0; Accounting Standards=1 | Profitability=1; Accounting Standards=0 | Profitability=0; Accounting Standards=0 |
| Small | 0.585 | 0.297 | 0.203 | 0.329 | 0.490 | 0.435 | 0.602 |
| Medium | 0.523 | 0.248 | 0.166 | 0.150 | 0.257 | 0.217 | 0.352 |
| Large | 0.431 | 0.185 | 0.121 | 0.080 | 0.145 | 0.120 | 0.210 |
| State | 0.460 | 0.204 | 0.134 | 0.145 | 0.249 | 0.210 | 0.343 |
| Private Domestic | 0.431 | 0.185 | 0.121 | 0.080 | 0.145 | 0.120 | 0.210 |
| Foreign | 0.324 | 0.126 | 0.080 | 0.067 | 0.124 | 0.102 | 0.182 |

Note: Continuous variables, age and sales change, are at their sample means; other dummies are zero; Profitability=1 is for profitable firms and 0 otherwise; Accounting Standards=1 is for firms that use national or international accounting standards and 0 otherwise.

The table also shows that small firms consistently have a higher probability of reporting finance as a major obstacle compared to medium-sized and large firms. Medium-sized firms, too, have a higher probability of reporting finance as a major obstacle compared to large firms. The gap between the small and larger firms is decreasing over time suggesting that the financing constraints for small firms are reducing in the SEE. It seems that there has been a shift towards lending to the small business sector in the region though, given the magnitude of the probabilities, finance remains problematic for growth and operation of a substantial proportion of firms, particularly small ones. In terms of the ownership effect, foreign-owned firms have consistently lower probability of reporting finance as a major obstacle compared to SOEs and their domestic counterparts.

Table 5 presents the predicted probabilities of firms being credit rationed by size and ownership, and considering the effect of profitability and following accounting standards. These two factors noticeably decrease the probability of credit rationing among all firm categories suggesting that banks screen their borrowers and increasingly are able to distinguish 'good' from 'bad' firms. However, as in the previous example, the probability of credit rationing decreases with the size of the firm – large firms consistently have a lower probability of being credit rationed compared to their smaller counterparts. This implies that a substantial proportion of small firms with 'good' characteristics do not participate in the credit market either because they are rejected, or do not apply for a loan.

4. CONCLUSIONS AND POLICY IMPLICATIONS

This paper assesses the significance and determinants of financing constraints, credit rationing and financing obstacles faced by firms in the SEE region by using a wide range of indicators and a large data set from the three rounds of BEEPS. These indicators include

the proportion of investment expenditure financed by internal funds and bank loans, the probability of applying for a loan and being rejected, the probability of being a discouraged borrower and the importance of finance as an obstacle to the growth of firm. The empirical results suggest that the cohort of small firms is relatively more constrained. Compared to the group of larger firms, small firms rely more on internal funds and less on bank loans to finance investment, are less likely to apply for a loan, are more likely to be refused a loan, are more likely to fall within the group of discouraged borrowers, and face greater difficulties in accessing both short-and long-term loans. Furthermore, finance, high interest rates and high collateral requirements pose a greater obstacle to the operation and growth of small firms than larger firms.

In terms of ownership, the evidence indicates that foreign-owned firms face lower financing constraints compared to their domestic counterparts and SOEs. This may be explained by their ability to access financial sources from their parent companies and banks in their home countries. The estimates suggest that they do not rely much on the domestic banking sector – presumably because of better financing conditions in their home countries. State-owned firms, on the other hand, seem to face credit constraints from the financial sector, suggesting some hardening of budget constraints in the SEE region, at least in the bank-firm relationship.

There was some support for the ‘bank screening hypothesis’. It was found that more profitable firms, those with better prospects and firms that implement some accounting standards face fewer constraints, implying that banks do engage in screening their applicants to reduce information asymmetries and are able, to some extent, to distinguish ‘good’ from ‘bad’ borrowers. However, the bank screening hypothesis is not the only explanation. To the extent that screening is limited to observable characteristics of firms that make up each risk class, the unobserved heterogeneity remains within each class and credit rationing may still continue. There is also some evidence of self-selection in the credit market since firms with poor prospects do not enter the market (i.e., the likelihood of adverse selection is less than expected). The evidence also suggests that there has been a substantial decrease in financing constraints in all firm categories. Importantly, the decrease of financing constraints is greater for small firms than for larger ones, indicating a shift in the lending technology of banks towards small business sector. This may be a natural evolution, given the dominance of this sector in the countries under investigation.

There is much room for government policies aimed at improving the position of small firms in the credit market. While loan guarantee schemes and other forms of subsidies to small firms may relax some of the financial constraints, these schemes also generate moral hazard and weaken the banks’ incentive to screen the applicants effectively (Vogel and Adams, 1997). Given the importance of collateral as a major element of financing constraint, there may be some room for the government to improve the operation of the collateral system and, as argued by DeSoto (2000), activate the large volume of ‘dead’ capital in these countries. The collateral system can be improved by strengthening the protection of property rights, improving the functioning of courts and rule of law, and

establishing pledge registers for movable assets and land registers for immovable assets, formalising land and other property titles that need to be integrated in a unified system of registration to facilitate the quick verification of property rights at low cost.

Credit rationing and financing constraints emanate from information asymmetries in the financial market. Government policies should aim to reduce the information asymmetry problem by devising regulations on financial reporting and disclosure and the use of appropriate accounting and auditing standards. Screening and monitoring by banks will be easier when firms become more transparent and the accounting information becomes more reliable and meaningful, enabling banks to adopt lending technologies based on 'hard' information. To the extent that weak transparency is an intrinsic feature of small firms, enhancing the availability of information through credit registers and other systems of notice will decrease the costs of screening loan applications.

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Appendix 1: Definition of variables

| Variable | Definition | Year in which data are available |
|--|--|----------------------------------|
| Dependent variables | | |
| Internal Funds | The proportion of the firm's investment that has been financed through internal funds over the last 12 months (0-100%) | 1999, 2002, 2005 |
| Bank Loans | The proportion of the firm's investment that has been financed through bank loans over the last 12 months (0-100%) | 1999, 2002, 2005 |
| Difficulty of accessing short-term loans | Is the response to the question: 'can you tell how easy would it be for your firm to obtain short-term working capital loan?' (with 1 indicating impossible; 2, very difficult; 3, fairly difficult; 4, fairly easy and 5, very easy) | 2002 |
| Difficulty of accessing long-term loans | Is the response to the question: 'can you tell how easy would it be for your firm to obtain long-term bank loan for new investment?' (with 1 indicating impossible; 2, very difficult; 3, fairly difficult; 4, fairly easy and 5, very easy) | 2002 |
| Discouraged borrowers | Dummy variable taking the value of 1 if the firm was denied a loan, and among non-applicants: firms that did not think the application will be approved, collateral was too high, procedures of application complicated, informal payments required, several from above; and 0 otherwise | 2005 |
| Applicants | Dummy variable taking the value of 1 if the firm has applied for a bank loan and 0 otherwise | 2005 |
| Rejected borrowers | Dummy variable taking the value of 1 if the firm was denied a loan and 0 otherwise | 2005 |
| Financing obstacle | Is the response to the question: 'can you tell how problematic is <i>Financing</i> for the operation and growth of your business?' (with 1 indicating no obstacle; 2 a minor obstacle; 3 a moderate obstacle; and 4, a major obstacle) | 1999, 2002, 2005 |
| High interest rate obstacle | Is the response to the question: 'can you tell how problematic are <i>High Interest Rates</i> for the operation and growth of your business?' (with 1 indicating no obstacle; 2 a minor obstacle; 3 a moderate obstacle; and 4, a major obstacle) | 1999, 2002, 2005 |
| Collateral obstacle | Is the response to the question: 'can you tell how problematic are <i>Collateral requirements from banks</i> for the operation and growth of your business?' (with 1 indicating no obstacle; 2 a minor obstacle; 3 a moderate obstacle; and 4, a major obstacle) | 1999 |
| Access to long-term loans obstacle | Is the response to the question: 'can you tell how problematic is <i>Lack of access to long-term bank loans</i> for the operation and growth of your business?' (with 1 indicating no obstacle; 2 a minor obstacle; 3 a moderate obstacle and 4, a major obstacle) | 1999 |
| Explanatory Variables | | |
| Age | Logarithm of age | 1999, 2002, 2005 |
| Small | Dummy variable taking the value of 1 for the firm employing 2-49 employees and 0 otherwise | 1999, 2002, 2005 |
| Medium | Dummy variable taking the value of 1 for the firm employing 50-249 employees and 0 otherwise | 1999, 2002, 2005 |
| Large | Dummy variable taking the value of 1 for the firm employing more than 250 employees and 0 otherwise | 1999, 2002, 2005 |
| State | Dummy variable taking the value of 1 for the firm in majority state ownership (>50%) and 0 otherwise | 1999, 2002, 2005 |
| Private domestic | Dummy variable taking the value of 1 for the firm in majority private domestic ownership (>50%) and 0 otherwise | 1999, 2002, 2005 |
| Foreign | Dummy variable taking the value of 1 for the firm in majority foreign ownership (>50%) and 0 otherwise | 1999, 2002, 2005 |
| Sales change | Percentage change over the last 3 years | 1999, 2002, 2005 |
| Profitability1 | Dummy variable taking the value of 1 if the firm had positive gross profit to total sales ratio in 2001 and 0 otherwise | 2002 |
| Profitability2 | Dummy variable taking the value of 1 if the firm had reinvested profits in 2004 from profits in 2003 and 0 otherwise | 2005 |
| Accounting standards | Dummy variable taking the value of 1 if the firm uses national and/or international accounting standards and 0 otherwise | 1999, 2002, 2005 |
| Sector | Dummy variables for Mining, Construction, Manufacturing, Transport, Trade, Real Estate, Hotels and Restaurants, Other | 1999, 2002, 2005 |
| Country | Dummy variables for Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia and Montenegro | 1999, 2002, 2005 |

Appendix 2: Various dimensions of financing obstacles, the ordered logit models

| | Difficulty Accessing Short-Term Loans | | | | Financing Obstacle | | | | High Interest Rate Obstacle | | | | Collateral Obstacle | | Access to Long-Term Loans Obstacle | |
|-----------------------|---------------------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|-----------------------------|----------------------|---------------------|---------------------|---------------------|------|------------------------------------|------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| Age | -0.036 (0.196) | 0.145 (0.200) | -0.187 (0.193) | 0.373** (0.190) | 0.117 (0.166) | 0.229** (0.110) | 0.041 (0.222) | 0.176 (0.199) | 0.223 (0.159) | 0.370*** (0.114) | -0.072 (0.200) | -0.107 (0.221) | | | | |
| Small | 0.94*** (0.208) | 1.297*** (0.214) | 0.810*** (0.257) | 0.384* (0.204) | 0.326** (0.159) | 0.410*** (0.123) | 0.465 (0.305) | 0.219 (0.201) | 0.376** (0.161) | 0.317*** (0.123) | 1.044*** (0.280) | 1.026*** (0.266) | | | | |
| Medium | 0.309 (0.209) | 0.461** (0.206) | 0.655*** (0.226) | -0.011 (0.204) | 0.200 (0.163) | 0.359*** (0.121) | 0.235 (0.268) | -0.018 (0.192) | 0.280* (0.199) | 0.265** (0.116) | 0.459** (0.228) | 0.491** (0.230) | | | | |
| State | 0.228 (0.212) | 0.165 (0.217) | 0.454** (0.232) | -0.311 (0.209) | -0.131 (0.183) | -0.068 (0.125) | -0.353 (0.277) | -0.392* (0.207) | -0.664*** (0.169) | -0.533*** (0.124) | 0.152 (0.243) | 0.185 (0.243) | | | | |
| Foreign | -0.488*** (0.184) | -0.546*** (0.183) | -0.626** (0.271) | -0.405** (0.174) | -0.557*** (0.151) | -0.483*** (0.117) | 0.076 (0.326) | -0.291* (0.165) | -0.577*** (0.161) | -0.306*** (0.113) | -0.128 (0.276) | -0.266 (0.322) | | | | |
| Sales change | -0.005*** (0.001) | -0.004*** (0.001) | -0.002 (0.002) | -0.003** (0.001) | -0.002* (0.001) | -0.003*** (0.000) | 0.001 (0.002) | -0.001 (0.001) | -0.001 (0.001) | -0.001* (0.000) | 0.001 (0.001) | 0.001 (0.002) | | | | |
| Profitability1 | -0.758*** (0.202) | -0.493** (0.208) | | 0.067 (0.214) | | | | 0.202 (0.193) | | | | | | | | |
| Profitability2 | | | | | | | | | | | | | | | | |
| Accounting Standards | 0.061 (0.135) | 0.076 (0.133) | -0.013 (0.177) | -0.015 (0.123) | 0.105 (0.089) | -0.078 (0.077) | 0.078 (0.228) | -0.128 (0.123) | 0.013 (0.056) | 0.008 (0.008) | 0.515*** (0.189) | 0.353* (0.202) | | | | |
| Year 1999 | | | | | | 1.508*** (0.110) | | | | 1.989*** (0.123) | | | | | | |
| Year 2002 | | | | | | 0.1778*** (0.061) | | | | 0.361*** (0.096) | | | | | | |
| Cut1 | -1.299** (0.517) | -1.147** (0.496) | -1.467** (0.609) | 0.278 (0.519) | -0.374 (0.435) | 0.320 (0.317) | -1.941** (0.904) | -0.247 (0.315) | -0.090 (0.420) | 0.346 (0.315) | 1.046* (0.693) | -0.271 (0.849) | | | | |
| Cut2 | 0.445 (0.517) | 0.463 (0.399) | -0.815 (0.606) | 1.028** (0.521) | 0.557 (0.435) | 1.148*** (0.318) | -1.411* (0.904) | 0.827 (0.513) | 0.909** (0.423) | 1.309*** (0.316) | 1.721*** (0.688) | 0.119 (0.849) | | | | |
| Cut3 | 1.761*** (0.519) | 1.871*** (0.500) | 0.403 (0.601) | 2.157*** (0.528) | 1.789*** (0.436) | 2.349*** (0.320) | -0.309 (0.901) | 2.041*** (0.315) | 2.150*** (0.425) | 2.446*** (0.318) | 2.721** (0.693) | 1.041 (0.848) | | | | |
| Cut4 | 3.742*** (0.534) | 3.549*** (0.508) | | | | | | | | | | | | | | |
| Obs | 963 | 947 | 696 | 988 | 1713 | 2722 | 613 | 1021 | 1728 | 2729 | 601 | 619 | | | | |
| Log Likelihood | -1337.76 | -1361.53 | -806.82 | -1290.45 | -2270.78 | -3533.00 | -487.75 | -1368.5 | -2294.57 | -3442.07 | -753.35 | -637.47 | | | | |
| LR chi2 | 220.39*** | 163.92*** | 68.13*** | 95.73*** | 156.64*** | 384.05*** | 134.16*** | 61.7*** | 167.25*** | 445.93*** | 92.75*** | 58.93*** | | | | |
| Pseudo R ² | 0.08 | 0.06 | 0.04 | 0.04 | 0.04 | 0.05 | 0.1209 | 0.04 | 0.04 | 0.07 | 0.06 | 0.05 | | | | |

Notes: ***, **, * denote significance at 1%, 5% and 10%, respectively. Robust standard errors in parentheses.

