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Product Market Competition, Capital Constraints and Firm Growth

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Abstract

We examine the impact of product market competition on quantity-of-capital constraints in 58 countries. Prior work shows that competition increases the costs of debt and equity, which reduce the economic profit from investment. Capital constraints, however, may prevent firms from exploiting all positive NPV projects. Using econometric techniques and unique survey data, we avoid potential endogeneity problems common to the study of both capital constraints and product market competition. We show that product market competition increases capital constraints. Auxiliary analyses suggest that asymmetric information is one mechanism driving this linkage. We also show that quantity-of-capital constraints negatively impact firm growth.

1. Introduction

At the very center of Schumpeter's (1934, 1942) notion of creative destruction is firms' access to bank capital, which helps to fund the innovation in competitive markets that drives out less productive firms in favor of those with more profitable ideas. While product market competition may be the fundamental driver of the innovation envisioned by Schumpeter, it may also impede access to the very source of capital that is supposed to drive that innovation. More intense product market competition can cause an increase in the cost of debt or induce credit rationing. While current evidence indicates that product market competition increases the cost of debt (Valta, 2012), there is no research on whether banks restrict the supply of capital to firms which face greater competition.[1] This is somewhat surprising because the imposition of capital constraints has a more deleterious effect on firm innovation than an increase in the cost of debt.[2]

An increase in the cost of debt may halt investment, but only at the margin (in those projects which now have a negative net present value). While higher cost of debt makes fewer projects profitable, it does not force firms to abandon projects whose net present value remains positive, albeit at a lower level, after the increase in the cost of debt. Hence, it will not altogether prevent innovation. Moreover, if this increase in the cost of debt does not merely reflect an increase in idiosyncratic risk (due to a higher probability of default), but reflects an increase in systematic risk and, therefore, expected return, new investors will benefit from higher future expected returns, albeit in exchange for exposure to greater risk.

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[1] The effect of product market competition on the quantity of capital supplied cannot be inferred from its effect on the cost of bank loans or equity (Hou and Robinson, 2006; Valta, 2012) as high cost of capital does not necessarily translate to a lower supply of capital (Stiglitz and Weiss, 1981). Further, theoretical work finds that banks' decision regarding charging higher loan rates versus rationing credit depends on the structure of the banking sector and monopolistic banking systems may charge high loan rates without rationing credit (Guzman, 2000). Moreover, alleviating credit rationing (with loan commitments and pledging of collateral) has different implications for firm operations relative to alleviating the obstacle of higher cost of available funds (with interest rate hedging and pass-through to customers).

[2] We use the term "capital constraints" to mean the situation where firms are unable to obtain external capital to fund profitable projects.

Capital constraints potentially have a more deleterious effect. Greenwald, Stiglitz, and Weiss (1984) note that firms' investment behavior is not particularly sensitive to the interest rates they pay and it is credit constraints, not the cost of credit, that hinder investment. Accordingly, capital constraints prevent firms from implementing all projects that have a positive net present value (Harford and Uysal, 2014). This prevents firm growth and denies growth opportunities, therefore harming both new and existing investors alike. Therefore, capital constraints are arguably much more important, as it is access to capital that fosters innovation (Schumpeter, 1934), spurring the growth of the firm's future payouts to shareholders, particularly for small and medium-sized enterprises, which are typically more dependent on external financing than large firms.[3]

The aim of this paper is to examine the effect of product market competition on capital constraints. Such a link is justified at least in part based on several theories that predict that increased competition reduces firm disclosure (Verrecchia, 1983; Dye, 1986; Wagenhofer, 1990) because firms are reluctant to disclose commercially valuable information when it may be exploited by rivals. Reduced disclosure implies greater information asymmetry between firms and suppliers of capital. Credit policy theory predicts that when banks face residual asymmetric information granting credit even at relatively high interest rates is not optimal and so banks may ration credit (Stiglitz and Weiss, 1981).[4]

The challenge when considering capital constraints is that it is very difficult to tell from firm-level measures, such as firm size, loan sizes and investment-cash-flow sensitivity, whether a firm is constrained or whether it is unconstrained, but has merely exhausted all its investment

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[3] Almeida, Hsu and Li (2013) argue that financial constraints benefit innovation by improving the efficiency of investment. However, the effect they find is strongest for firms with high cash and low investment opportunities and in non-competitive industries. Here we focus on the impact of product market competition on capital constraints.

[4] Competition can also increase capital constraints by lowering the liquidation value of firms' assets, thus increasing creditors' loss given default. This is because product market competition lowers economic profits and reduces the attractiveness of a particular industry to new entrants that may demand these assets. Consistent with this, Gan (2007) finds that a reduction in collateral values causes reductions in bank loans.

opportunities.[5] We circumvent this problem using survey data from the World Bank's World Business Environment Survey (WBES), which directly asks managers and owners in a cross section of companies in 58 countries to rank, from "No Obstacle" to "Major Obstacle" to firm growth, the severity of financial constraints the firm faces. In this way we obviate the endogeneity problems that can result from inferring capital constraints from accounting data. Similarly, we overcome potential shortcomings with assigning industry-level competitiveness to individual firms (see Ali, Klasa, and Yeung, 2009, for a discussion) by constructing a competition index for each firm from the survey responses about the effects of eight forms of competition.

Using an ordered probit model and a measure that captures firms' general capital constraints, we find that capital constraints increase significantly with the intensity of product market competition. The evidence indicates that a one standard-deviation increase in our product market competition index leads to a 5.9% increase in the probability that capital constraints are a "Major Obstacle" (4 on a four-point scale). The results are qualitatively similar if we replace the measure of general capital constraints with measures that capture the capital constraints arising from corruption in the bank lending process, bank illiquidity, and borrowers' need to meet banks' request for paperwork, collateral, and special connections to banks.[6] Other types of financing are impacted by product market competition as well, including lease financing, special export financing, foreign bank loans, and non-bank equity. Product market competition generally has greater explanatory power for firms' capital constraints, whether general or specific, than other determinants. These findings are robust to controls for the level of competition in the banking industry, which can influence the structure of non-finance industries (Cetorelli and Strahan, 2006; Bertrand et al., 2007), even for

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[5] See Chen and Chen (2012) and Farre-Mensa and Ljungquist (2013) for a discussion of the challenges.
[6] Loan contracts are influenced by, inter alia, collateral (Benmelech and Bergman, 2009), special connections to banks (Laeven, 2001; Charumilind et al., 2006), possession of financial records (Berger et al., 2005), corruption in the lending process (Beck et al., 2006; Barth et al., 2009), and banks' illiquidity (Khwaja and Mian, 2008; Paravisini, 2008).

specific causes of capital constraints, such as the need for special connections and corruption in bank lending, where it may be expected that bank competition would have a dominant effect.[7]

We examine whether information asymmetry is one mechanism that links product market competition to capital constraints. To do this we look at the incremental impact of competition conditional on proxies for the extent to which firms' information environment is characterized by information asymmetry. These proxies include dummy variables for small firms, for firms that use international accounting standards, and for sole proprietorships. The results are consistent with competition affecting capital constraints through its impact on asymmetric information.

Although we would like to interpret the links between product market competition and capital constraints as causal, it is possible that they are endogenous. For instance, capital constraints and the level of competition, or at least managers' perceptions of them, may be jointly determined. In addition, capital constrained firms may signal their financial condition to rivals who then ramp up competition in order to capture market share, which could lead to reverse causality.[8]

We address potential endogeneity in three ways. First, we use various alternate measures of competition, some of which are unlikely to co-evolve with managerial perceptions of capital constraints or to be susceptible to reverse causality. Further, we avoid the concern that competitors could ramp up competition in response to other firms' capital constraints by using alternate measures of competition, some of which are unlikely to be related to attempts to capture market share. Second, our models control for several variables (e.g., foreign ownership, banking sector

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[7] For instance, banking sector structure is a major determinant of the usefulness of collateral (Besanko and Thakor, 1987) and bank competition can reduce corruption in lending (Ades and Di Tella, 1999; Barth et al., 2009). Further, hierarchical distances within banks can induce credit constraints when loan decisions depend on soft information, such as in the absence of hard information contained in proper financial records (Liberti and Mian, 2009). In perfectly competitive bank markets hierarchical distances should be short as bank size is small. As such, banking sector structure is expected to be a dominant determinant of the credit constraints associated with these sources of credit constraints.

[8] Firms could signal their weak financial condition by becoming less capable of providing customers with favorable trade credit terms. Trade credit is a part of the firm's selling expense and without it sales tend to decline (Nadiri, 1969). Haushalter, Klasa, and Maxwell (2007) find evidence of predatory behavior by rivals when firms are unable to exploit their growth opportunities.

structure) that are likely to affect both firms' capital constraints and competition. As such, their inclusion should help to mitigate any simultaneity bias. Third, we use an instrumental variable approach. We instrument product market competition with the effect of customs/foreign trade regulations on firms' operations under the assumption that differences in impact of the regulations are unrelated to the level of capital constraints. This is broadly similar to the approach of Fresard (2010) and Valta (2012). Customs/foreign trade regulations determine the entry of foreign products into a local market, thus influencing its competitive landscape. We posit that these regulations have a significant effect on the competition that firms experience, but have no direct effect on capital constraints, and should be correlated with capital constraints only through their effect on product market competition. Our results remain qualitatively unchanged. Hence, our results are consistent with the view that product market competition causes capital constraints.

We argue that it is important to understand whether product market competition impacts capital constraints because capital constraints can impact firm growth. Consistent with prior research we find that firms which face greater constraints have lower growth, incremental to the direct impact of competition on growth. This is consistent with prior research which finds that credit constraints lead to a significant decline in firm growth (Beck et al., 2005), investments (Campello et al., 2010), and trade (Manova, 2008).

Our paper contributes to the literature on impediments to financing by extending in several ways the evidence of an important product market-financial market linkage. Previous work provides evidence of this linkage through a *cost-of-capital* channel (Hou and Robinson, 2006; Valta, 2012): greater competition leads to a higher cost of debt and equity capital. As far as we are aware, our paper is the first to provide empirical evidence on the more important link between product market competition and access to capital – a link that indicates that product market competition is an even

greater impediment to raising capital than bank competition.[9] Our paper further shows that this linkage also arises from a variety of (non-price) credit market conditions and in a variety of financial markets. In addition, while prior work provides U.S.-based evidence, our multi-country study allows us to condition on bank market structure, which can affect both product market competition and access to bank credit, thereby allowing us to control for another potential endogeneity concern. Given the substantive effect of product market competition on capital constraints and the evidence that capital constraints significantly reduce firm growth, our results reinforce the importance of product market competition for firms' operations (Irvine and Pontiff, 2009, and others).

Finally, our work has policy implications for both firms and regulators. Recent work finds that acquisitions ease financial constraints (Erel et al., 2015; Williamson and Yang, 2013). Our work suggests an additional channel through which financial constraints can be relaxed: firms can improve their access to capital by improving their competitive position in their industry. For regulators, an implication of our findings is that when financial sector reforms are contemplated with the aim of deepening financial markets in order to improve access to capital (e.g., creating a more competitive banking system), the existing competitiveness of the product market should be taken into consideration. Relatedly, the implementation of a product-market competition policy should consider that such action could have negative externalities for access to capital.[10]

The next section describes the data and methodology. In Section 3 we examine the impact of product market competition on capital constraints. Section 4 examines the impact of capital constraints on firm growth. The summary and conclusions are reported in Section 5.

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[9] A large literature examines the effect of banking sector structure on firms' access to capital (Petersen and Rajan, 1995; Beck et al., 2004; Cetorelli and Strahan 2006; Zarutskie, 2006; Carbó-Valverde et al., 2009; Rice and Strahan, 2010).
[10] In the 1990s several Central and East European countries established competition policies designed, in part, to make their product markets more competitive (Fingleton et al., 1996; Dutz and Vagliasindi, 2000).

2. Data and methodology

2.1. Survey description and discussion on the use of survey-based data

The World Bank conducts periodic surveys among nonfinancial firms from around the world. The surveys attempt to obtain a response from at least 100 firms from each country, with a greater emphasis on small and medium-sized firms. An advantage of this is that the database captures information on truly small firms relative to typical databases of public firms (see, e.g., Beck et al., 2008). We use the survey that was conducted in late 1999 to early 2000 because more recent surveys have changed the questions and eliminated some that are important to our analysis. In particular, the newer surveys no longer report details on the forms of competition and the specific conditions, such as collateral and corruption of bank officials, which lead to capital constraints. We do not believe that our inferences would change materially if a more recent survey with the same questions was conducted because financial systems within countries and their differences across countries are persistent over time, even if there have been significant institutional changes (Djankov, McLiesh, and Shleifer, 2007; Monnet and Quintin, 2007). An advantage of using a single survey is that it allows us to hold the within-country bank regulatory environment constant when focusing on product market competition.

The data are from the World Business Environment Survey (WBES) available at http://go.worldbank.org/RV060VBJU0. Data from this and more recent surveys are used by Beck et al. (2004, 2005, 2008), Barth et al. (2009), Bergbrant et al. (2014), and others. After accounting for the fact that not all firms responded to all questions of interest to our paper and excluding firms because of the unavailability of country-level data our final sample has a maximum of 3,518 firms from 58 countries. Samples of this size are common for papers that use the WBES data.

These survey data convey some particular advantages over standard measures of capital constraints. First, by measuring the capital constraints as perceived by the manager of the firm, we

avoid the use of common proxies for capital constraints, such as firm size, whether the firm has a bank loan, and the KZ index of Kaplan and Zingales (1997). This is particularly important given recent questions about their validity (Chen and Chen, 2012, Farre-Mensa and Ljungqvist, 2013). Second, with some standard measures the researcher faces the problem of disentangling a reduction in the demand for capital from a reduction in the supply of capital. For instance, using traditional data, observing that a firm does not receive a bank loan in a particular period does not necessarily imply that the firm experienced a supply constraint; it may be that management believed there was no need to raise capital. The main advantage of our data, and its uniqueness, is that the survey directly asks managers whether access to capital is an impediment for the operation and growth of their business. In this way we get a measure of excess demand and whether or not credit constraints are binding, in a way that is not possible with traditional measures of credit constraints.

Likewise, we use a measure of product market competition that reflects managers' perception of the competition that they face from both public and private domestic firms and from foreign firms in export markets. This is distinct from the common practice of assigning industry-level competitiveness to individual firms, which, as discussed in Bergbrant et al. (2014), can lead to incorrect conclusions. The problems with industry competitiveness are further compounded if the measure is based only on public firms, as reported in databases like Compustat (Ali et al., 2009). In addition, these survey data convey yet another advantage that addresses endogeneity concerns. The data provide alternate measures of individual forms of competition. It would be difficult to imagine some of these forms of competition co-evolving with managerial perceptions of capital constraints.

Survey data also have some disadvantages relative to other data (see, e.g., Beck et al., 2005). For instance, self-reporting by respondents might be biased. In our specific case, respondents might unfairly blame government policy as the cause of their credit constraints and, consequently, underperformance, without placing sufficient weight on the firm's own lack of credit worthiness.

The effect of any such biases is more important when the primary objective is to analyze firm performance, but this is not the main purpose of this study. Another potential disadvantage of survey data is that some firm-level variables used to capture certain firm characteristics may not be directly comparable to the usual variables obtained from various other databases used in previous work. Like Beck et al. (2008), and others, we have no reason to believe that these differences create any biases in favor of the results presented in this paper.

2.2. Variable description

In this subsection we describe the three variables from the survey that are the most important to our tests: a measure of general capital constraints, an intensity of competition index, and a measure of firms' perception of how problematic customs/foreign trade regulations are. We use the latter measure as an instrument for competition. We describe the remainder of the data in Appendix Table A.2.

We use a measure of the general capital constraints that a firm experiences based on the manager's response to the instruction: *Please judge on a four-point scale how problematic [financing is] for the operation and growth of your business.* The responses are: 1 (No Obstacle), 2 (Minor Obstacle), 3 (Moderate Obstacle), and 4 (Major Obstacle). Similarly, using the responses to the above request, we obtain measures of the level of the credit constraints related to specific credit market mechanisms or conditions that impede access to credit.

The measure of firm-specific competition is based on the response to the instruction: *Please judge on a four-point scale how problematic [...] the following [eight] practices of your competitors [are] for your firm.* As noted, there are eight forms of competition that firms could indicate that they consider to be a problem. While it is interesting to examine the effect of each form, we also need to gauge the overall intensity of competition that each firm faces. We, therefore, compute a firm-specific competition

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index for each firm by rescaling the four-point (1-4) scale by subtracting one from each value, such that "no obstacle" has a value of zero and "major obstacle" has a value of three (0-3). Using only those firms that reported how problematic all eight forms of competition are for their business, we sum the scaled response to each form of competition. This procedure results in a minimum score of zero and a maximum score of 24 (8×3) for each firm. We then divide the index by 24 to get a range from 0 to 1. This is our main measure of competition (*Competition index (Main)*). The construction of this index implicitly assumes that each form of competition has an equal effect as every other form on a firm's operations, so differences between two scores mean the same across the individual measures of competition. In addition, it limits the number of firms that can be included in the index to those that reported how each of the types of competition affects them.

In order to ensure that our results are not driven by the specific construction of the index, we also conduct our tests using two additional competition indices, as well as using the eight individual forms of competition directly. The second index (*Competition index (All)*) follows the above procedure with the exception that we include firms that did not respond to all eight forms of competition by assigning a score of zero to a particular form of competition to which the firm did not respond. By assigning a score of zero to a nonresponse we overstate the number of "no obstacle" responses. Our third index (*Competition index (Binary)*) simply assigns a firm's response a value of 1 if the firm reported that a particular form of competition was a "mild," "moderate," or "major obstacle" (response 2, 3, or 4) and 0 for each competition obstacle to which the firm responded "no obstacle" (response 1) or did not respond. We then take the firm-specific index value as the sum of the scores. The minimum and maximum index values for a firm are 0 and 8, respectively. A disadvantage of this index is that transforming ordinal variables into binary variables results in a loss of information and assumes that a score of, say, 2 on the four-point scale has the same effect as a score of 4.

It is important to point out that aggregating different forms of competition into indices likely biases against our finding that the intensity of competition has a significant effect on credit constraints and, consequently, makes our test a conservative one. However, in order to allay the concern that the use of these indices potentially distorts the effect of competition on capital constraints we also examine the effect of individual forms of competition on capital constraints.

We believe that the relation between some of our measures of competition and capital constraints is relatively immune to endogeneity concerns. In particular, several of the eight forms of competition that make up the index, including tax avoidance, duty and trade regulation avoidance, labor tax/regulation avoidance, and violation of copyrights and patents, are unlikely to co-evolve with firms' credit constraints or suffer from concerns of reverse causality. Nonetheless, to address potential endogeneity concerns, we instrument product market competition with firms' response to the instruction to judge on a four-point scale how problematic customs/foreign trade regulations are for their operations and growth (*Customs regulations*). The logic follows Valta (2012) and others who use changes in customs regulations to instrument increases in product market competition.

We report summary statistics of the main variables averaged at the firm level in Table 1. Because averages are not as meaningful with ordinal data as with cardinal data, we report frequencies of each category for the general capital constraints variable. Interestingly, over a third of the sample firms report that capital constraints are a major obstacle. The evidence also indicates that the average intensity of competition is 0.43 out of a maximum of one. The relatively large standard deviations indicate that there is significant cross-firm variation in these variables. In Panel B, the unconditional correlations suggest that general capital constraints increase with product market competition. These correlations also serve to validate our measures of capital constraints because the correlations show that the level of capital constraints is inversely associated with size and development (per capita GDP). In Appendix Table A.1 we report summary statistics averaged at the country level for each

of the 58 countries in our sample. There is substantial cross-country variation in the variables. The

evidence suggests that firms in developing economies generally experience greater external financing

obstacles than firms in industrialized countries, consistent with the correlations.

2.3. Methodology

To examine the effect of product market competition (*Competition index*) on capital

constraints we use an ordered probit model with different proxies for capital constraints of firm i in

country j. The basic specification of our model is as follows:

$$capital\ constraints_{ij} = \beta_1 Competition\ index_{ij} + \beta_2 mfg\ firm\ dummy_{ij} +$$
$$\beta_3 svce\ firm\ dummy_{ij} + \beta_4 govt\ own\ dummy_{ij} + \beta_5 small\ \&\ med.firm\ dummy_{ij} + \qquad (1)$$
$$\beta_6 high\ interest\ rates_{ij} + \beta_7 foreign\ own\ dummy_{ij} +$$
$$\beta_8 foreign\ operations\ dummy_{ij} + \beta_9 foreign\ trade\ dummy_{ij} + \beta_{10} inflation_j +$$
$$\beta_{11} GDP\ growth\ rate_j + \beta_{12} GDP\ per\ capita_j + \varepsilon_{ij}.$$

The independent variables are described in Appendix Table A.2 and are similar to those used in the

literature to examine access to capital (Beck et al., 2004). We use an ordered probit model because

our dependent variables (measures of capital constraints) are ordinal data measured on the

previously mentioned four-point scale.[11] The ordered probit model is designed to account for the

possibility that, given a change in, say, the level of product market competition, the difference

between any two adjacent categories of the dependent variable, (1) "no obstacle" and (2) "minor

obstacle", is different from the difference between another two adjacent categories, (3) "moderate

obstacle" and (4) "major obstacle." Because our dependent variable is a four-point ordered variable,

we estimate all ordered probit models with three "cut points" or "thresholds." The cut points

determine the probability that the dependent variable takes the ordinal values 1 to 4. For instance,

pr(capital constraints=1 (no obstacle)) = *pr(Xβ+e* < cut point 1) and *pr(capital constraints* =2 (minor

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[11] With ordinal data OLS models would lead to heteroskedasticity and, possibly, estimates of probabilities outside of the unit interval. Likewise, binary models such as logit and probit, would be an inefficient use of the information in the data as they would require either data aggregation or data thinning to create the binary choices.

obstacle)) = pr(cut point 1 < $X\beta+e$ < cut point 2), where $X\beta+e$ is the estimated model without an intercept and the probabilities are the normal distribution function. The ordered probit model jointly estimates the coefficient vector β and the cut points that maximize the likelihood of observing the actual levels of capital constraints in the data.

Given the likelihood that country-level policies affect all firms within a country, the capital constraints of individual firms within the country are likely to be correlated. Since country-level policies cannot all be controlled for parametrically in our models, the residuals would be correlated. If this is not accounted for in the estimation of the standard errors, then the significance of the coefficient estimates is overstated. Thus, we use Rogers cluster-adjusted standard errors, with clustering at the country level.

3. Product market competition and capital constraints – empirical findings

3.1. Intensity of product market competition and general capital constraints

3.1.1. General Measure of Capital Constraints

In Table 2 we report the results of Equation (1) for our survey measure of general capital constraints regressed on the intensity of product market competition plus controls using an ordered probit model. In Panel A we report three different specifications. The first uses our primary competition index, *Competition Index (Main)*. The other specifications use the two alternative indices, *Competition Index (All)* and *Competition Index (Binary)*, by substituting them into the specification reported in Equation (1). Those results are reported in Models 2 and 3 of Table 2, Panel A.

We see from Models 1 to 3 that the coefficient estimate on our competition index is positive and highly significant. This implies that general capital constraints increase significantly with the intensity of product market competition, and our results appear not to be dependent on the way the competition index is constructed.

We include a number of controls which have been shown to influence access to capital. We would like to be certain that we are picking up the impact of product market competition on capital constraints and not the impact of product market competition on the cost of debt, which has already been documented in Valta (2012). Since, in general, the cost of debt and capital constraints are almost certainly related, we include in all our models the survey response to the question of how problematic high interest rates are for the operations and growth of the company (*High interest rates*). This control has one other benefit. If one is concerned that survey respondents have conflated the concept of credit constraints and high interest rates, even though the question about high interest rates is distinct, including the high interest rate measure helps alleviate this concern. To further address the concern that respondents may have confused high interest rates with capital constraints, in unreported tests we restrict the sample to only those firms where managers reported that high interest rates were either no or a minor problem. The results are qualitatively the same and numerically similar (a coefficient estimate of 0.562 on the Main Competition index instead of the 0.599 reported in Table 2).

The results from the control variables are quite sensible. We find that service (*Services dummy*) and manufacturing (*Manufacturing dummy*) firms are less capital constrained than other firms (in agriculture, mining, etc.). In an unregulated industry (i.e., government does not enforce a competitive policy), the 1942 Schumpeterian view is that creative (innovative) firms become bigger and earn extra profits. The manufacturing industry is likely to be the locus of this creative process. The negative coefficient estimate on the manufacturing industry dummy in Table 2 is consistent with this view. When a firm faces high interest rates, unsurprisingly, the manager responds that the firm is capital constrained (*High interest rates*). The evidence also indicates that foreign-owned firms (*Foreign ownership dummy*) are significantly less capital constrained. This is consistent with Desai et al. (2008) who find that local subsidiaries of multinationals in emerging economies outperform local

firms because they benefit from financial liquidity provided by foreign parent firms. Capital constraints are less binding in better developed countries with higher per capita income (*GDP per capita*), perhaps because credit rationing declines with capital accumulation (Nabi and Suliman, 2011). We also find that small and medium-sized firms (*SME*) are significantly more capital constrained than large firms, consistent with Beck et al. (2004, 2008). Somewhat surprisingly, government-owned firms do not have easier access to capital.

One might reasonably be concerned that what we are really capturing is managers' overly optimistic view of their companies' potential, which leads them to request funding for projects that are perceived by suppliers of capital as negative net present value projects. Rationally suppliers of capital turn down such requests. The managers then perceive these rejections as capital constraints. For robustness, in unreported tests, we sort firms on managers' forecasts of future three-year sales growth and re-estimate Equation (1), under the assumption that more optimistic managers are more likely to forecast high growth. We find that product market competition impacts capital constraints for firms within both the high and low growth forecast groups.

To judge the overall model fit, we report the *p*-value of the null hypothesis that the coefficient estimates are jointly zero (*p*-value of the fit). This hypothesis is strongly rejected in all the models. We find that at least one of the (unreported) individual cut points is significantly different from zero. It is also important to note that the cut points are different from each other. For instance, in Model (1) these are -1.249, -0.565, and 0.188. This is consistent with the ordered nature of the dependent variable and supports the use of the four-category ordered probit model.

In Panel B we report the average marginal effects of our independent variables on capital constraints for Model 1 in Panel A so we can better understand the economic impact of competition on capital constraints. To estimate the economic effect of an independent variable on capital constraints we evaluate the change in the probability that general capital constraints equal 1 – "No

Obstacle", 2 – "Minor Obstacle", 3 – "Moderate Obstacle" and 4 – "Major Obstacle" given a marginal change in the independent variable, holding all other variables at their actual value for each sample firm. The marginal effect for a dummy variable is the difference in the probability of observing a specific value of capital constraints (1, 2, 3, or 4) when the dummy equals 1 vs. 0. For a continuous variable it is the rate of change in the probability of observing a specific value of capital constraints given a small change in the independent variable of interest. Table 2, Panel B indicates that an increase in product market competition *increases* the probability that capital constraints are a "Major Obstacle", while *decreasing* the chance that it is "No Obstacle". A small increase in product market competition leads to an *increase* in the likelihood that capital constraints are a "Major Obstacle" at a rate of 18.9% per unit change in product market competition. At the same time, the likelihood that it is considered "No Obstacle" is *decreasing* at a rate of 14.7% per unit of increase in competition. Because product market competition is our primary variable of interest, we also evaluate the effect of a one standard-deviation change in competition on capital constraints. The results indicate that a one standard-deviation increase in competition leads to a 5.9% increase in the likelihood of firms considering capital constraints a "Major Obstacle", while it decreases the likelihood of firms considering capital constraints "No Obstacle" by 4.2%.[12,13]

3.1.2. Robustness to the specific type of competition

   Although theory does not provide specific guidance as to the nature of the competition that might affect capital constraints, our data allow us to provide some suggestive evidence on the

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[12] We estimate alternate specifications of Model 1 which allows for global exposure through different combinations of exports, foreign operations, and foreign ownership. Global exposure increases exchange rate risk, the leading theoretical determinant of which is product market competition (Shapiro, 1975). The implication of this is that it is possible that accounting for global exposure reduces the effect of a direct measure of competition as firms with foreign operations could access foreign capital when the local economy is capital constrained (Reeb et al., 2001). The untabulated results are qualitatively similar to the above. These results suggest that product market competition has a direct influence on capital constraints separate from any effect that these channels of global exposure represent.

[13] Because we are more concerned about the direction of the impact of these measures than the exact probabilities they predict, we do not report the marginal probabilities for most of the remaining tables in the paper (except in Table 8) in order to conserve space. All marginal effects are available on request.

association between specific forms of competition and capital constraints. These forms of competition are related to: *a.* rivals avoiding sales tax or other taxes (*Tax avoidance*); *b.* rivals not paying duties or observing trade regulations (*Duty/trade reg. avoidance*); *c.* foreign producers selling below international prices (*Foreign dumping*); *d.* domestic producers unfairly selling below the respondent firm's prices (*Domestic dumping*); *e.* rivals avoiding labor taxes/regulations (e.g., social security) (*Labor tax/reg. avoidance*); *f.* rivals violating the respondent firm's copyrights, patents, or trademarks (*Violate copyright/patent*); *g.* rivals receiving subsidies from national/local government (*Government subsidy*); and *h.* rivals having favored access to credit, infrastructure services, or customers (*Favored access*). These are the same eight measures that comprise our competition measures, Competition index (*Main*), (*All*) and (*Binary*). The intensity of each form of competition (*Competition Components* in Table 3) is scored on the previously described four-point scale.

It is possible that the forms of competition have different effects on firms' access to capital because banks' perception of firms' vulnerability to competition or of firms' willingness to disclose information differs depending on the form of competition to which firms are exposed. An advantage of our firm-specific competition index relative to industry concentration, the Lerner index or other aggregate proxies, is that we can decompose it to provide evidence as to whether the form of competition is of lessor importance to creditors.[14]

We begin in Table 3, Panel A, by calculating the rank correlation among each of these eight forms of competition. If the correlations are high, it is unlikely that looking at the different forms of competition would provide much value beyond the results using the index. Interestingly, the correlations between several pairs are relatively low, suggesting that these different measures reflect different aspects of competition.

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[14] In Table 3 we report results only for the general capital-constraints variable as dependent variable. In unreported results we also use several measures of capital constraints (see Tables 4 and 5) and obtain qualitatively similar results.

In Table 3, Panel B, we replace the competition index in Equation (1) with the eight individual forms of competition (*Competition Components*) one at a time. Given that some of these forms are correlated, the results could overstate their effect.

These tests in Table 3 convey two important advantages. First, repeating our central test (from Equation 1 in Table 2) with these alternate forms of competition allows us to alleviate any concern that our findings are driven by the way we construct our competition indices. The evidence in Table 3, Panel B, indicates that our central findings hold, regardless of the form of competition that we use as our measure of the intensity of competition.

Second, this test conveys one other important benefit: it helps to address a potential endogeneity problem. One may reasonably be concerned that several of the measures of competition, most notably domestic dumping and foreign dumping, might actually be a response to capital constraints. This would be the case if competitors are trying to drive a capital-constrained company out of the industry by forcing prices temporarily lower. Since our competition indices are made up of those competition measures, the relation between the indices and capital constraints could be endogenous. On the other hand, it is difficult to tell a story in which competitors increase tax avoidance, labor tax and regulation avoidance, perhaps even copyright and patent violations in response to a competing firm's capital constraints. Because our results hold for each of these measures, our central findings in Table 2 are not likely to be driven by endogeneity. Nonetheless, we will address the endogeneity concern in the more usual way (econometrically) below.

3.2. Product market competition and specific capital-constraining loan preconditions

Specific policies, actions, and economic circumstances of creditors can contribute to firms' capital constraints. We examine the association between product market competition and the level of the capital constraints firms experience when access to capital is contingent on pledging collateral

(*Collateral requirements*), satisfying banks' bureaucratic need for records by having to present detailed documentation of their operations (*Bank paperwork*), having special connections with banks, for example, through political connections or board representation (*Special Connections*), and paying bribes to corrupt bank officials (*Corruption*). The survey data also allow us to examine the extent to which banks' lack of capital to lend (*Banks lack money*) imposes a constraint on firms' operations and growth. There is likely to be significant cross-sectional variation in the level of capital constraints associated with these preconditions because different firms have different capacities to meet them. For instance, small firms may find it more difficult, relative to large firms, to meet collateral or documentation requirements, to have important connections in the financial sector, or to have cash (or kind) to be able to afford upfront payment of bribes. Moreover, even in the absence of the above, some firms may be unable to obtain the quantity of credit that they desire because banks' own financial condition, such as internal illiquidity, forces banks to allocate capital in a manner that benefits some firms over others.[15]

To examine the above, we use the survey responses to the request: *Please judge on a four-point scale how problematic […] these different financing issues [are] for the operation and growth of your business.* The responses provide data for financing issues related to collateral, paperwork, the need for special connections with banks, corrupt bank officials, and banks lacking money to lend (as discussed above). These are scored on the same four-point scale as the general capital constraints variable and the responses reflect the extent to which each of these financing issues is an obstacle to firm operations and growth. Hence, we are *not* examining whether product market competition increases, say, the probability that banks lack money to lend or the probability that banks impose collateral requirements. Instead, we examine whether product market competition increases the credit

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[15] Firms borrow more after banks experience an exogenous (positive) liquidity shock, suggesting that banks' supply constraints increase firms' credit constraints (Paravisini, 2008).

constraints that firms experience when banks lack money to lend or when firms are required to pledge collateral in order to obtain credit.

The results are reported in Table 4. In Model 1 the evidence indicates that the credit constraints arising from the need to pledge collateral increase significantly with product market competition. This is likely because competition erodes the value of pledgeable collateral, which is important to securing bank loans (Benmelech and Bergman, 2009).

The results are similar for the credit constraints due to the need to provide paperwork. This is consistent with the view that product market competition reduces voluntary disclosure, which increases asymmetric information between banks and borrowers (Wagenhofer, 1990). If banks require documentation as a precondition for providing loans, then this poses greater difficulty for firms faced with more intense product market competition because they are more reluctant to voluntarily disclose information (such as current revenues, future orders, and planned expansion) which could facilitate the banks' decision making.

We also find that the credit constraints related to the need to have special connections to banks increase significantly with product market competition. Given evidence that special connections to banks increase access to credit (Charumilind et al., 2006), our result suggests that in more competitive product markets the average firm is less capable of initiating and/or maintaining special connections with banks. If a higher level of competition is due to, say, an influx of new firms, then banks now have a broader potential client base with which to forge new relationships. As such, the average firm may find it more difficult to access bank credit by special connections.[16]

The evidence also indicates that the credit constraints associated with having to deal with corrupt bank officials increase significantly as firms face greater levels of product market

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[16] It should be borne in mind that the competitiveness of the banking sector will influence the extent to which banks will enter new relationships with and fund new entrants to an industry as doing so could reduce the rents they are able to extract from older firms with which they have built relationships (see discussion in, e.g., Cetorelli and Strahan, 2006).

competition. This may be because firms whose cash flows have been diminished by competition are less able to fund bribes and, as such, will have limited access to formal credit. Stated differently, less competitive product market environments generate more firm rents, which they can share with corrupt bank officials in order to obtain formal credit.

We also examine whether the level of firms' credit constraints associated with bank illiquidity increase with product market competition. The evidence indicates that the credit constraints firms experience when banks lack money to lend increases significantly with product market competition. This is not surprising and is consistent with the idea that when banks have limited lending capacity they are more likely to cherry pick the firms they lend to, which should favor those firms that face less competition as they are better able to generate cash flows to repay their debt.

The marginal effects are large. A small increase in product market competition increases the probability that credit constraints are a major obstacle at a rate of between 11.3% (*special connections*) and 17.6% (*bank paperwork*) per unit change in product market competition. Together with large z-statistics, the evidence suggests that product market competition is also a leading determinant of the cross-firm variation in the level of these specific sources of credit constraints.

3.3. Product market competition and access to specific sources of capital

The results thus far are due to perceptions about general capital constraints. However, the relation between product market competition and firms' access to capital may vary with the type of supplier. We examine the relation between product market competition and access to four other sources of capital: special export financing, lease financing, foreign bank loans, and non-bank equity.

Previous empirical evidence finds that the lease yield on lease contracts increases with information asymmetry about the lessee (e.g., Schallheim and Johnson, 1987). Sharpe and Nguyen (1995) posit that lessee firms may be attempting to reduce fixed capital cost by avoiding the external

financing premium of public capital markets arising from information asymmetry. Although this implies that firms that choose to lease are relatively opaque firms who fear the consequences of information asymmetry, it also suggests that the market for leased assets is less sensitive to information asymmetry. Therefore, to the extent that the impact of competition on capital constraints is due to information asymmetry, it is an empirical question whether product market competition impedes access to lease financing and increases credit constraints. Similarly, it is an empirical question whether product market competition impedes access to special export financing. This is because governments typically provide subsidies under these programs, even when privately administered (Brander and Spencer, 1985) and, as such, access to export financing could be insensitive to the competition that applicant firms face.

Generally, there is even greater information asymmetry between foreign banks, relative to domestic banks, and local firms. As such, foreign banks engage in 'cream skimming,' lending only to the most profitable entities (Dell'Ariccia and Marquez, 2004). This suggests that product market competition should also significantly increase the impediment to foreign bank capital. Similarly, given that product market competition affects stock returns (Hou and Robinson, 2006), we expect that it also impedes access to non-bank equity capital.

To examine the above, we obtain the responses to the instruction: *Please judge on a four-point scale how problematic are … [the above] financing issues for the operation and growth of your business.* The responses reflect the level of the difficulty firms experience in accessing these sources of capital. The results are reported in Table 5. We find that the difficulty of accessing these four sources of capital increases with product market competition. The marginal effects indicate that a small increase in product market competition increases the probability that these forms of credit constraints are a major obstacle at a rate of between 13.7% (*foreign bank loans*) and 20.4 % (*special export financing*) per

unit change in product market competition. Overall, product market competition also has important implications for access to sources of capital other than loans from domestic banks.[17]

3.4. Robustness

3.4.1. Controlling for the type of banking sector structure

In this subsection we introduce various variables that capture some aspect of banking sector structure to ensure the robustness of our results and to determine whether banking or product market competition is the greater impediment to capital. This is necessary not only because prior work (previously referenced) finds that the structure of the banking sector affects access to credit, but also because banking sector structure can affect industry structure. Specifically, Cetorelli and Strahan (2006) and Bertrand et al. (2007) find that concentrated banking sectors can deter new entrants to non-financial industries. Therefore, banking sector structure may alter the effect of product market competition on firms' credit constraints. It may even be that the structure of the banking sector represents an omitted variable that drives both managers' perception of product market competition and capital constraints.

Guzman (2000) shows that when monopoly banks do ration credit they tend to engage in excessive monitoring. As monitoring reduces information asymmetry, in countries with more monopolistic banking structures product market competition might have less of an influence on firms' access to credit. Therefore, structural and legal arrangements that could alter the competitiveness of the banking sector, such as foreign ownership and the ease of entry into the banking sector, may alter our results related to product market competition.

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[17] Because the results in Model 1 are based on all sample firms, we allow the possibility that non-export firms might have sought credit from the special export financing facility to initiate exports or otherwise finance their operations. In Model 2 we use only export firms and control for the percentage of export sales ("Exports (% of sales)").

More generally, the regulatory structure of the banking sector can offset the effect of the tendency of firms to limit disclosure and, therefore, dampen the effect of product market competition on firms' credit constraints. As an example, the existence of information-sharing mechanisms, such as credit registries, can reduce the information asymmetry between banks and borrowers that results from borrowers' reluctance to disclose information due to product market competition. For example, Djankov et al. (2007) find that the provision of private credit around the world increases after the introduction of credit registries. Similarly, if banks are allowed to engage in non-banking activities, such as insurance or underwriting, they may be able to gather information on potential borrowers and, accordingly, reduce any information asymmetry. Hence, failing to account for the structural and regulatory setting of the country's banking sector could overstate the importance of product market competition as a result of this potential omitted variable problem.

To examine the above we augment Equation (1) with three variables, one at a time, that describe aspects of the structure of a country's banking sector (see, e.g., Carbó-Valverde et al., 2009): the *Lerner Index*, which measures market power in the banking industry; *bank concentration,* which is a simple Herfindahl index of market concentration in the banking industry; and the *Boone indicator*, which measures the extent to which the bank uses its efficiency to improve performance through the acquisition of market share. We also augment Equation (1) with private credit as a fraction of GDP (*Private credit*), which proxies for banking sector development, restriction on banks' participation in non-banking activities (*Restrict*), the fraction of banking applications denied (*Fraction denied*), banking freedom from government interference (*Bank freedom*), the existence of a credit registry (*Credit Registry*), and the fraction of the banking system controlled by foreign-owned banks *(Foreign bank share)* and by government-owned banks (*Public bank share*) (Beck et al., 2004).

The results are reported in Table 6. We report results using the measure of general capital constraints as the dependent variable. First, the evidence continues to indicate a positive and

significant relation between product market competition and capital constraints. Second, there is generally no diminution in the marginal effect of a change in product market competition on the probability that firms experience the highest level of capital constraints. Third, judging from the z-statistics, product market competition remains a leading determinant of firms' capital constraints, exhibiting greater explanatory power than any of the banking structure variables. We also find similar (untabulated) results when we use the individual forms of product market competition instead of the competition index. Further, to the extent that our "general capital constraints" measure is not strictly a reflection of bank credit constraints, the effect of banking sector structure variables on access to capital will be understated and, accordingly, the importance of the product market competition variable might be overstated. When we estimate the banking-structure augmented models with the measures of bank credit constraints the inferences are not any different. Overall, these results are consistent with the view that the significant association between product market competition and firms' credit constraints is independent of any influence that banking sector structure has on product market competition.

3.4.2 Endogeneity

We believe that the consistency of our findings across the variety of alternate competition measures (see Table 3) means that our findings are largely immune to concerns about endogeneity. Nonetheless, out of an abundance of caution we address the possibility that our results might not represent a causal relation between product market competition and firms' capital constraints, by using an instrumental variable ordered probit model. This is the equivalent of the 2SLS model given the ordinal nature of the data used as dependent variable in the second stage of our tests.[18] To estimate this model we need an instrument for product market competition. We use firms' response about the country's customs/foreign trade regulations to the request: *Please judge on a four-point scale*

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[18] For details on the instrumental variables ordered probit (IV OProbit) technique used to address endogeneity in the presence of ordered variables, see Roodman (2011).

how problematic are these different regulatory areas for the operation and growth of your business. We use the impact of country's customs/foreign trade regulations on firms' operations and growth because these regulations are unlikely to be a response to a firm's degree of capital constraints, similar in spirit to Valta (2012), which uses changes in customs regulations as an exogenous shock to product market competition.

The results are reported in Table 7. We report the first-stage results in Model 1. Model 2 includes a measure of bank competition for robustness (see Section 3.4.1). The results in Model 1 indicate that customs/foreign trade regulations have a positive and highly significant association with product market competition. We also find that product market competition is less of an obstacle to firm operations if the firm is large, foreign owned, in the service industry, and from countries with higher per capita income. In Model 2, the evidence indicates that the one measure of bank competition that significantly influences capital constraints (see Table 6) is insignificantly related to product market competition. In the second stage we find a positive and significant association between firms' capital constraints and the fitted value of product market competition. Similar to previous results, product market competition is a leading determinant of capital constraints. In Model 2, we also control for banking sector competition in each country. The effect of product market competition on capital constraints is materially unchanged.

In unreported tests, the results of which are available on request, we replace the competition index with each of the individual forms of competition (as listed in Table 3). We find that the instrument is highly significant in each first-stage model and the results continue to indicate a strong positive relation between capital constraints and product market competition whether we control for bank competition or not. These results are consistent with the view that product market competition causes a decline in firms' access to capital and that these findings are not driven by an endogenous relation between product market competition and capital constraints.

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3.5. Is information asymmetry a mechanism linking product market competition and capital constraints?

Our conjecture is that information asymmetry is a mechanism that links product market competition and capital constraints. This is consistent with prior literature, including Stiglitz and Weiss (1981), that predicts that banks rationally impose credit constraints as a response to information asymmetry. If our conjecture is correct, then the effect of competition on capital constraints should be more pronounced for firms with higher levels of information asymmetry.

It is well accepted that information asymmetry is worse for small firms (see Kelly, 2014) partly because they attract less analyst following and disclosure imposes a greater burden on them. Firms that follow international accounting standards (IAS) have higher accounting quality as reflected by, inter alia, less earnings management and faster loss recognition (Barth, Landsman, and Lang, 2008). Therefore, firms that do not adopt the IAS have lower accounting quality and, hence, relatively higher levels of information asymmetry. Sole proprietorships are the epitome of information asymmetry. This is because they typically have no need to disclose much information, except to taxing authorities and to the banks from which they seek financing. They may also lack the organizational capacity to capture, store, and disseminate information.

Table 8 presents results from a specification of Equation (1) augmented with the information asymmetry proxy and an interaction term (Competition index × information asymmetry proxy). Panel A presents the results of the ordered probit estimation for these different specifications, while Panel B presents the specifications' marginal effects. The significance of an interaction term in ordered probit models cannot be determined by observing the coefficient estimate and associated z-statistic. Instead, we focus on the marginal effects of the interaction term. This is because, in non-linear models such as the ordered probit model, the effect of the interaction term, the cross-partial effect, is not dependent solely on the magnitude and sign of the coefficient estimate on the interaction term. As such, even if the coefficient estimate on the interaction term is

equal to zero, the cross-partial effect can be economically significantly different from zero, and of a different sign from the coefficient estimate (see Ai and Norton, 2003 and Karaca-Mandic, Norton and Dowd, 2011). To interpret the cross-partial effects for these models we report in Table 8, Panel B, the marginal effects for both the reported and omitted categories of the dummy variable proxy for information asymmetry in the interaction terms: for instance, for small and large firms in the interaction term *Competition Index × small/medium firm dummy* in Model 1.

Overall, the economic magnitude of these results supports our conjecture that the observed association between capital constraints and product market competition is due to information asymmetry. We see this in the economic magnitude of the differences of the marginal effects in Table 8, Panel B. For example, the marginal effects related to the probability that capital constraints are a "Major Obstacle" are economically larger for small and medium-sized firms, firms that do not use international accounting standards, and for sole proprietorships. Where capital constraints are a "Major Obstacle" the marginal effects for small firms are significantly larger, whereas when capital constraints are "No Obstacle" the marginal effects for firms that use international accounting standards are larger.[19] The marginal effects for sole proprietorships are not significantly different from that of other firms.

4. Real effects of capital constraints

Thus far the results indicate that firms' capital constraints increase with our measure of firm-specific product market competition. Ultimately, the importance of this finding rests on the effect that capital constraints have on firms' operational performance and, in turn, on firm value. In this section we examine the relation between our measure of capital constraints and firm growth to

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[19] To test the significance of the differences in marginal effects, in unreported tests we recode the four-point scale, so that category 4, "Major Obstacle" is 1 and the others are 0. Similarly, we recode the four-point scale, so that category 1, "No Obstacle" is 1 and the others are 0.

determine if capital constraints also have real effects. We also include our measure of product market competition to control for the direct impact of competition on growth, as well as the survey-based measure of the cost of debt, *High interest rates*, to see whether, as we assert in the introduction, increases in capital constraints have a more deleterious effect on firm growth than do increases in the cost of debt. We follow Beck et al. (2005) and use the three-year change in sales as our measure of firm growth (*Firm growth*) and specify a model of firm growth that is similar to theirs. The main difference of our model relative to theirs is the inclusion of our measure of firm-specific product market competition. We include our measure of product market competition, not only because product market competition may be a determinant of firm growth, but also because its inclusion allows us to determine if it has real effects other than through the effect on capital constraints.

The results are reported in Table 9. We report three specifications, each different from the other by the particular product market competition index employed, *Main, All* and *Binary*. We find that, incremental to the direct impact of product market competition, capital constraints are negatively and significantly related to firm growth.[20] Importantly, these findings show that capital constraints are more important for firm growth than the direct impact of high interest rates, which highlights the importance of our earlier findings that product market competition negatively impacts capital constraints.

5. Summary and conclusions

Many firms around the world experience difficulty accessing capital and are, therefore, capital constrained. Using survey data from 58 countries to obtain measures of capital constraints and product market competition as perceived by firms themselves, our paper is the first to examine

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[20] In untabulated results in which we use the individual forms of competition, as shown in Table 3, we also find that firm growth is negatively and significantly related to all but one form of product market competition (*f.* violation of copyrights, patents, or trademarks).

the link between product market competition and capital constraints and we find that capital constraints increase significantly with the intensity of product market competition. Relative to bank competition and other determinants, product market competition generally is a leading determinant of capital constraints. We also find a positive and significant relationship between product market competition and the capital constraints that firms experience due to bank illiquidity, corrupt bank officers, collateral and documentation requirements, and the need for personal connections to banks as a precondition for obtaining credit. This effect is also present in the markets for special export financing, lease financing, foreign bank loans, and non-bank equity capital.

We conduct auxiliary tests that support our conjecture that information asymmetry is a mechanism that links capital constraints and product market competition. These relations between credit market competition and capital constraints are important because, as we show, capital constraints have a negative impact on the growth of firms.

Taken together, our results have implications for the interaction between countries' efforts to improve access to capital while improving product market competitiveness. While both are desired goals, our results suggest that care should be taken because financial institutions consider the risks associated with greater product market competition when deciding to supply capital.

The fact that price competition in both the international and domestic product markets impedes firms' access to capital suggests that future work may find it fruitful to examine if product market competition in firms' domestic and international (e.g., export) markets influences the geographic location in which firms choose to raise capital. This is especially important in light of recent findings that product market competition also significantly increases firms' exchange rate exposure (Bergbrant et al., 2014). The fact that firms can use foreign currency debt to hedge currency risk implies that firms can choose to tradeoff the potential hedging effect of borrowing abroad with being potentially disadvantaged by competing outside of the domestic setting.

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Table 1

Summary statistics.

Panel A reports summary statistics for each variable of interest aggregated over the entire sample of firms. Firm-level "General capital constraints" is the response to the instruction: *Please judge on a four-point scale how problematic [financing] […][is] for the operation and growth of your business.* The responses are 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). "Firm growth" is the growth of the firm's sales over the past three years. Intensity of product market competition or "Competition index" is the value of one of three firm-specific competition indices, *Main*, *All* and *Binary* (see Appendix Table A.2), calculated for each firm and computed from the firm's response to the instruction: *Please judge, on a four-point scale, how problematic are the following [eight] practices of your competitors for your firm.* "Manufacturing firm dummy", "Service firm dummy", "Government-owned firm dummy", "Small & medium-sized firm dummy", "Foreign ownership dummy", "Foreign operations dummy" and "Foreign trade dummy" are all dummy variables which are 1 if the firm has this characteristic and 0 if not. The manufacturing and service dummies indicate whether a firm is in one of the respective industries. The government-owned dummy indicates whether a firm is partially or wholly government owned. Small & medium-sized firm dummy indicates if a firm is small or medium-sized by the number of full-time employees. The foreign-ownership dummy indicates if a firm is wholly or partly owned by a foreign entity. Foreign operations and foreign trade dummies indicate whether the firm has foreign operations or engages in foreign trade, respectively. "High interest rates" is an ordinal measure computed from the firm's response to the instruction: *Please judge on a four-point scale how problematic [high interest rates] are […] for the operation and growth of your business.* Country-level variables follow. "Inflation" is the average change in the CPI over the last three years (1997-1999). "GDP growth" is the GDP growth rate over the last three years (1997-1999). "GDP per capita" is GDP per capita over the last three years (1997-1999). Panel B presents the pairwise Spearman rank correlation coefficients among our variables of interest.

Panel A: Summary statistics

| Ordinal Variables | No. firms | Obstacle Level | | | |
		No	Minor	Moderate	Major
Category		1	2	3	4
General capital constraints	3518	20.2%	19.3%	25.4%	35.1%
High interest rates	3518	10.5%	12.5%	21.5%	55.5%

Continuous and Binary Variables	No. firms	Mean	St Dev	Min	Max
Firm growth	2706	16.399	52.853	-100	500
Competition Variables					
Competition index (Main)	2571	0.431	0.304	0	1
Competition index (All)	3518	0.394	0.287	0	1
Competition index (Binary)	3518	4.399	2.718	0	8
Controls					
Manufacturing firm dummy	3518	0.442	0.497	0	1
Service firm dummy	3518	0.454	0.498	0	1
Government-owned firm dummy	3518	0.105	0.307	0	1
Small & medium-sized firm dummy	3518	0.768	0.422	0	1
Foreign ownership dummy	3518	0.227	0.419	0	1
Foreign operations dummy	3518	0.224	0.417	0	1
Foreign trade dummy	3518	0.762	0.426	0	1
Country Level					
Inflation	3518	0.097	0.138	-0.048	0.959
GDP growth rate	3518	3.022	2.488	-4.387	7.897
GDP per capita	3518	8.103	1.264	5.910	10.348

Panel B: Correlations

	General capital constraints	Competition index (Main)	Competition index (All)	Competition index (Binary)	Manufacturing	Services	Government owned	Small/medium firm	High interest rates	Foreign owned	Foreign operations	Foreign trade	Inflation	GDP growth
Competition index (Main)	0.315													
Competition index (All)	0.261	1.000												
Competition index (Binary)	0.209	0.898	0.915											
Manufacturing firm dummy	0.053	0.105	0.089	0.078										
Services firm dummy	-0.088	-0.127	-0.105	-0.090	-0.811									
Government-owned firm dummy	0.044	-0.002	-0.005	-0.030	0.103	-0.096								
Small & medium-sized firm dummy	0.116	0.054	0.037	0.036	-0.140	0.118	-0.127							
High interest rates	0.360	0.329	0.263	0.191	0.066	-0.075	0.020	0.048						
Foreign ownership dummy	-0.163	-0.124	-0.103	-0.086	0.060	-0.013	-0.016	-0.207	-0.118					
Foreign operations dummy	-0.140	-0.104	-0.069	-0.061	0.019	0.004	-0.036	-0.249	-0.099	0.391				
Foreign trade dummy	0.054	0.091	0.078	0.066	0.270	-0.263	0.103	-0.117	0.056	0.114	0.144			
Inflation	0.198	0.248	0.199	0.164	0.103	-0.107	0.092	-0.003	0.346	-0.082	-0.083	0.213		
GDP growth	-0.087	-0.064	-0.022	-0.023	0.075	-0.083	0.070	-0.026	-0.153	-0.001	0.033	0.067	-0.252	
GDP per capita	-0.274	-0.368	-0.279	-0.236	-0.129	0.122	-0.039	0.032	-0.303	0.044	0.112	-0.126	-0.546	0.014

Table 2

Impact of product market competition on firm-level capital constraints.

The results in Panel A are from an ordered probit model of firms' general capital constraints on proposed determinants. Competition index is a firm-specific index of the intensity of product market competition computed from the firm's response to the request: *Please judge, on a four-point scale, how problematic are the following [eight] practices of your competitors for your firm* and calculated in three different ways, *Main*, *All* and *Binary*, as described in Appendix Table A.2. All other variables are defined in Table 1 and Appendix Table A.2. The thresholds (cut points) are suppressed to conserve space. All z-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels. Panel B reports the marginal effects, from Model 1, of product market competition and the other independent variables on firms responding, on a four-point scale, that General capital constraints pose a certain level of "problem" for their operations given a certain difference in the independent variable. p-values indicating if the marginal effect is significant are reported in italics below each probability.

Panel A: Coefficient estimates from probit models

	Dependent variable: General capital constraints		
	(1)	(2)	(3)
Competition index (Main)	0.599***		
	(5.610)		
Competition index (All)		0.568***	
		(5.085)	
Competition index (Binary)			0.050***
			(4.187)
Manufacturing dummy	-0.161*	-0.141*	-0.141*
	(-1.806)	(-1.879)	(-1.868)
Services dummy	-0.253***	-0.212***	-0.213***
	(-3.114)	(-3.120)	(-3.103)
Government ownership dummy	0.044	0.147	0.151
	(0.415)	(1.566)	(1.577)
Small/medium firm dummy	0.249***	0.266***	0.264***
	(4.181)	(5.043)	(5.126)
High interest rates	0.274***	0.278***	0.288***
	(5.755)	(6.151)	(6.218)
Foreign ownership dummy	-0.207***	-0.232***	-0.241***
	(-3.461)	(-4.514)	(-4.630)
Foreign operations dummy	-0.056	-0.109**	-0.105*
	(-0.862)	(-2.009)	(-1.919)
Foreign trade dummy	-0.002	0.059	0.061
	(-0.025)	(0.671)	(0.697)
Inflation	0.252	0.249	0.230
	(1.034)	(1.151)	(1.059)
GDP growth	-0.004	-0.022	-0.021
	(-0.179)	(-1.075)	(-1.053)
GDP per capita	-0.172***	-0.142***	-0.150***
	(-3.156)	(-2.828)	(-2.963)
No. of firms	2,571	3,518	3,518
p-value of fit	0.000	0.000	0.000
No. of clusters	56	58	58
Pseudo R²	0.092	0.082	0.080

Panel B: Marginal effects for Model 1 from Panel A					
		Dependent variable: General capital constraints			
Marginal effects of:	For a change of:	No Obstacle (1)	Minor Obstacle (2)	Mod. Obstacle (3)	Major Obstacle (4)
Competition index (Main)	Marginal	-0.147	-0.052	0.010	0.189
	p-value	*0.000*	*0.000*	*0.062*	*0.000*
	+SD	-0.042	-0.017	0.000	0.059
	p-value	*0.000*	*0.000*	*0.925*	*0.000*
	0 to 1	-0.145	-0.059	0.008	0.196
	p-value	*0.000*	*0.000*	*0.165*	*0.000*
Manufacturing dummy	0 to 1	0.040	0.014	-0.003	-0.051
	p-value	*0.074*	*0.053*	*0.181*	*0.067*
Services dummy	0 to 1	0.063	0.022	-0.005	-0.080
	p-value	*0.003*	*0.001*	*0.071*	*0.002*
Government own. dummy	0 to 1	-0.011	-0.004	0.001	0.014
	p-value	*0.675*	*0.684*	*0.582*	*0.681*
Small/medium firm dummy	0 to 1	-0.064	-0.020	0.007	0.077
	p-value	*0.000*	*0.000*	*0.040*	*0.000*
High interest rates	+1	-0.061	-0.027	-0.002	0.090
	p-value	*0.000*	*0.000*	*0.410*	*0.000*
Foreign own. dummy	0 to 1	0.053	0.017	-0.006	-0.064
	p-value	*0.001*	*0.000*	*0.052*	*0.000*
Foreign operations dummy	0 to 1	0.014	0.005	-0.001	-0.017
	p-value	*0.393*	*0.392*	*0.467*	*0.389*
Foreign trade dummy	0 to 1	0.001	0.000	0.000	-0.001
	p-value	*0.980*	*0.980*	*0.980*	*0.980*
Inflation	Marginal	-0.062	-0.022	0.004	0.080
	p-value	*0.300*	*0.302*	*0.403*	*0.297*
GDP growth	Marginal	0.001	0.000	0.000	-0.001
	p-value	*0.858*	*0.858*	*0.863*	*0.858*
GDP per capita	Marginal	0.042	0.015	-0.003	-0.054
	p-value	*0.002*	*0.001*	*0.059*	*0.002*

Table 3

Impact of individual forms of product market competition on firm-level capital constraints.

Panel A shows the Spearman (pairwise) correlation coefficients between the alternate measures of product market competition that make up our competition indices. The measures are obtained from the instruction: *Please judge on a four-point scale how problematic are the following practices of your competitors for your firm.* The forms of competition are: "they avoid sales tax or other taxes"; "they do not pay duties or observe trade regulations"; "foreign producers sell below international prices"; "domestic producers unfairly sell below my prices"; "they avoid labor taxes/regulations (e.g., social security)"; "they violate my copyrights, patents or trademarks"; "they receive subsidies from national/local government"; and "they have favored access to credit, infrastructure services, or customers". Panel B shows results from an ordered probit model of firms' General capital constraints on the alternative measures of competition, one at a time, as well as other determinants. The thresholds (cut points) are suppressed to conserve space. All z-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels.

Panel A: Spearman correlations	Tax avoidance	Duty/trade reg. avoidance	Foreign dumping	Domestic dumping	Labor tax/reg. avoidance	Violate copyright/patent	Government subsidy
Duty/trade reg. avoidance	0.800						
Foreign dumping	0.394	0.462					
Domestic dumping	0.478	0.479	0.462				
Labor tax/reg. avoidance	0.710	0.679	0.391	0.557			
Violate copyright/patent	0.434	0.494	0.403	0.421	0.483		
Government subsidy	0.387	0.438	0.402	0.389	0.432	0.495	
Favored access	0.378	0.424	0.388	0.391	0.429	0.428	0.622

Panel B: Probit model coefficient estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: General capital constraints				
Form of competition	Tax avoidance	Duty/trade reg. avoidance	Foreign dumping	Domestic dumping	Labor tax/reg. avoidance	Violate copyright/ patent	Government subsidy	Favored access
Competition component	0.110***	0.093***	0.075***	0.104***	0.117***	0.075***	0.111***	0.177***
	(4.939)	(4.076)	(3.863)	(4.768)	(5.501)	(2.962)	(4.509)	(6.927)
Manufacturing dummy	-0.132	-0.138*	-0.178**	-0.125	-0.147*	-0.125	-0.142*	-0.126
	(-1.594)	(-1.754)	(-2.220)	(-1.615)	(-1.921)	(-1.582)	(-1.773)	(-1.626)
Services dummy	-0.233***	-0.235***	-0.262***	-0.203***	-0.223***	-0.217***	-0.252***	-0.224***
	(-3.025)	(-3.333)	(-3.740)	(-2.987)	(-3.184)	(-2.859)	(-3.600)	(-3.168)
Government own. dummy	0.055	0.079	0.101	0.091	0.089	0.094	0.142	0.115
	(0.538)	(0.824)	(0.983)	(0.983)	(0.890)	(1.012)	(1.406)	(1.219)
Small/medium firm dummy	0.247***	0.268***	0.268***	0.274***	0.249***	0.280***	0.284***	0.283***
	(4.592)	(4.826)	(5.233)	(5.558)	(4.636)	(5.547)	(5.462)	(5.360)
High interest rates	0.293***	0.281***	0.301***	0.290***	0.280***	0.296***	0.292***	0.286***
	(6.218)	(5.910)	(6.605)	(6.210)	(6.041)	(6.519)	(6.655)	(6.277)
Foreign own. dummy	-0.247***	-0.234***	-0.237***	-0.241***	-0.217***	-0.278***	-0.245***	-0.212***
	(-4.619)	(-4.656)	(-4.457)	(-4.581)	(-4.070)	(-5.099)	(-4.225)	(-3.881)
Foreign operations dummy	-0.071	-0.077	-0.112**	-0.087	-0.107*	-0.070	-0.080	-0.099*
	(-1.216)	(-1.377)	(-2.050)	(-1.586)	(-1.874)	(-1.189)	(-1.320)	(-1.720)
Foreign trade dummy	0.025	0.045	0.043	0.083	0.046	0.061	0.054	0.053
	(0.275)	(0.462)	(0.476)	(0.928)	(0.535)	(0.671)	(0.668)	(0.610)
Inflation	0.196	0.178	0.092	0.156	0.154	0.058	0.130	0.212
	(0.867)	(0.698)	(0.389)	(0.719)	(0.721)	(0.247)	(0.562)	(0.884)
GDP growth	-0.028	-0.022	-0.021	-0.020	-0.021	-0.022	-0.010	-0.023
	(-1.310)	(-1.032)	(-1.036)	(-1.010)	(-1.016)	(-1.126)	(-0.457)	(-1.085)
GDP per capita	-0.153***	-0.158***	-0.160***	-0.158***	-0.160***	-0.161***	-0.190***	-0.152***
	(-2.793)	(-2.856)	(-3.062)	(-3.093)	(-3.156)	(-3.123)	(-3.900)	(-3.086)
No. of firms	2,955	3,200	3,192	3,369	3,220	3,180	3,073	3,182
p-value of fit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No. of clusters	58	58	58	58	58	58	56	58
Pseudo R^2	0.087	0.081	0.079	0.080	0.082	0.078	0.086	0.089

Table 4

Intensity of product market competition on specific causes of capital constraints.

The results in this table are from an ordered probit model of different causes of firm-level credit/capital constraints related to (1) collateral requirements of banks/financial institutions, (2) bank paperwork/bureaucracy, (3) special connections to banks/financial institutions, (4) corruption of bank officials, and (5) banks lack money to lend on "Competition index", a firm-specific index of the intensity of product market competition ranging from 0 to 1, and other determinants. The capital constraints are based on firms' response to the request: *Please judge on a four-point scale how problematic are these different financing issues for the operation and growth of your business.* All variables are defined in Table 1 and Appendix Table A.2. The thresholds (cut points) are suppressed to conserve space. All z-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels.

Type or cause of constraints as dependent variable:	Collateral requirements	Bank paperwork	Special connections	Bank officials corrupt	Banks lack money
	(1)	(2)	(3)	(4)	(5)
Competition index (Main)	0.652***	0.687***	0.571***	1.064***	0.753***
	(6.573)	(6.244)	(5.065)	(6.923)	(5.380)
Manufacturing dummy	-0.028	-0.115	-0.035	0.014	-0.079
	(-0.348)	(-1.586)	(-0.424)	(0.200)	(-0.757)
Services dummy	-0.056	-0.068	0.042	0.143*	-0.074
	(-0.728)	(-0.835)	(0.580)	(1.648)	(-0.831)
Government own. dummy	-0.192**	-0.087	-0.250***	-0.231	-0.121
	(-2.143)	(-0.829)	(-2.684)	(-1.600)	(-0.835)
Small/medium firm dummy	0.220***	0.143**	0.219***	0.194**	0.055
	(3.489)	(2.142)	(4.403)	(2.502)	(0.913)
High interest rates	0.461***	0.489***	0.418***	0.180***	0.331***
	(14.578)	(12.087)	(13.447)	(5.227)	(6.781)
Foreign own. dummy	-0.079	0.014	-0.097	0.040	0.080
	(-1.434)	(0.244)	(-1.510)	(0.599)	(1.117)
Foreign operations dummy	-0.076*	-0.032	0.048	-0.014	-0.005
	(-1.662)	(-0.635)	(0.862)	(-0.201)	(-0.064)
Foreign trade dummy	0.126*	0.056	-0.028	-0.172**	0.011
	(1.851)	(0.818)	(-0.485)	(-1.994)	(0.135)
Inflation	-0.871***	-0.425*	-0.754***	0.907**	0.229
	(-3.455)	(-1.728)	(-2.823)	(2.402)	(0.651)
GDP growth	-0.027*	-0.006	-0.041***	-0.011	-0.052*
	(-1.756)	(-0.370)	(-2.719)	(-0.332)	(-1.940)
GDP per capita	0.006	0.047	-0.048	-0.180***	-0.182***
	(0.184)	(1.138)	(-1.456)	(-2.797)	(-3.327)
No. of firms	2,510	2,560	2,530	2,442	2,508
p-value of fit	0.000	0.000	0.000	0.000	0.000
No. of clusters	56	56	56	55	56
Pseudo R^2	0.096	0.095	0.087	0.103	0.104

Table 5

Impact of product market competition on foreign bank and non-bank capital constraints.

The results in this table are from an ordered probit model of different types of firm-level credit/capital constraints related to lack of access to 1&2) export financing, 3) lease financing, 4) foreign bank credit, and 5) non-bank equity on "Competition index", a firm-specific index of the intensity of product market competition ranging from 0 to 1, and other determinants. The capital constraints are based on firms' responses to the request: *Please judge on a four-point scale how problematic are these different financing issues for the operation and growth of your business.* In Model 2 we use only export firms and control for the percentage of export sales. All variables are defined in Table 1 and Appendix Table A.2. The thresholds (cut points) are suppressed to conserve space. All z-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels.

Type of constraint as dependent variable:	Export financing	Export financing	Lease financing	Foreign bank credit	Non-bank equity
	(1)	(2)	(3)	(4)	(5)
Competition index (Main)	0.727***	0.805***	0.844***	0.647***	0.744***
	(5.694)	(5.775)	(5.992)	(5.137)	(6.050)
Manufacturing dummy	0.069	0.147	-0.066	0.016	-0.129
	(0.707)	(0.971)	(-0.769)	(0.187)	(-1.465)
Services dummy	-0.064	0.142	-0.161**	0.024	-0.032
	(-0.719)	(0.962)	(-1.967)	(0.290)	(-0.366)
Government own. dummy	0.143	0.146	0.048	-0.089	0.005
	(1.161)	(1.127)	(0.529)	(-0.831)	(0.050)
Small/medium firm dummy	0.168**	0.159*	0.172**	0.168***	0.112**
	(2.296)	(1.699)	(2.509)	(2.689)	(2.139)
High interest rates	0.265***	0.310***	0.266***	0.229***	0.263***
	(8.106)	(5.377)	(8.481)	(8.594)	(8.799)
Foreign own. dummy	-0.067	-0.159*	-0.075	-0.175***	-0.137**
	(-1.006)	(-1.784)	(-1.238)	(-2.736)	(-2.218)
Foreign operations dummy	0.084	0.045	0.001	0.045	-0.005
	(1.248)	(0.472)	(0.021)	(0.667)	(-0.081)
Foreign trade dummy	0.355***		0.097	0.180***	0.205***
	(4.786)		(1.172)	(2.677)	(3.309)
Exports (% of sales)		0.001			
		(0.910)			
Inflation	-0.286	-0.635**	-0.332	0.210	-0.384
	(-0.794)	(-2.033)	(-0.885)	(0.959)	(-1.083)
GDP growth	-0.048**	-0.077***	-0.033	-0.010	-0.033
	(-2.413)	(-3.325)	(-1.606)	(-0.658)	(-1.612)
GDP per capita	-0.023	-0.030	-0.096**	-0.139***	-0.039
	(-0.761)	(-0.750)	(-2.114)	(-4.158)	(-1.042)
No. of firms	2,170	1,081	2,395	2,416	2,373
p-value of fit	0.000	0.000	0.000	0.000	0.000
No. of clusters	56	56	56	56	56
Pseudo R²	0.069	0.077	0.078	0.069	0.061

Table 6

Impact of product market competition on firm-level capital constraints - robustness to the effect of banking sector structure.

The results in this table are from an ordered probit model of firms' general capital constraints on product market competition and other determinants while controlling for banking sector competitive structure or the legal and institutional structure of the banking sector. The product market competition index is a firm-specific index of the intensity of product market competition ranging from 0 to 1. *Lerner index, bank concentration, Boone indicator* and other structural characteristics of the banking sector are defined in Appendix Table A.2. All other variables are defined in Table 1 or Appendix Table A.2. The thresholds (cut points) are suppressed to conserve space. All z-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels.

					Dependent variable: General capital constraints					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Competition index (Main)	0.626***	0.637***	0.608***	0.653***	0.618***	0.638***	0.597***	0.568***	0.620***	0.644***
	(5.099)	(5.475)	(5.845)	(6.121)	(4.603)	(4.315)	(5.695)	(4.584)	(4.606)	(4.735)
Lerner index	0.855**									
	(2.019)									
Bank concentration		-0.001								
		(-0.565)								
Boone indicator			-0.000							
			(-0.003)							
Private credit				-0.039						
				(-0.209)						
Restrict					0.035					
					(1.572)					
Fraction denied						0.082				
						(0.684)				
Bank freedom							-0.144**			
							(-2.014)			
Credit registry								0.143		
								(0.643)		
Foreign bank share									-0.002	
									(-0.649)	
Public bank share										0.003
										(1.130)
Manufacturing dummy	-0.137	-0.175*	-0.150	-0.180*	-0.188*	-0.223*	-0.157*	-0.281**	-0.204*	-0.201*
	(-1.400)	(-1.816)	(-1.633)	(-1.942)	(-1.669)	(-1.851)	(-1.714)	(-2.278)	(-1.706)	(-1.776)
Services dummy	-0.204**	-0.226**	-0.230***	-0.242***	-0.246**	-0.265**	-0.248***	-0.356***	-0.256**	-0.247**
	(-2.291)	(-2.557)	(-2.814)	(-2.800)	(-2.335)	(-2.355)	(-2.966)	(-3.098)	(-2.303)	(-2.284)
Government own. dummy	-0.043	0.002	0.036	-0.014	-0.012	-0.013	0.043	0.037	-0.083	-0.104
	(-0.440)	(0.018)	(0.324)	(-0.134)	(-0.106)	(-0.108)	(0.408)	(0.281)	(-0.735)	(-0.952)

(continued)

Table 6 - *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Dependent variable: General capital constraints (*continued*)					
Small/medium firm dummy	0.252***	0.252***	0.268***	0.261***	0.215***	0.184**	0.244***	0.205***	0.205***	0.199***
	(3.505)	(3.715)	(4.255)	(4.193)	(2.866)	(2.393)	(4.167)	(2.673)	(2.751)	(2.659)
High interest rates	0.279***	0.275***	0.274***	0.327***	0.283***	0.254***	0.275***	0.324***	0.347***	0.340***
	(5.406)	(5.201)	(5.578)	(11.230)	(5.674)	(4.631)	(5.762)	(8.288)	(8.622)	(8.841)
Foreign own. dummy	-0.190***	-0.204***	-0.206***	-0.241***	-0.149**	-0.119*	-0.203***	-0.280***	-0.171***	-0.193***
	(-3.003)	(-3.293)	(-3.374)	(-4.060)	(-2.360)	(-1.685)	(-3.401)	(-4.090)	(-2.592)	(-2.879)
Foreign operations dummy	-0.053	-0.048	-0.060	-0.034	-0.100	-0.130	-0.059	-0.052	-0.054	-0.046
	(-0.737)	(-0.688)	(-0.924)	(-0.527)	(-1.199)	(-1.418)	(-0.924)	(-0.617)	(-0.617)	(-0.552)
Foreign trade dummy	0.014	0.028	0.011	0.072	0.023	-0.030	0.011	0.135	0.076	0.099
	(0.141)	(0.304)	(0.125)	(1.090)	(0.250)	(-0.312)	(0.125)	(1.518)	(0.928)	(1.190)
Inflation	0.105	0.230	0.272	0.063	0.132	0.023	0.227	0.343	0.419	0.268
	(0.329)	(0.732)	(1.111)	(0.165)	(0.527)	(0.050)	(0.873)	(1.251)	(1.474)	(0.769)
GDP growth	-0.007	0.001	-0.008	-0.039*	0.012	0.018	-0.005	-0.030	-0.025	-0.022
	(-0.228)	(0.030)	(-0.307)	(-1.939)	(0.396)	(0.506)	(-0.230)	(-1.300)	(-0.939)	(-0.758)
GDP per capita	-0.200***	-0.195***	-0.180***	-0.111**	-0.139**	-0.174**	-0.140**	-0.121*	-0.076	-0.087*
	(-2.792)	(-2.720)	(-2.703)	(-2.359)	(-2.151)	(-2.201)	(-2.275)	(-1.928)	(-1.386)	(-1.753)
No. of firms	2,091	2,190	2,453	2,434	1,956	1,717	2,542	1,569	1,730	1,847
p-value of fit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No. of clusters	41	44	50	52	38	33	54	30	34	36
Pseudo R^2	0.095	0.095	0.097	0.099	0.089	0.084	0.095	0.097	0.092	0.099

Table 7

Impact of product market competition on firm-level capital constraints - robustness to possible endogeneity of competition intensity.

This table reports results from a two-stage ordered probit model in which we instrument the intensity of product market competition obtained using the main competition index with *customs regulations*, the effect of the country's customs/foreign trade regulations on the firm's operations. In the first stage (Panel A) the competition index is a function of the instrument and the exogenous (explanatory) variables. In the second stage (Panel B), general capital constraints are modeled as a function of the predicted competition index and other explanatory variables. In Model 2 we report a model in which both the first and second stages are augmented with the Lerner index, a measure of banking sector competition, from Table 6. All other variables are defined in Table 1 and Appendix Table A.2. The thresholds (cut points) are suppressed to conserve space. All *z*-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels.

Panel A: First Stage			Panel B: Second Stage		
Dependent variable:	Competition index			General capital constraints	
	(1)	(2)		(1)	(2)
Customs regulations	0.049***	0.049***	*Competition index (Fitted)*	1.543***	1.674***
	(7.407)	(7.193)		(5.466)	(5.226)
Manufacturing dummy	-0.001	-0.014	*Manufacturing dummy*	-0.147*	-0.103
	(-0.028)	(-0.691)		(-1.757)	(-1.174)
Services dummy	-0.052**	-0.070***	*Services dummy*	-0.193**	-0.120
	(-2.539)	(-2.978)		(-2.509)	(-1.495)
Government own. dummy	-0.008	-0.003	*Government own. dummy*	0.064	-0.029
	(-0.416)	(-0.147)		(0.603)	(-0.294)
Small/medium firm dummy	0.032**	0.030	*Small/medium firm dummy*	0.216***	0.217***
	(2.062)	(1.642)		(3.245)	(2.680)
High interest rates	0.050***	0.052***	*High interest rates*	0.204***	0.199***
	(6.064)	(5.976)		(3.946)	(3.458)
Foreign own. dummy	-0.056***	-0.048***	*Foreign own. dummy*	-0.155***	-0.145**
	(-3.682)	(-2.885)		(-2.651)	(-2.328)
Foreign operations dummy	-0.006	-0.020	*Foreign operations dummy*	-0.042	-0.022
	(-0.422)	(-1.167)		(-0.659)	(-0.311)
Foreign trade dummy	0.020	0.023	*Foreign trade dummy*	-0.047	-0.043
	(1.098)	(1.174)		(-0.561)	(-0.439)
Inflation	-0.239**	-0.084	*Inflation*	0.475	0.236
	(-1.975)	(-0.737)		(1.629)	(0.782)
GDP growth	-0.003	0.003	*GDP growth*	0.000	-0.007
	(-0.539)	(0.501)		(0.015)	(-0.225)
GDP per capita	-0.068***	-0.056***	*GDP per capita*	-0.095	-0.124
	(-6.487)	(-5.207)		(-1.571)	(-1.618)
Lerner index		-0.187	*Lerner index*		1.064**
		(-1.506)			(2.576)
No. of firms	2571	2,091		2571	2,091
No. of clusters	56	41		56	41

Table 8

Impact of product market competition on firm-level capital constraints conditional on asymmetric information.

Panel A presents results from an ordered probit model of firm-level general capital constraints on the interaction between product market competition and proxies for information asymmetry: dummies for small/medium-sized firms, (Model 1), firms that use international accounting standards (IAS) (Model 2), and sole proprietorships (Model 3). *"Competition index"* is a firm-specific index of the intensity of product market competition ranging from 0 to 1. Remaining variables are defined in Table 1 and Appendix Table A.2. All z-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels. The models in Panel A are estimated with the same controls as in previous models, but we do not report them to conserve space. Panel B presents the marginal effects of competition when each dummy variable proxy for information asymmetry takes the value of one or zero. The thresholds (cut points) are suppressed to conserve space. *p*-values indicating if the marginal effect is significant is reported in italics below each probability.

Panel A: Probit model coefficient estimates			
	(1)	(2)	(3)
Competition(Main)	0.388**	0.776***	0.545***
	(2.060)	(5.454)	(4.783)
Small/medium firm dummy	0.127	0.243***	0.245***
	(1.238)	(3.713)	(3.973)
Competition(Main) × Small/medium firm	0.288		
	(1.482)		
International Accounting Standards		0.284***	
		(2.787)	
Competition(Main) × Intl Accting Standards		-0.325*	
		(-1.798)	
Sole Proprietorship			-0.128
			(-1.034)
Competition(Main) x Sole Proprietorship			0.381
			(1.319)
Control variables	*yes*	*yes*	*yes*
No. of firms	2,571	2,420	2,484
p-value of fit	0.000	0.000	0.000
No. of clusters	56	56	56
Pseudo R²	0.092	0.097	0.093

Table 8 - continued

Panel B: Marginal Effects of Product Market Competition for Different Categories of Firms				
	Dependent variable: General capital constraints			
Marginal effects of Competition index for/in:	No Obstacle (1)	Minor Obstacle (2)	Moderate Obstacle (3)	Major Obstacle (4)
Model 1:				
Small/Medium firms	-0.159	-0.062	0.005	0.217
	0.000	*0.000*	*0.454*	*0.000*
Large firms	-0.109	-0.027	0.022	0.114
	0.034	*0.052*	*0.046*	*0.039*
Model 2:				
No International Accounting Standards	-0.196	-0.061	0.020	0.236
	0.000	*0.000*	*0.003*	*0.000*
International Accounting Standards	-0.104	-0.044	0.001	0.148
	0.002	*0.001*	*0.816*	*0.001*
Model 3:				
Sole Proprietorship	-0.222	-0.076	0.011	0.286
	0.000	*0.000*	*0.380*	*0.000*
Other form of Business Organization	-0.136	-0.047	0.012	0.171
	0.000	*0.000*	*0.037*	*0.000*

Table 9

The real effects of capital constraints.

The results in this table are from an OLS model of firms' growth, measured as the three-year percentage change in firm sales, on firms' general capital constraints and different representations of the competition index. All variables are defined in Table 1 and Appendix Table A.2. All *t*-statistics (in parentheses) are based on standard errors made robust to clustering at the country level. *p-value of fit* is the *p*-value of the hypothesis that all coefficient estimates are zero. *, **, and *** represent significance at the 0.10, 0.05, and 0.01 levels.

	Dependent variable: Firm growth		
	(1)	(2)	(3)
General capital constraints	-2.969**	-2.724***	-2.909***
	(-2.594)	(-2.865)	(-2.995)
Competition index (Main)	-12.176**		
	(-2.398)		
Competition index (All)		-9.046**	
		(-2.098)	
Competition index (Binary)			-0.472
			(-1.088)
Manufacturing dummy	-7.367	-10.245*	-10.272*
	(-1.498)	(-1.798)	(-1.801)
Services dummy	-2.069	-3.535	-3.436
	(-0.418)	(-0.703)	(-0.683)
Government ownership dummy	-1.447	-3.210	-3.143
	(-0.305)	(-0.849)	(-0.833)
Small/medium firm dummy	0.999	1.080	1.094
	(0.264)	(0.363)	(0.369)
High interest rates	-0.030	-0.432	-0.664
	(-0.023)	(-0.354)	(-0.539)
Foreign ownership dummy	-0.705	-0.229	-0.038
	(-0.220)	(-0.082)	(-0.014)
Foreign operations dummy	5.162	3.699	3.664
	(1.638)	(1.300)	(1.287)
Foreign trade dummy	8.731**	10.317***	10.246***
	(2.125)	(2.946)	(2.938)
Inflation	17.436	25.221	26.053
	(0.794)	(1.488)	(1.527)
GDP growth	1.913**	1.730**	1.722**
	(2.165)	(2.196)	(2.199)
GDP per capita	0.452	1.190	1.436
	(0.369)	(1.015)	(1.260)
No. of firms	1,967	2,706	2,706
p-value of fit	0.002	0.001	0.001
No. of clusters	56	58	58
Pseudo R²	0.032	0.030	0.028

Appendix
Table A.1
Country averages of firm-level capital constraints and other variables
This table provides summary statistics at the country level for the main variables used in the paper. All variables are described in Table 1 and Appendix Table A.2.

	# of firms	General capital constraints	Firm growth	Competition index (Main)	Competition index (All)	Competition index (Binary)	Manufacturing firm dummy	Service firm dummy	Government-owned firm dummy	Small/medium firm dummy	High interest rates	Foreign ownership dummy	Foreign operations dummy	Foreign trade dummy	Inflation	GDP growth rate	GDP per capita
Albania	59	2.864	34.844	0.605	0.519	5.763	0.322	0.627	0.119	0.983	3.475	0.203	0.153	1.000	0.096	2.708	6.671
Argentina	74	3.108	9.493	0.486	0.459	4.797	0.324	0.500	0.041	0.770	3.635	0.351	0.284	0.676	-0.001	2.853	9.020
Armenia	28	2.964	-3.087	0.370	0.269	2.964	0.321	0.500	0.179	0.893	3.000	0.036	0.107	1.000	0.045	4.654	6.783
Azerbaijan	12	2.583	-17.143	0.417	0.389	4.833	0.250	0.500	0.167	1.000	2.917	0.083	0.000	1.000	-0.048	7.733	6.061
Belarus	31	3.065	32.138	0.079	0.103	1.226	0.581	0.258	0.452	0.774	3.194	0.097	0.032	1.000	0.959	7.733	7.812
Belize	23	2.391	11.000	0.289	0.261	3.391	0.478	0.391	0.043	1.000	3.565	0.304	0.217	0.826	-0.010	4.235	7.974
Bolivia	77	3.221	7.407	0.628	0.589	5.701	0.519	0.442	0.000	0.675	3.740	0.234	0.221	0.805	0.048	3.542	6.861
Brazil	165	2.715	4.192	0.333	0.290	3.145	0.315	0.612	0.024	0.824	3.721	0.279	0.303	0.479	0.039	1.427	8.415
Bulgaria	28	3.179	47.037	0.526	0.475	4.429	0.750	0.179	0.464	0.857	2.643	0.286	0.143	1.000	0.098	-0.379	7.221
Canada	84	1.988	19.338	0.149	0.160	2.238	0.274	0.643	0.024	0.714	2.488	0.274	0.381	0.762	0.013	4.095	9.955
Chile	80	2.450	7.727	0.311	0.308	3.488	0.488	0.463	0.038	0.675	3.088	0.338	0.363	0.900	0.041	3.442	8.554
China	86	3.337	6.344	0.408	0.394	4.593	0.605	0.349	0.244	0.721	2.047	0.384	0.151	0.500	-0.011	7.897	6.585
Colombia	92	2.663	5.107	0.506	0.483	4.880	0.380	0.576	0.022	0.522	3.663	0.391	0.315	0.793	0.146	-0.021	7.771
Costa Rica	54	2.519	25.244	0.520	0.506	5.000	0.519	0.389	0.056	0.648	3.148	0.370	0.407	0.833	0.103	7.460	8.218
Croatia	75	3.360	9.173	0.545	0.492	5.293	0.653	0.347	0.453	0.747	3.867	0.107	0.173	1.000	0.049	2.991	8.498
Czech Rep	34	2.853	12.074	0.150	0.161	2.088	0.265	0.676	0.118	0.853	2.676	0.353	0.176	1.000	0.061	-0.784	8.553
Dominican Republic	79	2.658	22.183	0.594	0.557	5.570	0.582	0.329	0.051	0.557	3.519	0.215	0.177	0.899	0.055	7.755	7.517
Ecuador	55	3.309	-4.325	0.583	0.566	5.909	0.545	0.400	0.055	0.800	3.709	0.164	0.200	0.745	0.364	-1.159	7.327
El Salvador	62	2.903	-0.932	0.568	0.533	5.258	0.532	0.403	0.016	0.597	3.694	0.226	0.323	0.710	0.015	3.725	7.455
Estonia	70	2.429	79.194	0.318	0.301	3.700	0.400	0.514	0.171	0.914	3.014	0.271	0.271	1.000	0.056	4.738	8.300
France	40	2.675	23.065	0.250	0.245	3.050	0.400	0.550	0.075	0.800	2.675	0.225	0.200	0.600	0.006	2.741	10.250
Georgia	33	3.333	20.923	0.502	0.461	4.485	0.364	0.485	0.242	0.909	3.697	0.242	0.242	1.000	0.105	5.468	6.114
Germany	88	2.545	11.906	0.378	0.342	4.932	0.205	0.659	0.068	0.841	2.693	0.330	0.114	0.557	0.008	1.669	10.348
Guatemala	52	3.019	15.818	0.536	0.510	5.577	0.442	0.462	0.000	0.750	3.692	0.192	0.269	0.712	0.057	4.402	7.330
Haiti	65	3.585	-6.579	0.737	0.677	6.092	0.431	0.446	0.046	0.769	3.569	0.138	0.046	0.600	0.092	2.228	5.910
Honduras	45	2.800	11.515	0.561	0.529	6.022	0.489	0.467	0.000	0.778	3.667	0.244	0.267	0.600	0.119	2.037	6.574
Hungary	34	2.676	43.226	0.333	0.322	3.794	0.471	0.382	0.324	0.824	3.059	0.118	0.118	1.000	0.114	4.534	8.497
India	100	2.460	9.303		0.308	4.110	0.850	0.020	0.180	0.570	3.320	0.330	0.240	1.000	0.085	5.846	6.063

Table A.1 - *continued*

	# of firms	General capital constraints	Firm growth	Competition index (Main)	Competition index (All)	Competition index (Binary)	Manufacturing firm dummy	Service firm dummy	Government-owned firm dummy	Small/medium firm dummy	High interest rates	Foreign ownership dummy	Foreign operations dummy	Foreign trade dummy	Inflation	GDP growth rate	GDP per capita
Indonesia	76	3.000	-4.509	0.546	0.508	5.961	0.184	0.711	0.066	0.737	3.500	0.158	0.145	0.487	0.321	-2.527	6.932
Italy	63	2.206	13.952	0.263	0.247	2.810	0.238	0.698	0.095	0.698	2.476	0.397	0.238	0.460	0.018	1.816	9.903
Kazakhstan	32	3.219	32.759	0.429	0.302	3.438	0.250	0.344	0.219	0.938	3.625	0.094	0.063	1.000	0.074	0.833	7.202
Kyrgizstan	15	3.800	26.667	0.292	0.314	3.000	0.533	0.133	0.200	0.800	3.933	0.200	0.067	1.000	0.203	5.231	6.734
Lithuania	42	2.976	16.743	0.396	0.304	3.357	0.310	0.595	0.095	0.976	3.381	0.119	0.167	1.000	0.029	2.831	7.598
Malaysia	58	2.448	1.774	0.246	0.218	3.466	0.586	0.310	0.017	0.828	2.586	0.172	0.121	0.603	0.039	2.014	8.431
Mexico	50	3.340	28.486	0.560	0.518	5.380	0.560	0.340	0.000	0.800	3.620	0.180	0.300	0.780	0.151	5.186	8.169
Moldova	36	3.611	-16.042	0.476	0.369	4.167	0.472	0.250	0.306	0.806	3.917	0.056	0.028	1.000	0.221	-2.767	6.478
Nicaragua	66	3.182	20.529	0.683	0.656	6.409	0.470	0.455	0.030	0.833	3.636	0.136	0.136	0.591	0.114	5.511	6.094
Pakistan	64	3.266	11.095	0.577	0.517	5.875	0.484	0.484	0.078	0.813	3.531	0.172	0.266	0.828	0.051	2.408	6.219
Panama	50	2.120	8.351	0.587	0.568	5.500	0.520	0.420	0.060	0.500	2.760	0.180	0.280	0.900	0.010	3.927	8.068
Peru	67	3.015	0.571	0.618	0.554	5.239	0.403	0.403	0.015	0.627	3.552	0.224	0.179	0.522	0.052	2.387	7.769
Philippines	80	2.663	2.985	0.506	0.478	5.575	0.475	0.513	0.013	0.788	3.375	0.225	0.125	0.538	0.079	2.668	7.041
Poland	100	2.760	32.289	0.574	0.482	5.040	0.460	0.380	0.300	0.820	3.490	0.100	0.150	1.000	0.091	5.233	8.267
Portugal	73	1.671	12.342	0.363	0.365	5.699	0.233	0.712	0.041	0.767	2.301	0.301	0.288	0.384	0.025	3.648	9.394
Romania	25	3.440	37.318	0.367	0.338	3.760	0.680	0.320	0.320	0.760	3.760	0.440	0.120	1.000	0.421	-4.387	7.299
Russia	66	2.970	55.345	0.322	0.281	3.803	0.530	0.409	0.197	0.818	3.242	0.076	0.091	1.000	0.432	0.467	7.699
Singapore	84	1.917	12.215	0.191	0.190	2.512	0.333	0.488	0.048	0.655	2.048	0.369	0.524	0.679	-0.001	4.861	10.148
Slovakia	45	3.400	23.722	0.338	0.288	3.200	0.311	0.578	0.089	0.933	3.511	0.067	0.022	1.000	0.083	4.067	8.288
Slovenia	77	2.364	31.769	0.408	0.402	4.740	0.532	0.325	0.403	0.909	3.377	0.143	0.208	1.000	0.073	4.533	9.275
Spain	73	2.219	26.680	0.348	0.328	3.425	0.411	0.534	0.055	0.863	2.164	0.219	0.274	0.603	0.021	4.093	9.710
Sweden	79	1.848	22.403	0.202	0.205	2.759	0.304	0.519	0.038	0.848	1.835	0.253	0.316	0.696	0.002	3.261	10.277
Thailand	35	3.143	2.797		0.349	4.114	0.514	0.457	0.000	0.829	3.514	0.314	0.229	0.971	0.040	-2.665	7.924
Trinidad & Tobago	61	2.869	20.538	0.310	0.296	3.967	0.508	0.344	0.098	0.803	3.623	0.197	0.115	0.754	0.044	4.720	8.456
Turkey	60	3.283	9.400	0.463	0.439	5.017	0.667	0.167	0.083	0.833	3.800	0.183	0.267	1.000	0.557	1.825	8.036
UK	55	2.273	30.024	0.225	0.242	2.945	0.309	0.491	0.018	0.964	2.927	0.164	0.291	0.400	0.025	2.814	9.938
Ukraine	58	3.500	25.854	0.527	0.442	4.759	0.483	0.241	0.224	0.810	3.879	0.069	0.052	1.000	0.152	-1.711	6.733
Uruguay	65	2.677	2.571	0.473	0.436	4.154	0.631	0.308	0.000	0.785	3.385	0.154	0.477	0.877	0.079	2.247	8.750
US	73	2.288	14.314	0.203	0.196	3.274	0.247	0.603	0.096	0.740	2.534	0.096	0.219	0.452	0.019	4.376	10.314
Venezuela	65	2.492	-2.294	0.535	0.510	5.169	0.462	0.446	0.046	0.554	3.662	0.308	0.292	0.785	0.259	0.152	8.152

Table A.2

Variable definitions

Data in Panel A are from the WBES Survey. The WBES four-point scale is: 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Data in Panel B are from the World Development Indicators of the World Bank. Italicized word in parentheses is the name of the variable obtained from the data described.

Panel A. Data Obtained from the WBES Survey

Company size: number of full-time employees (today)

Small firms are those with 5 to 50 employees, medium-sized firms are those with 51 to 500 employees, and large firms are those with more than 500 employees. In our sample, about 75% of firms are small and medium-sized firms (*Small/medium firm dummy*).

Industry

Manufacturing (*Manufacturing dummy*), services (*Services dummy*), and other industries.

Please judge, on a four-point scale, how problematic are the following factors for the operation and growth of your business:

Financing (*General capital constraints*)

Please judge on a four-point scale how problematic are these different financing issues for the operation and growth of your business

Credit/capital constraints related to non-price channels of capital rationing

i. collateral requirements of banks/financial institutions (*Collateral requirements*)

ii. bank paperwork/bureaucracy (*Bank paperwork*)

iii. need special connections with banks/financial institutions (*Special connections*)

iv. corruption of bank officials (*Corruption*)

iv. banks lack money to lend (*banks lack money*)

v. high interest rate (*High interest rate*)

Credit constraints related to non-domestic bank sources of credit/capital

1. access to specialized export finance (*Export financing*)

2. access to lease finance for equipment (*Lease financing*)

3. access to foreign banks (*Foreign bank credit*)

4. access to non-bank equity/investors/partners (*Non-bank equity*)

Please judge, on a four-point scale, how problematic are these different regulatory areas for the operation and growth of your business.

Customs/foreign trade regulations in your country (*Customs regulations*)

Does your firm have holdings or operations in other countries? YES   NO

Foreign operations (*Foreign operations dummy*)

Does your firm export?   yes (specify % of total sales) _____   no

If you import, how long does it typically take from the time your goods arrive in their point of entry (e.g., port, airport) until the time you can claim them from customs?   _____ days   N/A

Foreign trade dummy variables (*Foreign trade dummy*; export/sales (*Exports (% of sales)*))

Table A.2 - *continued*

Please judge, on a four-point scale, how problematic are the following practices of your competitors for your firm:

a. They avoid sales tax or other taxes (*Tax avoidance*).

b. They do not pay duties or observe trade regulations (*Duty/trade reg. avoidance*).

c. Foreign producers sell below international prices (*Foreign dumping*).

d. Domestic producers unfairly sell below my prices (*Domestic dumping*).

e. They avoid labor taxes/regulations (e.g., social security) (*Labor tax/reg. avoidance*).

f. They violate my copyrights, patents, or trademarks (*Violate copyright/patent*).

g. They receive subsidies (including toleration of tax arrears) from national/local government (*Government subsidy*).

h. They have favored access to credit, infrastructure services or customers (*Favored access*).

Individual forms of product market competition (*Form of competition*)

Competition index: firm-specific competition index based on subtracting one from each response on the four-point scale and summing over all eight forms of competition and dividing by 24 with a range of 0 if the firm faces none of competition *a* to *h* and 1 maximum if it faces all forms of competition (*Main*). A second index assigns a value of 0 to a form of competition to which the firm did not respond (*All*). A third index is based on creating a binary variable, 1 if the firm's response is 2, 3, or 4 and 0 otherwise, from the response on the four-point scale and summing over all eight forms of competition (*Binary*).

Share of state ownership? yes (specify % of total ownership) _____ no

Share of foreign ownership? yes (specify of total ownership and nationality of leading foreign owner) _____ no

Foreign ownership dummy (*Foreign own dummy*)

Please estimate the growth of your company's sales… over the past three years.

Firm growth (*Firm growth*)

Panel B. Country-Level Variables	
Variable	**Definition; Source**
Inflation	Three-year average of the change in the country's consumer price index (CPI) from 1997-1999; World Bank.
GDP growth	Three-year average of the country's GDP growth rate from 1997-1999; World Bank.
GDP per capita	Three-year average of the country's GDP per capita in US$ from 1997-1999; World Bank.
Bank concentration	The share of the largest three banks in total banking sector assets; Beck et al. (2004); FRED/Bankscope
Lerner index	Difference between a country's banking sector output prices and its marginal costs over output prices; FRED/Bankscope
Boone indicator	Measures extent to which a bank uses its efficiency to improve performance through acquisition of market share; FRED/Bankscope
Restrict	An indicator of the degree to which banks' activities are restricted outside the credit and deposit business; Beck et al. (2004)
Fraction denied	The share of bank license applications rejected; Beck et al. (2004)
Banking freedom	A general indicator of the absence of government interference in the banking sector; Beck et al. (2004)

Table A.2 – *continued*

Variable	Definition; Source
Credit registry	A summary variable of the amount of information and the number of institutions that have access to borrower information from credit registries in a country; Beck et al. (2004)
Foreign bank share	The percentage of assets in banks that are majority foreign owned; Beck et al. (2004)
Public bank share	The percentage of assets in banks that are majority government owned; Beck et al. (2004)