Finance, Firm Size, and Growth

Thorsten Beck, Asli Demirguc-Kunt, Luc Laeven and Ross Levine*

June 7, 2006

Abstract: This paper provides empirical evidence that financial development boosts the growth of small firms more than large firms and hence provides information on conflicting theoretical predictions about the distributional effects of financial development. Using cross-industry, cross-country data, the results are consistent with the view that financial development exerts a disproportionately positive effect on small firms. These results have implications for understanding the political economy of financial sector reform.

Keywords: Firm Size; Financial Development; Economic Growth

JEL Classification: G2, L11, L25, O1

* Beck, Demirgüç-Kunt: World Bank; Laeven: International Monetary Fund and CEPR; Levine: Brown University and NBER. Corresponding author: Ross Levine, Department of Economics, Brown University, Providence, Rhode Island, 02912, Email: Ross_Levine@brown.edu. We would like to thank Maria Carkovic, Stijn Claessens, Bill Easterly, Alan Gelb, Krishna Kumar, Michael Lemmon, Karl Lins, Alan Winters and seminar participants at the World Bank, University of Minnesota, New York University, University of North Carolina, the University of Stockholm, Tufts University, and the University of Utah for helpful comments, and Ying Lin for excellent research assistance. We also thank Lori Bowan at the U.S. Census Bureau for help with the U.S. Economic Census data on firm size distribution. This paper was partly written while the third author was at the World Bank. This paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the International Monetary Fund, the World Bank, their Executive Directors, or the countries they represent.

I. Introduction

Although research shows that financial development accelerates aggregate economic growth (Levine, 2006), economists have devoted few resources to resolving conflicting theoretical predictions about the distributional effects of financial development. Some theories imply that financial development disproportionately helps small firms. If smaller firms find it more difficult to access financial services due to greater information and transaction costs, then financial development that ameliorates these frictions will exert an especially positive impact on smaller firms (Galor and Zeira, 1993; Aghion and Bolton, 1997)). In contrast, if fixed costs prevent small firms from accessing financial services, then financial development will disproportionately help larger firms (Greenwood and Jovanovic, 1990; Haber et al., 2003).

Besides assessing theoretical disputes, political economy and public policy considerations motivate our study of the cross-firm distributional effects of financial development. If financial development affects small firms differently from large ones, then firms might disagree about the desirability of financial reforms. Even if financial development helps all firms, one set of firms might oppose financial reforms that diminish the group's comparative power, which is consistent with influential work on the political economy of financial policies such as Kroszner and Stratmann (1998), Kroszner and Strahan (1999), Rajan and Zingales (2003), Pagano and Volpin (2005), and Perotti and von Thadden (2006). Rather than analyzing political lobbying by firms of different sizes, we examine whether financial development has cross-firm distributional effects. In addition, the World Bank pours about $2 billion per year toward subsidizing small firms, which further motivates our examination of the cross-firm distributional effects of financial development.

We examine whether industries that have a larger share of small firms for technological reasons grow faster in economies with well-developed financial systems. As formulated by Coase (1937), firms should internalize some activities, but size enhances complexity and coordination costs. Thus, an industry's "technological" firm size depends on that industry's particular production processes, including capital intensities and scale economies. After computing an estimate of each industry's technological share of small firms, we use a sample of 44 countries and 36 industries in the manufacturing sector to examine the growth rates of different industries across countries with different levels of financial development. If "small-firm industries" – industries naturally composed of small firms for technological reasons – grow faster than "large-firm industries" in economies with more developed financial systems, this suggests that financial development boosts the growth of small-firm industries more than large-firm industries. In contrast, we might find that financial development disproportionately boosts the growth of large-firm industries or that financial development fosters balanced growth.[1]

More specifically, we use a difference-in-difference approach to examine whether financial development enhances economic growth by easing constraints on industries that are technologically more dependent on small firms. We first measure an industry's "technological" composition of small firms relative to large firms as the share of employment in firms with less than 20 employees in the United States in 1992. Assuming that financial markets are relatively frictionless in the United States, we therefore identify each industry's "technological" share of small firms in a relatively frictionless financial system. Then, we extensively test the validity of

[1] Besides the argument that financial development disproportionately helps large firms because small firms are cut-off from financial development that we mention above, Petersen and Rajan (1994, 1995) show that local banking monopolies foster close ties between banks and small firms that ease credit constraints. Therefore, financial development that intensifies competition and loosens these ties might hurt small firms. On a global scale, Gozzi, et al (2006) show that when financial development lowers barriers to firms accessing international capital markets, it has predominantly helped large firms.

this benchmark measure of technological small firm share by using (i) using data from the U.S. in 1958 to compute small firm share, (ii) measuring small firm share at different stages of the U.S. business cycle, (iii) computing technological small firm share from different countries, and (iv) defining small firm in different ways, ranging from five to 500 employees.

The results indicate that small-firm industries grow disproportionately faster in economies with well-developed financial systems. This does not imply that financial development slows the growth of large firms. Rather, financial development exerts a particularly positive growth effect on small-firm industries. Furthermore, our analyses suggest that large-firm industries are not the same as industries that rely heavily on external finance. Rajan and Zingales (1998) show that industries that are technologically more dependent on external finance grow disproportionately faster in economies with better developed financial systems. When controlling for cross-industry differences in external dependence, we continue to find that financial development disproportionately accelerates the growth of industries that are composed of small firms for technological reasons.

The results also provide information regarding which particular characteristics of small-firm industries account for their greater sensitivity to financial development. One possibility is that small firms are more informationally opaque than large firms, so that financial improvements that lower the marginal costs of acquiring information disproportionately facilitate the flow of capital to small firms. Another possibility is that small firms rely more on intangible assets, so that financial innovations that reduce the need for collateral ease credit constraints on small firms more than large ones. A different possibility is that the results are spurious and arise only because small-firm industries enjoyed greater growth opportunities than large-firm industries over the sample period. From this perspective, financially more developed economies

were simply better at exploiting these growth opportunities that happened to be concentrated in small-firm industries. If these potential characteristics of small-firm industries are driving the results, then our findings should vanish when we control for them.

The results indicate that financial development still exerts a disproportionately positive impact on small-firm industries even when controlling for cross-industry differences in informational opacity, asset intangibility, and growth prospects, though the estimated size of the relationship diminishes. This suggests that financial development affects small-firm industries beyond opacity, collateral, and growth prospects. Although we do not have direct measures of firms access to financial services, these findings are consistent with the view that financial development makes it affordable for more small firms to purchase financial services. Accordingly, the results suggest that financial development influences the extensive margin by allowing new small firms to access financial services as well as facilitating the intensive margin by improving financial services for those already using the financial system.[2]

Our paper complements two recent empirical papers. First, using evidence across different regions in Italy, Guiso, Sapienza, and Zingales (2004) find that small firms enjoy more growth benefits than large firms from regional financial development.[3] Rather than focusing on inter-regional differences in Italy, we undertake a cross-country, cross-industry investigation. Second, Beck, Demirguc-Kunt, and Maksimovic (2005) use survey data to assess the relationship between the financing obstacles that firms report they face and firm growth. They

[2] Although Beck, et al. (2004) show that small firms finance a higher percentage of investment with external finance in countries with stronger property rights protection, we do not have direct evidence on fixed costs or on whether a higher proportion of small firms accesses financial services in more financially developed economies. Thus, we can only draw the cautious conclusion that the results are consistent with the view that financial development lowers the fixed costs of accessing financial services with disproportionately positive ramifications on small firms. For the case of the United States, where there are data on fixed costs, Jayaratne and Strahan (1998) find that efficiency improvements within U.S. banks lowered the fixed costs included in loan prices.

find that the negative impact of reported obstacles on firm growth is stronger for small firms than large firms and stronger in countries with under-developed financial systems.[4] Their study has the advantage of using cross-country, firm-level data, but it has the disadvantage of relying on survey responses regarding the obstacles that firms encounter. In contrast, we use a different methodology that assesses whether industries that are naturally composed of small firms grow faster in countries with better-developed financial systems. Our research provides complementary information on whether financial development fosters aggregate growth by disproportionately facilitating the growth of small firm industries.

II. Data

We construct a cross-country, cross-industry dataset that includes new data on firm size distribution to assess whether financial development boosts the growth of industries that for technological reasons are naturally composed of small firms more than the growth of large-firm industries. Specifically, we compile data on (i) industry growth, (ii) each industry's technological firm size, and (iii) country-level indicators of financial development. This section describes these key variables. Furthermore, in robustness tests presented below, we construct and use additional information on industry and country traits. The data cover 44 countries and 36 industries in the manufacturing sector. Table 2 presents descriptive statistics.

II.1. Industry growth rates

Growth$_{i,k}$ equals the average annual growth rate of real value added of industry *k* in country *i* over the period 1980 to 1990. The data are from the *Industrial Statistics Yearbook*

[3] Guiso, Sapienza, and Zingales (2004) also find that more financially developed regions of Italy enjoy faster rates of new firm creation. Similarly, Black and Strahan (2002) show that more competitive banking markets are associated with higher rates of new incorporations in the United States.
[4] Beck et al. (2006) find that financial development reduces constraints on firms choosing their optimal sizes.

database (United Nations Statistical Division, 1993). When we extend the measurement period to 1999, the sample drops by one-third because of missing observations on several countries and industries. Nevertheless, the paper's results hold over the longer sample period with the smaller number of observations.

II.2. Measure of Small Firm Share

Since our goal is to assess whether industries that are naturally composed of small firms grow faster, or slower, than large-firm industries in countries with greater financial development, we need to measure each industry's "natural" or technological share of small firms. Differences in productive technologies influence an industry's technological firm size (Coase, 1937; Sutton, 1991). Therefore, to get a proxy measure of each industry's share of small firms, we need a benchmark economy with relatively few market imperfections and policy distortions, so that we capture, as closely as possible, only the impact of cross-industry differences in production processes, capital intensities, and scale economies on cross-industry firm size.

We start by using the United States to form the benchmark measure of an industry's technological share of small firms. This relies on the assumption that U.S. financial markets are relatively frictionless. Since the United States has one of the most developed financial systems in the world by many measures (Demirguc-Kunt and Levine, 2001), it represents a natural benchmark for providing a ranking of each industry's technological share of small firms. Furthermore, the perfect benchmark country has relatively frictionless markets and few policies distorting firm size beyond the financial sector. For instance, differences in human capital, market size, contract enforcement, and overall institutional development may influence industrial firm size beyond technological factors (Lucas, 1978; You, 1995). Thus, the ideal benchmark economy not only has relatively frictionless financial markets; it has relatively frictionless

markets in general. Again, the United States is a reasonable initial benchmark. The United States has the full spectrum of human capital skills (Easterly and Levine, 2001). Furthermore, comparative studies of U.S. and European labor markets suggest that the United States has many fewer policy distortions. Moreover, the U.S. internal market is huge and – given its size – it is comparatively open to international trade. Many studies also point to the United States as having a superior contracting environment and well-developed institutions (La Porta et al, 1999).

The empirical methodology does not require that the United States has perfect financial markets, labor markets, contracting systems, or institutions. Rather, we require that policy distortions and market imperfections in the United States do not distort the ranking of industries in terms of the technological share of small firms within each industry. Thus, we begin with the following benchmark measure of each industry's technological share of small firms.

Small Firm Share$_k$ equals industry *k*'s share of employment in firms with less than 20 employees in the United States, and is obtained from the 1992 Census. We measure Small Firm Share in 1992 because the U.S. Census did not start collecting comprehensive firm size distribution data at the firm level until 1992. For a less refined categorization of firms by employment size, the data extend back to 1958. Below, we confirm the findings with the 1958 data. In our baseline regressions, we use Small Firm Share as the measure of each industry's "natural" or "technological" share of small firms. Table 1 lists the Small Firm Share for each industry in the sample. The Small Firm Share has a mean of 6 %, but varies widely from 0.1 % in manufacturing of pulp, paper and paperboard to 21% in wood manufacturing.

Below, we present a large battery of sensitivity analyses of the benchmark measure of Small Firm Share. We use different measures of Small Firm Share, different benchmark years from the U.S., different benchmark countries, and different cut-offs for the definition of a small

firm, ranging from five to 500. We also control for numerous industry traits, including asset tangibility and opacity, sales growth, and dependence on external finance. We further condition on country characteristics, including the level of economic development, labor market frictions, and market size.

II.3. Indicator of financial development

Ideally, one would like indicators of the degree to which the financial system ameliorates information and transactions frictions and facilitates the mobilization and efficient allocation of capital. Specifically, we would like indicators that capture the effectiveness with which financial systems research firms and identify profitable projects, exert corporate control, facilitate risk management, mobilize savings, and ease transactions. Unfortunately, no such measures are available across countries. Consequently, we rely on an assortment of traditional measures of financial development that existing work shows are robustly related to economic growth.

Private Credit$_i$ equals the value of credits by financial intermediaries to the private sector divided by GDP for country i. It captures the amount of credit channeled through financial intermediaries to the private sector. Levine, Loayza, and Beck (2000) show that Private Credit is a good predictor of economic growth. In our baseline regression, we measure Private Credit in the initial year of our estimation period, 1980 (or the first year in which data are available), to control for reverse causation. Since using initial values instead of average values implies an informational loss, we also use Private Credit averaged over the full period 1980-89 and employ instrumental variables to control for endogeneity. Data for Private Credit are from Beck, Demirguc-Kunt and Levine (2000). There is wide variation in Private Credit, ranging from 7% in Bangladesh to 117% in Japan. Below, we define and use several alternative indicators of financial development, including a measure of stock market development.

III. Methodology

To examine whether industries that are naturally composed of small firms grow faster than large-firm industries in countries with higher levels of financial development, we interact an industry characteristic – each industry's technological small firm share – with a country-characteristic – the level of financial development. In describing the econometrics, we only discuss the interaction between financial development and Small Firm Share. In the actual implementation, we control for many interactions between country and industry characteristics.

Consider the following regression:

$$Growth_{i,k} = \sum_i \alpha_i Country_i + \sum_k \beta_k Industry_k + \gamma Share_{i,k} + \delta (Small\ Firm\ Share_k * FD_i) + \varepsilon_{i,k},$$

where $Growth_{i,k}$ is the average annual growth rate of value added, in industry k and country i, over the period 1980 to 1990. $Country_i$ and $Industry_k$ are country and industry dummies, respectively, and $Share_{i,k}$ is the share of industry k in manufacturing in country i in 1980. *Small Firm* $Share_k$ is the benchmark share of small firms in industry k, which in our baseline specification equals the share of employment in firms with less than 20 employees in the United States in 1992. FD_i is an indicator of financial development for country i, which equals Private Credit in our baseline regression. We include the interaction between the share of small firms in an industry and financial development. We do not include financial development on its own, since we focus on within-country, within-industry growth rates. The dummy variables for industries and countries correct for country and industry specific characteristics that might determine industry growth patterns. We thus isolate the effect that the interaction of Small Firm Share and Private Credit has on industry growth relative to country and industry means. By

including the initial share of an industry we control for a convergence effect: industries with a large share might grow more slowly, suggesting a negative sign on γ. We include the share in manufacturing rather than the level, since we focus on within-country, within-industry growth rates. We exclude the United States (the benchmark country) from the regressions.

The focus of our analyses is on the interaction between financial development and small firm share, i.e., we focus on the sign and significance of δ. If δ is positive and significant, this suggests financial development exerts a disproportionately positive effect on small-firm industries relative to large-firm industries. This would suggest that financial development tends to ease growth constraints on small firms more than on large firms.

Apart from using Ordinary Least Squares (OLS) regressions, we also run Instrumental Variables (IV) regressions to address the issue of endogeneity of financial development. Based on research by La Porta et al. (1998), Levine (1999), Levine, Loayza, and Beck (2000), and Beck, Demirguc-Kunt, and Levine (2003), we use the legal origin of countries as instrumental variables for financial development. Legal systems are typically classified into four major legal families: the English common law and the French, German, and Scandinavian civil law countries. An extensive literature holds that British common law countries do a comparatively better job at protecting private property rights, fostering private contracting, and hence promoting financial development. We use dummy variables for these categories of legal origin as instruments (excluding one category, Scandinavian civil law countries, which is included in the constant term).

IV. Results, Extensions, and Sensitivity Tests

IV.1. Main Results

Table 3 results suggest that small-firm industries (industries with technologically larger shares of small firms) grow faster in economies with better-developed financial intermediaries. The interaction of Private Credit with Small Firm Share enters positively and significantly at the 5% level in column (1). We also find that the coefficient on Industry Share enters negatively and significantly, suggesting some convergence in industrial composition. Overall, these results indicate that industries whose organization is based more on small firms than on large firms grow faster in countries with better-developed financial intermediaries.

The relationship between financial development, an industry's small firm share, and industry growth is not only statistically, but also economically large. To illustrate the effect, we compare the growth of an industry with a relatively large share of small firms and an industry with a relatively low share of small firms across two countries with different levels of financial development. Specifically, the results in column (2) of Table 3 suggest that the furniture industry (75^{th} percentile of Small Firm Share) should grow 1.4% per annum faster than the spinning industry (25^{th} percentile of Small Firm Share) in Canada (75^{th} percentile of Private Credit) than in India (25^{th} percentile of Private Credit). Since the average growth rate in our sample is 3.4%, this is a relatively large effect.

Given the influential findings of Rajan and Zingales (1998), we were concerned that there might be a large, negative correlation between industries that are naturally heavy users of external finance and industries that are naturally composed of small firms. If this were the case, then it would be difficult to distinguish between the finding that externally dependent industries grow faster in economies with well-developed financial systems and our result that small-firm

industries grow faster in economies with well-developed financial systems. While there is a negative correlation between Small Firm Share and External Dependence, it is very small (-0.04) and insignificant. This suggests that the industry characteristics explaining firm size distribution are not the same as the characteristics explaining technological dependence on external finance, and that the firm size channel we have identified is different from the external financial dependence channel.

Table 3 demonstrates the robust link between financial development, small firm share, and industry growth when controlling for external dependence. As shown in column (2), the interaction between each industry's level of external dependence and financial development (Private Credit * External Dependence) enters positively and significantly. This indicates that industries that are naturally heavy users of external finance grow faster in economies with higher levels of financial development. Moreover, column (2) shows that the interaction between each industry's technological Small Firm Share and financial development (Private Credit*Small Firm Share) enters positively and significantly when controlling for external dependence. Thus, we find that industries with technologically larger shares of small firms grow more quickly in countries with higher levels of financial development even when controlling for cross-industry differences in external dependence. In unreported regressions, we also tested whether the interaction between Private Credit and small firm share varies across industries with different degrees of external dependence. The triple interaction term does not enter significantly and the interaction of Private Credit with small firm share continues to enter significantly and positively. This result suggests that small firms consistently face high financing constraints, irrespective of whether they are in an industry with a naturally high or low demand for external finance.

Table 3 provides five additional robustness tests. First, we were concerned that there may be industry-specific shocks within industries across all countries. If this is the case, then it is inappropriate to treat the errors as independent. Thus, in column (3), we present a regression where we cluster at the industry level, i.e. we allow error terms to be correlated within industries but not across industries. As shown, this does not change the results.

Next, we use two IV estimators to assess whether the relationship between financial development and industry growth is due to reverse causation or simultaneity bias. We extract the exogenous component of Private Credit using the legal origin of each country. A substantial body of work demonstrates that dummy variables for the legal origin of countries are valid instruments for Private Credit in cross-country growth regressions (e.g., Levine, Loayza, and Beck, 2000). Following this literature, we use four dummy variables for whether the country's commercial law is based on the British common law, French civil law, German civil law, or Scandinavian civil law. We use these legal origin dummy variables to instrument for both the interaction of Private Credit with Small Firm Share and the interaction of Private Credit with External Financial Dependence. As shown in columns 4 and 5, the interaction of Small Firm Share with Private Credit continues to enter positively and significantly when using IVs and when also correcting the standard errors for clustering.[5]

The fourth and fifth robustness tests in Table 3 involve sampling. For three industries we had data on fewer than ten firms when computing the small firm share in the United States. In column 6, we exclude these three industries from the analyses (Tobacco, Petroleum Refineries, and Paper and Pulp). As shown, the results hold. Next, we were concerned that some industries played very little role in some countries. Including these in the analyses, therefore, may bias the

[5] The results hold when using alternative instruments based on the work of Beck, et al., (2003) and Easterly and Levine (2003), e.g., latitude, settler mortality, religious composition, and ethnic fractionalization.

results. Thus, for each country, we excluded industries below the median share of value added. These results are presented in Table 3 column 7. We continue to find that financial development exerts a particularly large impact on small firm industries.

IV.2. Controlling for Different Industry Characteristics

By conditioning on industry traits, this subsection (1) further gauges the validity and robustness of the findings and (2) searches for which characteristics of small-firm industries make them more sensitive to financial development than large-firm industries. First, we evaluate whether a spurious relationship between small firm industries and growth opportunities invalidates our conclusions. Specifically, if (1) financial development has a disproportionately positive effect on industries with good growth opportunities (Fisman and Love, 2003) and (2) small-firm industries just happened to enjoy good growth opportunities over the sample period, then we might erroneously infer that financial development exerts an especially positive impact on small firms. Since there is not a strong correlation between Small Firm Share and sales growth (-0.08 and insignificant), this is unlikely to be driving the results. Moreover Table 4's column 1 includes the interaction between Private Credit and industrial Sales Growth to control for growth opportunities. Sales Growth is calculated as real annual growth in net sales of U.S. firms over the period 1980 to 1989 using data from Compustat. Even when controlling for both external dependence and growth opportunities, the interaction of Small Firm Share with Private Credit enters positively and significantly.

Second, we test whether differences in asset intangibility explain why financial development has a larger impact on small-firm industries than large-firm industries. Improvements in the operation of the financial system may facilitate the extension of credit to firms that employ a high proportion of intangible assets. Indeed, Claessens and Laeven (2003)

show that industries that naturally use a high proportion of intangible assets grow faster in countries with strong private property rights protection. If (a) small firms rely heavily on intangible assets and (b) strong private property rights are closely associated with financial development, then our findings may simply be confirming Claessens and Laeven (2003). In Table 4 column 2, we therefore control for the interaction of Property Rights with the percentage of intangible assets in each industry. We use the ratio of intangible assets to fixed assets of U.S. firms over the period 1980 to 1989 calculated using data from Compustat. We confirm the Claessens and Laeven (2003) result: The interaction of Property Rights with Intangibility enters significantly and positively. However, the interaction between financial development and small-firm shares continues to enter significantly. Although the magnitude of the negative coefficient on the Private Credit-Small Firm Share interaction term falls, we continue to find that industries with a larger small firm share grow faster in economies with better-developed financial intermediaries.[6] Thus, small-firm share is measuring more than asset intangibility.

Third, we assess whether differences in informational asymmetries account for financial development's disproportionate influence on small-firm industries. Cross-industry differences in technological firm size might be correlated with informational opacity. For example if small-firm industries are more opaque than large firm industries, then financial innovations that lower informational barriers will disproportionately benefit small firms. To test this, we use two measures of the informational opacity of industries. First, Rating Splits measures disagreement between the two major bond rating agencies – Moody's and S&P – about the risk of U.S. firms. Taken from Morgan's (2002) database, this measure of disagreement is based on the ratings of

[6] Consistent with the view that industries with a high proportion of small firms rely more on intangible assets, the correlation between Small Firm Share and Intangibility is 0.43 and significant at the five percent level. Nevertheless, even when controlling for the interaction of Property Rights and Intangibility, the results on financial development

almost 8,000 firms during the period 1983-1993 firms. We compute the average within each industry to produce an industry-level measure of the degree to which bond rating agencies disagree about firms. Greater disagreement suggests greater opacity. The second measure of informational opacity comes from Durnev, Morck, and Yeung (2004), who measure the degree of synchronicity in stock returns within industries in the United States. They compute the degree to which individual stock prices move with average stock prices in an industry based on an R-square measure of synchronicity. They interpret a higher R-squared – greater synchronicity – as an indication that investors have a more difficult time discerning firm-specific differences. As shown, adding either of these opacity measures does not change the results on Small Firm Share (Table 4 columns 3 and 4), suggesting that small-firm industries are not only a proxy for greater informational opacity.

Finally, we simultaneously control for all of these industry traits in assessing the independent relationship industrial performance and the interaction between Private Credit and Small Firm Share (Table 4 column 5). As shown, we continue to find that financial development exerts a disproportionately positive effect on small-firm industries when controlling for numerous industry traits. The magnitude of the relation between industry growth and the interaction between Small Firm Share and Private Credit diminishes when controlling for these other industry traits, suggesting the Small Firm Share partially reflects cross-industry differences in external dependence, growth opportunities, asset intangibility, and informational opacity. The relation between industry growth and the Small Firm Share – Private Credit interaction term does not vanish, however, indicating that Small Firm Share does not only reflect these industry characteristics. The robustness of Small Firm Share indirectly suggests that financial

---

and Small Firm Share continue to hold. Furthermore, we tried an interaction of intangibility and financial development and obtained similar results.

development operates at the extensive margin by allowing new small firms to access growth-enhancing financial services.

IV.3. Controlling for Different Country Characteristics

Next, we assess whether financial development simply proxies for various country characteristics that interact with industry firm size to shape cross-industry growth rates. First, financial development might simply proxy for the overall level of economic and institutional development, which might exert particularly beneficial effects on small firms. Thus, we include the interaction between Per Capita GDP and Small Firm Share (Table 4 column 76. In unreported tests, we also included a proxy for educational attainment and its interaction with Small Firm Share. A more educated population might be more conducive to the growth of industries composed of smaller (or larger) firms since technical, entrepreneurial, and managerial skills influence industrial organization and growth. Adding this additional term did not change the results on the interaction between financial development and Small Firm Share and did not enter independently significantly. Second, industries that depend on relatively large firms may grow faster in economies with larger markets that allow them to exploit economies of scale more fully (Braun and Raddatz, 2005). To test this, we include a proxy for market size: openness to international trade, which is measured as exports plus imports divided by GDP (Table 4 column 7). In unreported tests, we also used the size of the economy (GDP) as a proxy for market size and this did not alter the results. Third, financial market frictions might be highly correlated with regulatory impediments to labor mobility and new firm formation. If this is the case, we might inappropriately interpret the results as applying to finance when they really apply to other frictions. For instance, Klapper, Laeven, and Rajan (2006) find that new firms are disproportionately hurt by regulatory impediments to labor mobility and high entry barriers.

Thus, we control for these country traits (Table 4 column 8). To save space, we only report the results on entry barriers but obtain similar result when using regulatory restrictions on labor mobility.

The finding that financial development disproportionately boosts the growth of industries that are naturally composed of small firms holds even when controlling for these other country characteristics. The interaction of Private Credit with Small Firm Share enters positively and significantly in all of the Table 4 regressions. Furthermore, this paper's core results on financial development, industrial small firm share, and industry growth are robust to including all of the industry and country trait variables simultaneously (Table 4 column 10).

IV.4. Alternative Definitions of a Small Firm

Table 5 indicates that the results are robust to using alternative definitions of a small firm. We use four different cut-offs to define a small firm: 5, 10, 100 and 500 employees respectively.[7] Table 1 lists Small Firm Share for the different definitions of a small firm. There is a high correlation among the different measures of Small Firm Share, and the average correlation is 91%. Not surprisingly, the correlation decreases with higher threshold measures of firm size. The correlation between S5 and S10 is 99%, but 78% between S5 and S500. Nevertheless, using different cut-offs provides additional robustness tests and more fully characterizes the relationship between cross-industry firm size, financial development, and growth.

The significance of the interaction term between Private Credit and Small Firm Share dissipates when increasing the cut-off size for the definition of a small firm. For example, the p-value rises toward 0.10 when defining a small firm as having up to 100 employees. Once we include firms up to 500 employees in the definition of Small Firm Share, then the interaction of financial development and firm size distribution becomes insignificant. These sensitivity checks

emphasize that financial development exerts a particularly large growth effect on industries with a technologically large share of firms with less than 100 employees.

The economic size of the impact of financial development on industries with different Small Firm Shares is robust to using different definitions of small firm share. Using the example above, moving from India (25^{th} percentile Private Credit) to Canada (75^{th} percentile Private Credit) benefits the industry at the 75^{th} percentile of Small Firm Share relatively more than the industry at the 25^{th} percentile of Small Firm Share. According to the estimated coefficients, this change induces a 1.4% growth differential between these two types of industries using 20 employees as the cut-off definition for a small firm. For example, the growth differentials are virtually identical (1.6% and 1.5 % growth differential respectively) when using 10 or 5 employees as alternative definitions of small firm in categorizing the technological level of small firm share. Given that we control for the interaction of financial development with external financial dependence, these results suggest that small-firm industries benefit more than large-firm industries from financial development.

In column (6), we use the industry rank order of the Small Firm Share using 20 employees as a cutoff to define a small firm. Small Firm Share Rank takes a value of 1 for the industry with the lowest actual value of small firm share and a value of 36 for the industry with the highest actual value of small firm share (there are 36 industries). The results are robust, though the p-value rises toward 0.10. When we use 10 employees as a cut-off to construct the Small Firm Share Rank variable the results are statistically significant at the 5 percent level (column (7)).

[7] Two industries drop from the sample due to missing U.S. Census data when using 5 or 10 employees as the cut-off.

IV.5. Alternative Benchmark Measures of Small Firm Share from the U.S.

Next, we were concerned that the U.S. in 1992 might be an inappropriate benchmark for all the countries in our sample. Beyond financial sector distortions, there are other factors that may affect an industry's technological firm size. We have shown that the results hold when conditioning on many industry-specific and country-specific traits, including the level of economic development. But, these controls might not fully account for connections between the level of technological development and optimal firm size. Thus, to form an alternative benchmark, we want to choose a country with low financial sector distortions and a lower level of technological development than the U.S. in 1992.

Thus, to further test the robustness of the results, we use the U.S. in 1958 to form the benchmark measures of each industry's technological firm size. While we cannot measure small firm shares in earlier periods for all employment size categories due to the data constraints mentioned above, we do have 1958 data on Small Firm Share for the 20-employee cut-off. (Annex Table 1). The correlation between small firm shares in 1958 and 1992 is remarkably high, 90%, and significant at the 1% level. The average small firm share is decreases only slightly from 6.1% in 1958 to 5.9% in 1992, suggesting that firm size distributions are quite stable over time.

The results are robust to measuring Small Firm Share for U.S. industries in 1958 instead of 1992 (column 1 of Table 6). The interaction of the Small Firm Share benchmark from 1958 with Private Credit enters positively and significantly at the 5% level. This further reduces concerns that the findings are driven by a peculiar feature of industrial firm size in the U.S. in 1992.

Furthermore, since in 1992 the economy was just emerging from a recession, we check the results by using Small Firm Share for the United States in 1997, when the economy was in the middle of an economic boom (Annex Table 1). The correlation between the small firm shares in 1992 and 1997 using the 20-employee cut-off is 90%, and significant at the 1% level. This suggests that firm size distribution across industries in the United States does not vary significantly over the business cycle. This paper's findings are also robust to measuring Small Firm Share for U.S. industries in 1997 instead of 1992. Column (2) of Table 6 reports the results when using the Small Firm Share across U.S. industries when using the 1997 Census and 20 employees as the cut-off. Using the 1997 data does not change our findings: the interaction of the Small Firm Share with Private Credit enters positively and significantly at the 1% level.

IV.6. Alternative Benchmark Countries

There may be concerns that the results are driven by the choice of the United States as the benchmark country. From this perspective, the United States has particular production technologies or distortions that yield different industry firm size traits. While it is unclear why this would produce the particular patterns documented above, we also conducted the analyses using different benchmark countries.

As shown in Table 6, the results hold when using the United Kingdom, Germany, or France as the benchmark economy for computing each industry's technological small firm share. We use AMADEUS data for 1997 to calculate the small firm share across industries for these countries. AMADEUS is a commercial database maintained by Bureau Van Dijk containing financial statements and employment data for over 5 million firms in Europe. Unfortunately, the data on industrial firm size distribution is not as complete as the data for the United States.[8]

[8] Unlike for the U.S. Census, for the Amadeus dataset we only have complete data for enterprises above 10 employees so that our small firm share for European countries is calculated as employment in enterprises between

Nevertheless, we continue to find that small-firm industries grow faster in countries with well-developed financial systems. The interaction of Small Firm Share in the United Kingdom, Germany, and France and Private Credit enters positively and significantly at the 5% level (Table 6, columns 3, 4, and 5), which again confirms this paper's core conclusion.

As an additional test, note that the results should vanish if we choose a country with a severely distorted distribution of firm sizes as the benchmark country. In this case, the benchmark would not provide a good proxy for the technological small firm share and we should therefore not expect to obtain significant results. To test this, we choose Romania, which is a country that is still in a turbulent, transitional state with regard to industrial structure.[9] Consistent with our expectation, we do not find significant results with Romania as the benchmark country (column 6). In sum, the results using different benchmark countries to identify the small firm share of each industry confirm this paper's findings.

IV.7. Controlling for Median Firm Size

Critically, we focus on the share of small firms in each industry, not the median (or average) size of firms in an industry. The goal is to test whether small firms face greater barriers to accessing financial services than large firms. Thus, one needs to measure the actual share of small firms in an industry because the average firm size might reflect the influences of a few firms, and the median size will not necessarily indicate the importance of small firms. In the extreme case, if industry A consists of firms of equal size, and industry B consists of firms with size equally distributed around the median size of firms in industry A, then both industries would

---

10 and 20 employees relative to employment in enterprises with more than 10 employees. We only include limited liability companies in our calculations, since in most European countries unlimited liability companies are not required to file financial accounts (for further details, see Klapper, Laeven, and Rajan, 2006). Also, we exclude industries with less than 20 firm-observations. The correlation between the small firm shares for industries in the U.S. in 1992 and small firm shares in the U.K. in 1997 is 58%, significant at the 1% level and the Spearman rank correlation is 52%.

have the same median firm size, yet the share of small firms is positive in industry B and zero in industry A (assuming that the median is above the definition of a small firm). Since we are examining whether small firms face tighter financing constraints than large firms, we want to focus on the technological share of small firms in an industry, not on the median firm size.

While the median firm size is negatively and significantly correlated with Small Firm Share (-0.41), this correlation is far from perfect and a comparison of the automobile and beverage industries further demonstrates the value of examining small-firm industries, not median firm size. For example, the beverages industry and the manufacturing of motor vehicles industry have similar median firm sizes, but the number of employees in small firms is almost twice as high in the beverage industry as it is in the motor vehicles industry (see Table 1). For production technology reasons, there is much less variation in the size of car manufacturers: It is difficult to have 10-20 workers run an automobile manufacturing firm. In contrast, although there are massive beverage manufacturers (Budweiser), there are microbreweries and small wineries so that the beverage industry has a smaller technological firm size due its particular production processes than the car manufacturing industry. Conceptually, this is what we are trying to capture.

More formally, we include the interaction between financial development and the median firm size of an industry in the regression. To compute Median Size, we use U.S. Census data in 1980, which is provided in terms of "bins" of firms by the number employees, e.g., less than 10, between 10 and 19, etc. We then identify the bin that accounts for the median employee. For this bin, we calculate the average size firm as the total number of employees in this bin divided by the number of firms in this bin (see Table 1 for estimates of the Median Size of each industry).

[9] We choose Romania, and not another transition economy, because Romania has the broadest coverage of firms of all the transition countries included in the AMADEUS database.

If small firms are driving the results, we should find that the interaction between Small Firm Share and Private Credit remains significantly correlated with industry growth when controlling for the interaction of Median Size and Private Credit. This is exactly what we find. Table 6 (columns 7 and 8) shows that after controlling for the interaction between Median Size and Private Credit, the relationship between industry growth and the interaction between Small Firm Share and Private Credit is significant at the one percent level and the coefficient size is essentially unchanged. The interaction term between Private Credit and Median Size, on the other hand, does not enter significantly.

The results are robust to controlling for the median size of *large* firms in each industry. We were concerned that industry variation in the size of the largest firms could reflect U.S. specific factors. Thus, we control for the median size of the large, listed firms by industry in the U.S., using Compustat data to calculate the log of the median number of employees across large, listed firms in the United States. We refer to this size variable as Industry Size US. The interaction of Private Credit with the median firm size of large, listed firms enters marginally significantly and positively (Table 6, column 9).[10] Importantly, we continue to find that the interaction of Private Credit and Small Firm Share enters positively and significantly at the 5% level.

IV.8. Sensitivity to Alternative Measures of Financial Development

The findings are also robust to using two alternative measures of financial intermediary development as shown in Table 7. First, we use Private Credit, averaged over the period 1980 to 1989 instead of using the value in the initial year. While using the average value may introduce a bias in our estimates, the interaction with the Small Firm Share enters positively and

[10] The interaction of Private Credit with the median firm size of large U.S. firms looses significance when including the interaction of Private Credit and Small Firm Share when defining a small firm as having 10 or fewer employees.

significantly at the 1% level, and the coefficient is only slighter higher than when using the initial value (regression 1). Second, we use Liquid Liabilities, which equals the liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries) divided by GDP. Unlike Private Credit, Liquid Liabilities simply measures the size financial intermediaries and does not focus on the intermediation of credit to the private sector. As shown in Table 7 regression 2, the results hold when using Liquid Liabilities.

The results do not, however, indicate that small-firm industries grow faster in economies with more developed stock markets. Market Turnover equals the ratio of the value of stock transactions divided by market capitalization for each country's stock exchange. While the interaction with Small Firm Share is positive, it is not significant (Table 7 regression 3). These results hold when using stock market capitalization and value traded as alternative stock market indicators. Consistent with Petersen and Rajan (1995), small firms benefit more from services provided by financial intermediaries than services provided by stock markets. This result is not surprising because small firms tend to depend much more on banks than on stock markets.

Next, we use several indicators that do not directly measure the size or efficiency of the financial system, but instead measure the institutional foundations for financial development. First, Legal Efficiency measures the efficiency and integrity of a country's legal environment. Data are averaged over the period 1980-83 and are originally from Business International Corporation. Second, we use the Law and Order index compiled by ICRG, which is based on survey data, gauges the degree of trust that citizens have in the legal system's ability to resolve disputes. Finally, Accounting Standards measures the quality of financial statements about firms. As shown in Table 7, the interaction between Legal Efficiency and Small Firm Share and the

interaction between the Law and Order and Small Firm Share both enter positively and significantly at the 5% level (columns 4 and 5). Legal system improvements that improve financial contracting exert a particularly positive effect on small-firm industries. The interaction of Accounting Standards with Small Firm Share, however, enters insignificantly (column 6). This suggests that the quality of financial statements does not foster disproportionately faster growth in small-firm industries. This result is consistent with arguments that small firms rely on financial intermediaries to evaluate and fund their projects, not on disclosing information through publicly available financial statements and then raising capital through securities markets.

Finally, we use a survey based measure of firm financing constraints. World Business Economic Survey conducted a survey of different sized firms around the world in 1999. We use the answer to one question from this survey: "How problematic is financing for the operation and growth or your business?" Answers vary between 1 (no obstacle), 2 (a minor obstacle), 3 (a moderate obstacle), or 4 (a major obstacle)? We take the average of these answers across firms within each country and use this as an indicator national financial development, where larger values imply lower development. There are problems with averaging across firms within a country because each country may have different types of firms in terms of ownership, size, industrial composition etc. Nevertheless, we find that financing constraints induce a disproportionately adverse effect on small firm industries (Table 7, column 7).

V. Conclusions

This paper finds that financial development boosts the growth of small-firm industries more than large-firm industries. Some theories of the firm argue that financial development is particularly beneficial to large firms. Others predict that financial development is especially important for lowering transaction costs and informational barriers that hinder small firm growth. Our findings support the view that under-developed financial systems are particularly detrimental to the growth of firms with less than 100 employees. Although we do not examine specific policies, the results indicate that policies that improve the operation of the financial system will have cross-firm distributional effects, helping small-firms more than large ones. In future work, we plan to assess whether large firms oppose financial sector reforms that disproportionately benefit small firms.

References

Acemoglu, Daron, Simon Johnson, and James A. Robinson (2005), "Institutions as a Fundamental Cause of Long-Run Growth," in *Handbook of Economic Growth*, Eds. Philippe Aghion and Steven N. Durlauf, New York: Elsevier North-Holland, p. 385-464.

Aghion, Philippe and Patrick Bolton, (1997). "A Trickle-Down Theory of Growth and Development with Debt Overhang," *Review of Economic Studies* 64, 151-72.

Barth, James, Gerard Caprio, and Ross Levine (2006). *Rethinking Bank Regulation: Till Angels Govern*. Cambridge, UK: Cambridge University Press.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine (2003). "Law, Endowments, and Finance", *Journal of Financial Economics* 70, 137-181.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine (2005). "SMEs, Growth and Poverty: Cross-Country Evidence" *Journal of Economic Growth*, 197-227.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine (2000). "A New Database on Financial Development and Structure", *World Bank Economic Review* 14, 597-605.

Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic (2006). "The Influence of Financial and Legal Institutions on Firm Size" *Journal of Banking and Finance*, forthcoming.

Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic (2005). "Financial and Legal Constraints to Firm Growth: Does Firm Size Matter?" *Journal of Finance* 60, 137-177.

Beck, Thorsten Asli Demirguc-Kunt, and Vojislav Maksimovic (2004). "Financing Patterns around the World: Are Small Firms Different?" World Bank mimeo.

Beck, Thorsten, Ross Levine, and Norman Loayza (2000). "Finance and the Sources of Growth." *Journal of Financial Economics* 58, 261-300.

Black, Sandra E., and Philip Strahan (2002). "Entrepreneurship and the Availability of Bank Credit." *Journal of Finance* 67, 2807-2833.

Braun, Matias and Claudio Raddatz, 2005, Trade Liberalization and the Politics of Financial Development, Mimeo, UCLA.

Claessens, Stijn, and Luc Laeven (2003). "Financial Development, Property Rights, and Growth." *Journal of Finance* 58, 2401-2436.

Coase, Ronald (1937). "The Nature of the Firm", *Economica* 4, 386-405.

Cole, Rebel, and John Wolken (1994). "Financial Services used by Small Businesses: Evidence

from the 1993 Survey of Small Business Finances." *Federal Reserve Bulletin* 81, 629-676.

Demirgüç-Kunt, Asli and Ross Levine (2001). *Financial Structures and Economic Growth: A Cross-Country Comparison of Banks, Markets, and Development,* Cambridge, MA: MIT Press.

Demirgüç-Kunt, Asli and Vojislav Maksimovic (1998). "Law, Finance, and Firm Growth." *Journal of Finance* 53, 2107-2137.

Diamond, Douglas (1991). "Monitoring and Reputation: the Choice Between Bank Loans and Directly Placed Debt", *Journal of Political Economy* 99, 689-721.

Durnev, Art, Randall Morck, and Bernard Yeung (2004). "Value Enhancing Capital Budgeting and Firm-Specific Stock Return Variation," *Journal of Finance* 59, 65-105.

Easterly, William, and Ross Levine (1997). "Africa's Growth Tragedy: Policies and Ethnic Divisions." *Quarterly Journal of Economics* 112, 1203-1250.

Evans, David S., and Boyan Jovanovic (1989). "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints." *Journal of Political Economy* 97, 808-827.

Fisman, Raymond, and Inessa Love (2003). "Financial Dependence and Growth Revisited." NBER Working Paper 9582, March 2003.

Galor, Oded and Omer Moav (2004). "From Physical to Human Capital Accumulation: Inequality and the Process of Development." *Review of Economic Studies* 71, 1001-26.

Galor, Oded and Joseph Zeira (1993). "Income Distribution and Macroeconomics." *Review of Economic Studies* 60, 35-52.

Gozzi, Juan Carlos, Ross Levine, and Sergio Schmukler (2006). "Internationalization and the Evolution of Corporate Valuations." Brown University, mimeo.

Greenwood, Jeremy and Boyan Jovanovic (1990). "Financial Development, Growth, and the Distribution of Income." *Journal of Political Economy* 98, 1076-1107.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. (2004). "Does Local Financial Development Matter?" *Quarterly Journal of Economics 119(3),* 929-969.

Haber, Stephen H., A. Razo, and N. Maurer. 2003. *The Politics of Property Rights: Political Instability, Credible Commitments, and Economic Growth in Mexico* (Cambridge University Press).

Jayaratne, Jith, and Philip E. Strahan (1996). "The Finance-Growth Nexus: Evidence from Bank Branching Deregulation." *Quarterly Journal of Economics* 111, 639-670.

Jayaratne, Jith, and Philip E. Strahan (1998). "Entry Restrictions, Industry Evolution and Dynamic Efficiency: Evidence from Commercial Banking." *Journal of Law and Economics* 49, 239-274.

Klapper, Leora, Luc Laeven, and Raghuram Rajan (2006). "Entry Regulation as a Barrier to Entrepreneurship." *Journal of Financial Economics*, Forthcoming.

Kroszner, Randall and Philip Strahan (1999). "What Drives Deregulation? Economics and Politics of the Relaxation of Branching Restrictions," *Quarterly Journal of Economics* 114, 1437-1467.

Kroszner, Randall and Thomas Stratmann (1998). "Interest Group Competition and the Organization of Congress: Theory and Evidence from Financial Services Political Action Committees," *American Economic Review* 88, 1163-1187.

Kumar, Krishna B., Raghuram G. Rajan, and Luigi Zingales (2001). "What Determines Firms Size?" University of Chicago. CRSP Working Paper No. 496.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny. (1998)."Law and Finance." *Journal of Political Economy* 106, 1113-1155.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1999). "The Quality of Government." *Journal of Law, Economics, and Organization* 15, 222-279.

Levine, Ross (1999). "Law, Finance, and Economic Growth", *Journal of Financial Intermediation*, 8, 36-67.

Levine, Ross (2006). "Finance and Growth: Theory and Evidence." in *Handbook of Economic Growth*, Eds: Philippe Aghion and Steven Durlauf, New York: Elsevier North-Holland, p.865-934.

Levine, Ross, Norman Loayza, and Thorsten Beck (2000). "Financial Intermediation and Growth: Causality and Causes." *Journal of Monetary Economics* 46, 31-77.

Lucas, Robert E. (1978), "On the Size Distribution of Business Firms." *Bell Journal of Economics* 9, 508-523.

Morgan, Donald (2002). "Rating Banks: Risk and Uncertainty in an Opaque Industry." *American Economic Review* 92, 874-888.

Pagano, Marco and Paulo F. Volpin (2005). "The Political Economy of Corporate Governance," *American Economic Review* 95, 1005-1030.

Perotti, Enrico and Ernst-Ludwig von Thadden (2006). "The Political Economy of Dominant Investors and Labor Rents," *Journal of Political Economy* 114, 145-175.

Petersen, Mitchell and Raghuram G. Rajan (1994). "The Benefits of Lending Relationships: Evidence from Small Business Data." *Journal of Finance* 49, 3-38.

Petersen, Mitchell and Raghuram G. Rajan (1995). "The Effect of Credit Market Competition on Lending Relationships." *Quarterly Journal of Economics* 110, 407-444.

Petersen, Mitchell and Raghuram G. Rajan (2002). "Does Distance Still Matter: The Information Revolution in Small Business Lending." *Journal of Finance* 57, 2533-2570.

Rajan, Raghuram G. and Luigi Zingales (1998). "Financial Dependence and Growth." *American Economic Review* 88, 559-586.

Rajan, Raghuram G. and Luigi Zingales (2003). *Saving Capitalism from the Capitalists*. New York: Crown Business.

Sutton, John (1991). Sunk Costs and Market Structure. Cambridge, MA: MIT Press

World Bank (2004). *World Bank Group Support for Small Business*. Washington, DC: World Bank.

World Bank (2002). *World Bank Group Review of Small Business Activities*. Washington, DC: World Bank.

World Bank (1994). *Can Intervention Work? The Role of Government in SME Success*. Washington, DC: World Bank.

Wurgler, J. (2000). "Financial Markets and the Allocation of Capital." *Journal of Financial Economics*, 58: 187-214.

You, Jong-Il (1995). "Small Firms in Economic Theory." *Cambridge Journal of Economics* 19, 441-462.

Table 1 Firm Size Distribution in the United States in 1992

This table shows employment shares by firm size bin in the United States by ISIC Revision 2 industries. Sx is the industry's share of employment by firms with less than x employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. Median Size is the average firm size in the bin of the median worker, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. Employment shares are expressed in percentages of total number of employees.

ISIC	Industry name	S5	S10	S20	S100	S500	Median size
311	Food manufacturing	0.56	1.68	3.82	13.77	28.71	13.55
313	Beverage industries	0.60	1.76	4.04	14.75	30.66	13.93
314	Tobacco manufactures	0.09	0.20	0.30	1.49	5.14	44.75
321	Manufacture of textiles	0.40	1.17	2.81	13.43	32.95	13.99
322	Manufacture of wearing apparel, except footwear	1.30	3.60	8.18	31.74	58.39	6.70
323	Manufacture of leather and products of leather	1.94	4.78	10.45	36.89	61.08	6.72
324	Manufacture of footwear	0.31	0.81	1.61	7.40	30.89	13.90
331	Manufacture of wood and wood and cork products	4.20	11.20	21.37	47.31	67.42	6.67
332	Manufacture of furniture and fixtures	1.57	4.19	9.09	28.74	50.78	6.68
341	Manufacture of paper and paper products			3.03	16.16	33.60	44.15
342	Printing, publishing and allied industries	3.64	9.16	16.32	35.80	51.65	6.60
352	Manufacture of other chemical products	0.87	2.68	5.80	17.67	31.53	13.57
353	Petroleum refineries	0.05	0.18	0.36	1.90	5.67	131.17
354	Manufacture of miscellaneous products of petroleum and coal	1.26	3.93	9.26	29.80	52.11	13.04
355	Manufacture of rubber products	0.38	1.21	3.15	13.23	27.46	13.99
356	Manufacture of plastic products not elsewhere classified	0.69	2.24	6.09	27.19	54.98	13.90
361	Manufacture of pottery, china and earthenware	2.30	4.91	8.80	26.52	41.71	2.05
362	Manufacture of glass and glass products	1.15	2.82	5.05	13.92	24.41	6.69
369	Manufacture of other non-metallic mineral products	1.87	5.88	14.17	40.78	60.42	13.55
371	Iron and steel basic industries	0.20	0.59	1.62	8.05	23.38	44.62
372	Non-ferrous metal basic industries	0.50	1.78	4.76	18.65	37.07	14.05
381	Manufacture of fabricated metal products	1.28	4.07	9.98	33.87	55.62	13.76
382	Manufacture of machinery except electrical	2.15	6.37	13.68	34.60	50.87	6.75
383	Manufacture of electrical machinery apparatus, and appliances	0.50	1.48	3.44	14.18	28.97	13.78
384	Manufacture of transport equipment	0.18	0.54	1.21	4.20	8.15	13.56
385	Manufacture of professional and scientific equipment	0.68	1.87	4.01	12.88	25.74	6.69
390	Other Manufacturing Industries	3.54	8.72	16.95	43.48	66.66	6.63
3211	Spinning, weaving and finishing textiles	0.26	0.73	1.91	9.14	24.54	44.77
3411	Manufacture of pulp, paper and paperboard			0.14	1.29	7.27	183.80
3511	Manufacture of basic industrial chemicals except fertilizers	0.29	0.89	1.75	6.51	12.90	13.57
3513	Manufacture of synthetic resins, plastic materials and fibers	0.11	0.31	0.66	3.17	8.41	44.07
3522	Manufacture of drugs and medicines	0.26	0.86	2.10	8.09	18.46	13.82
3825	Manufacture of office, computing and accounting machinery	0.48	1.32	2.85	10.43	21.67	13.54
3832	Manufacture of radio, television and communication equipment	0.57	1.40	3.09	11.67	27.85	13.59
3841	Ship building and repairing	1.73	3.58	6.56	16.35	30.26	2.08
3843	Manufacture of motor vehicles	0.32	1.00	2.28	8.04	17.62	13.70
Average		1.07	2.88	5.85	18.42	33.75	23.57

Table 2 Summary Statistics

This table reports summary statistics for the main variables in our analysis. Country-industry variables: Growth in real value added is average growth in real value added over the period 1980-1989 by country and ISIC industry. Share in value added is the industry's share in total value added of the country's manufacturing sector. Industry variables: Small firm share (empl<x) is the industry's share of employment by firms with less than x employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. External financial dependence is a measure of the industry's dependence on external finance, from Rajan and Zingales (1998). Intangibility is a measure of the industry's dependence on intangible assets from Claessens and Laeven (2003). Sales growth is an industry measure of sales growth from Fisman and Love (2003). Median Size is the average firm size in the bin of the median worker, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. Industry size in US is the logarithm of the industry's median number of employees, and is calculated using data for the year 1980 on U.S. listed firms from Compustat. UK Small firm share is the industry's share of employment by firms with less than 20 employees, and is calculated using firm-level data from Amadeus on all U.K. limited liability firms with 10 or more employees for the year 1997 (we exclude industries with less than 20 firm-observations). Country variables: Private Credit is claims by financial institutions on the private sector divided by GDP in 1980. Liquid liabilities is liquid liabilities to GDP in 1980. Market turnover is total value of trades to total value of shares averaged in 1980. Per capita GDP is the logarithm of the country's real GDP per capita in 1980. Accounting standards is an index of the quality of accounting standards in 1990. Legal efficiency is the measure of the country's efficiency of the legal system used by LLSV (1998), and is an average for the years 1980-1983. Law and order is an index of the law and order tradition in the country from LLSV (1998), and is an average for the years 1982-1995. Property rights is a measure of the country's protection of property rights from the Heritage Foundation. Average for the years 1995-99. Human capital is average years of schooling in population age over 25 in the year 1980. Financing obstacles is the country-average of firm financing obstacles in 1999 from WBES.

Variable	Mean	Median	St.dev.	Minimum	Maximum
Panel A: Country-industry variables					
Growth in real value added	0.034	0.029	0.099	-0.447	1.000
Share in value added	0.016	0.009	0.021	0.000	0.224
Panel B: Industry variables					
Small firm share (empl<5)	0.011	0.006	0.011	0.001	0.042
Small firm share (empl<10)	0.029	0.018	0.027	0.002	0.112
Small firm share (empl<20)	0.059	0.039	0.053	0.001	0.214
Small firm share (empl<100)	0.184	0.14	0.13	0.013	0.473
Small firm share (empl<500)	0.337	0.305	0.183	0.051	0.674
External financial dependence	0.319	0.231	0.406	-0.451	1.492
Intangibility	0.625	0.460	0.810	0.020	4.540
Sales growth	0.045	0.042	0.037	-0.037	0.129
Median size	23.572	13.600	35.733	2.000	183.800
Industry size in US	2.309	1.225	2.649	0.250	10.60
UK Small firm share	0.010	0.009	0.009	0.000	0.037
Panel C: Country variables					
Private Credit	0.425	0.341	0.270	0.073	1.173
Liquid liabilities	0.487	0.447	0.234	0.142	1.342
Market turnover	0.157	0.109	0.164	0.001	0.712
Per capita GDP	7.791	7.860	1.334	4.793	9.573
Human capital	5.811	5.313	2.853	1.681	12.141
Property rights	3.966	4.000	0.879	2.000	5.000
Accounting standards	0.613	0.620	0.132	0.240	0.830
Legal efficiency	7.704	7.375	2.012	2.500	10.000
Law and order	6.692	6.575	2.770	1.900	10.000
Financing obstacles	2.575	2.593	0.421	1.691	3.267

Table 3 Financial Development, Small Firm Share, and Growth

Dependent variable is average growth in real value added over the period 1980-1990 by country and ISIC industry. Share in value added is the industry's share in total value added of the country's manufacturing sector. Private Credit is claims by financial institutions on the private sector divided by GDP in 1980. Small firm share is the industry's share of employment by firms with less than 20 employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. External dependence is a measure of the industry's dependence on external finance, from Rajan and Zingales (1998). The industry measures are based on U.S. data. The standard errors in regression (3) are adjusted for clustering at the industry-level. The regression in column (4) is estimated using legal origin dummies as instrumental variable for Private Credit. The regression in column (5) is estimated using legal origin dummies as instrumental variable for Private Credit, with standard errors adjusted for clustering at the country-level. The OLS regression in column (6) excludes industries with less than 10 firms in each size bucket; these are: Tobacco (ISIC 314), Petroleum refineries (ISIC 353), and Pulp and paper (ISIC 3411). The regression in column (7) excludes industries below the median initial industry share in value added for each country. All regressions include country and industry dummies, but these are not reported. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1) OLS	(2) OLS	(3) OLS with clustering	(4) IV	(5) IV with clustering	(6) Excluding industries with poor coverage	(7) Excluding industries with low share
Share in value added	-1.012***	-1.095***	-1.095***	-1.086***	-1.086***	-1.148***	-0.764***
	(0.253)	(0.253)	(0.287)	(0.253)	(0.391)	(0.282)	(0.209)
Private Credit * Small firm share	0.409**	0.445**	0.445**	0.567**	0.567*	0.567***	0.644***
	(0.172)	(0.173)	(0.187)	(0.220)	(0.290)	(0.194)	(0.190)
Private Credit * External dependence		0.144***	0.144***	0.101***	0.101**	0.166***	0.130***
		(0.039)	(0.037)	(0.037)	(0.050)	(0.043)	(0.040)
Observations	1242	1242	1242	1242	1242	1147	638
R-squared	0.26	0.28	0.28	0.27	0.27	0.29	0.52

Table 4 Controlling for Additional Industry and Country Characteristics

Dependent variable is average growth in real value added over the period 1980-1990 by country and ISIC industry. Share in value added is the industry's share in total value added of the country's manufacturing sector. Private Credit is claims by financial institutions on the private sector divided by GDP in 1980. Property rights is a measure of the country's protection of property rights from the Heritage Foundation, averaged for the years 1995-99. We reverse the original order of the index such that higher values indicate more protection (score of 1-5). Small firm share is the industry's share of employment by firms with less than 20 employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. External financial dependence is a measure of the industry's dependence on external finance, from Rajan and Zingales (1998). Sales growth is an industry measure of sales growth from Fisman and Love (2003), and is calculated as real annual growth in net sales of U.S. firms over the period 1980-89. Intangibility is a measure of the industry's dependence on intangible assets from Claessens and Laeven (2003), and is calculated as the ratio of intangible assets to fixed assets of U.S. firms over the period 1980-89. Per capita GDP is the logarithm of the country's real GDP per capita in 1980. Openness is the sum of exports and imports relative to GDP in 1980. The industry measures are based on U.S. data. Entry barriers is the cost of entry regulations as a share of per capita GDP in 1999 from Djankov et al (2002). A higher score denotes more costly entry regulations. Rating splits is the industry-average ratio of bond issues with split ratings between S&P and Moody's from Morgan (2000). A higher score indicates more industry-opaqueness. R-squared is industry-average R-squared from Durnev, Morck and Yeung (2004). A higher score indicates more stock return synchronicity and thus less informative pricing. We include country and industry dummies, but these are not reported. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share in value added	-1.108***	-1.114***	-1.064***	-1.088***	-1.097***	-1.089***	-1.160***	-0.813***	-0.862***	-0.834***
	(0.255)	(0.255)	(0.259)	(0.269)	(0.277)	(0.258)	(0.260)	(0.205)	(0.216)	(0.235)
Private Credit * Small firm share	0.468***	0.356**	0.459**	0.531***	0.473**	0.485**	0.464***	0.269**	0.406***	0.536***
	(0.176)	(0.167)	(0.181)	(0.181)	(0.191)	(0.190)	(0.169)	(0.128)	(0.147)	(0.157)
Private Credit * External	0.092**	0.139***	0.138***	0.165***	0.092*	0.143***	0.141***	0.115***	0.113***	0.079**
financial dependence	(0.040)	(0.038)	(0.043)	(0.046)	(0.048)	(0.039)	(0.039)	(0.030)	(0.030)	(0.038)
Private Credit * Sales growth	0.774*				0.801*					0.495
	(0.425)				(0.445)					(0.351)
Property rights * Intangibility		0.008***			0.006**					0.005**
		(0.003)			(0.002)					(0.002)
Private Credit * Rating splits			0.116		0.125					0.061
			(0.086)		(0.086)					(0.069)
Private Credit * R-squared				0.101	0.042					0.147
				(0.150)	(0.165)					(0.111)
Per capita GDP * Small firm share						-0.013			-0.048	-0.092*
						(0.043)			(0.049)	(0.051)
Openness * Small Firm share							0.000		0.001	0.000
							(0.002)		(0.002)	(0.002)
Entry barriers * Small firm share								-0.630**	-0.667**	-0.745**
								(0.271)	(0.287)	(0.305)
Observations	1242	1242	1081	1138	1044	1242	1215	1184	1157	974
R-squared	0.28	0.28	0.29	0.28	0.30	0.28	0.27	0.33	0.33	0.37

Table 5 Alternative Measures of Firm Size Distribution

Dependent variable is average growth in real value added over the period 1980-1990 by country and ISIC industry. Share in value added is the industry's share in total value added of the country's manufacturing sector. Private Credit is claims by financial institutions on the private sector divided by GDP in 1980. Small firm share (empl<x) is the industry's share of employment by firms with less than x employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. In column (6), we include the industry rank order of the Small firm share (empl<20) variable, which the lowest actual value of Small firm share (empl<20) taking a value of 1 and the highest value taking a score of 36. In column (7), we include the industry rank order of the Small firm share (empl<10) variable, which the lowest actual value of Small firm share (empl<10) taking a value of 1. External financial dependence is a measure of the industry's dependence on external finance, from Rajan and Zingales (1998). The industry measures are based on U.S. data. We include country and industry dummies, but these are not reported. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share in value added	-1.134***	-1.139***	-1.095***	-1.076***	-1.055***	-1.076***	-1.126***
	(0.265)	(0.266)	(0.253)	(0.251)	(0.249)	(0.252)	(0.266)
Private Credit * Small firm share (empl<5)	2.807***						
	(0.911)						
Private Credit * Small firm share (empl<10)		1.141***					
		(0.353)					
Private Credit * Small firm share (empl<20)			0.445**				
			(0.173)				
Private Credit * Small firm share (empl<100)				0.130*			
				(0.072)			
Private Credit * Small firm share (empl<500)					0.045		
					(0.051)		
Private Credit * Small firm share rank (empl<20)						0.002*	
						(0.001)	
Private Credit * Small firm share rank (empl<10)							0.002**
							(0.001)
Private Credit * External financial dependence	0.154***	0.153***	0.144***	0.142***	0.141***	0.139***	0.146***
	(0.040)	(0.040)	(0.039)	(0.039)	(0.038)	(0.038)	(0.039)
Observations	1170	1170	1242	1242	1242	1242	1170
R-squared	0.28	0.28	0.28	0.27	0.27	0.27	0.28

Table 6 Alternative Small Firm Data and Controlling for the Size of Large Firms

Dependent variable is average growth in real value added over the period 1980-1990 by country and ISIC industry. Share in value added is the industry's share in total value added of the country's manufacturing sector. Private Credit is claims by financial institutions on the private sector divided by GDP in 1980. External financial dependence is a measure of the industry's dependence on external finance, from Rajan and Zingales (1998). Small firm share is the industry's share of employment by firms with less than 20 employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. Small firm share in 1958 is the industry's share of employment by firms with less than 20 employees, and is calculated using data from the U.S. Census for the year 1958. Small firm share in 1997 is the industry's share of employment by firms with less than 20 employees, and is calculated using data from the U.S. Census for the year 1997. Small firm share in other countries is the industry's share of employment by firms with less than 20 employees, and is calculated using firm-level data from Amadeus on all limited liability firms in each country with 10 or more employees for the year 1997 (we exclude industries with less than 20 firm-observations). Median Size is the log of the average firm size (in terms of employees) in the bin where the median worker is located, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. Industry size in US is the log of the median number of employees across all U.S. listed firms in Compustat. The industry measures are based on U.S. data. We include country and industry dummies, but these are not reported. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share in value added	-1.067***	-1.146***	-1.055***	-1.077***	-1.042***	-1.048***	-1.041***	-1.088***	-1.079***
	(0.249)	(0.273)	(0.259)	(0.262)	(0.259)	(0.293)	(0.250)	(0.255)	(0.255)
Private Credit * External financial dependence	0.142***	0.157***	0.153***	0.157***	0.166***	0.150***	0.140***	0.155***	0.175***
	(0.039)	(0.041)	(0.042)	(0.042)	(0.043)	(0.043)	(0.038)	(0.039)	(0.044)
Private Credit * Small firm share								0.660***	0.603***
								(0.198)	(0.198)
Private Credit * Small firm share in 1958	0.375**								
	(0.162)								
Private Credit * Small firm share in 1997		0.685***							
		(0.249)							
Private Credit * Small firm share in UK			1.696**						
			(0.827)						
Private Credit * Small firm share in Germany				0.655***					
				(0.250)					
Private Credit * Small firm share in France					0.484**				
					(0.218)				
Private Credit * Small firm share in Romania						0.028			
						(0.205)			
Private Credit * Median Size							-0.000	0.022	
							(0.013)	(0.015)	
Private Credit * Industry size in US									0.020*
									(0.012)
Observations	1242	1102	1180	1180	1180	1028	1242	1242	1242
R-squared	0.27	0.28	0.28	0.28	0.28	0.29	0.27	0.28	0.28

Table 7 Alternative Measures of Financial Development

Dependent variable is average growth in real value added over the period 1980-1990 by country and ISIC industry. Share in value added is the industry's share in total value added of the country's manufacturing sector. Private credit 1980-89 is the country's private credit to GDP averaged over the period 1980-89. Liquid liabilities is liquid liabilities to GDP in 1980. Market turnover is total value of trades to total value of shares in 1980. Legal efficiency is the measure of the country's efficiency of the legal system used by LLSV (1998), and is an average for the years 1980-1983. Law and order is an index of the law and order tradition in the country from LLSV (1998), and is an average for the years 1982-1995. Accounting standards is an index of the quality of accounting standards in 1990. Financing obstacles is the country-average of firm financing obstacles in 1999 from WBES. Small firm share is the industry's share of employment by firms with less than 20 employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1992. External financial dependence is a measure of the industry's dependence on external finance, from Rajan and Zingales (1998). The industry measures are based on U.S. data. We include country and industry dummies, but these are not reported. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share in value added	-1.127***	-1.043***	-1.020***	-0.794***	-0.827***	-0.669***	-1.462***
	(0.255)	(0.251)	(0.257)	(0.195)	(0.210)	(0.209)	(0.341)
Private credit 1980-89 * Small firm share	0.444***						
	(0.161)						
Private credit 1980-89 * External financial dependence	0.097***						
	(0.025)						
Liquid liabilities * Small firm share		0.399**					
		(0.184)					
Liquid liabilities * External financial dependence		0.085***					
		(0.032)					
Market turnover * Small firm share			0.018				
			(0.234)				
Market turnover * External financial dependence			0.074**				
			(0.036)				
Legal efficiency * Small firm share				0.053***			
				(0.020)			
Legal efficiency * External financial dependence				0.009***			
				(0.003)			
Law and order * Small firm share					0.053***		
					(0.020)		
Law and order * External financial dependence					0.007***		
					(0.002)		
Accounting standards * Small firm share						0.363	
						(0.244)	
Accounting standards * External financial dependence						0.158***	
						(0.034)	
Financing obstacles * Small firm share							-0.423**
							(0.167)
Financing obstacles * External financial dependence							-0.060***
							(0.019)
Observations	1242	1242	1222	1174	1174	1067	838
R-squared	0.27	0.27	0.26	0.31	0.31	0.35	0.27

Annex Table 1 Firm Size Distribution in the United States in 1958 and 1997

This table shows SME shares in the United States by ISIC Revision 2 industries. Sx is the industry's share of employment by firms with less than x employees, and is calculated using data from the U.S. Census on all U.S. firms for the year 1958 or 1997. SME shares are expressed in percentages of total number of employees. Source: Authors' calculations based on data from the U.S. Census Bureau. Data are for firms, not establishments.

		1958	1997				
ISIC	Industry name	S20	S5	S10	S20	S100	S500
311	Food manufacturing	8.00	0.53	1.61	3.68	13.01	27.01
313	Beverage industries	9.47	0.80	2.22	4.70	16.38	33.29
314	Tobacco manufactures	0.98			0.55	3.03	9.02
321	Manufacture of textiles	3.72	0.44	1.23	2.95	13.29	30.57
322	Manufacture of wearing apparel, except footwear	10.50	1.53	4.40	10.04	34.42	57.26
323	Manufacture of leather and products of leather	11.35			10.17	31.95	57.93
324	Manufacture of footwear	0.84	0.52	1.18	2.18	10.29	31.54
331	Manufacture of wood and wood and cork products	26.92	3.80	9.90	19.50	43.78	63.82
332	Manufacture of furniture and fixtures	11.65	1.39	3.92	8.62	28.53	50.69
341	Manufacture of paper and paper products	5.16					32.16
342	Printing, publishing and allied industries	16.19	3.24	8.27	15.08	34.47	50.66
352	Manufacture of other chemical products	9.52	0.89	2.63	5.93	18.08	33.36
353	Petroleum refineries	0.13	0.04	0.09	0.21	1.60	6.72
354	Manufacture of miscellaneous products of petroleum and coal	14.30			9.01	27.90	47.10
355	Manufacture of rubber products	1.16	0.32	1.07	2.90	12.65	26.91
356	Manufacture of plastic products not elsewhere classified	11.99	0.63	2.03	5.44	25.23	50.88
361	Manufacture of pottery, china and earthenware	3.64	2.34	5.31	9.42	26.95	50.41
362	Manufacture of glass and glass products	2.88					24.21
369	Manufacture of other non-metallic mineral products	13.42					58.54
371	Iron and steel basic industries	0.50	0.16	0.46	1.20	7.73	23.18
372	Non-ferrous metal basic industries	3.95	0.42	1.40	3.77	17.12	36.82
381	Manufacture of fabricated metal products	9.52	1.10	3.69	9.46	34.59	57.75
382	Manufacture of machinery except electrical	10.05	1.98	5.73	12.26	33.37	51.05
383	Manufacture of electrical machinery apparatus and appliances	2.43	0.45	1.31	3.07	12.78	28.43
384	Manufacture of transport equipment	0.80	0.46	1.32	3.05	12.55	28.25
385	Manufacture of professional and scientific equipment	3.65	0.44	1.12	2.29	7.56	15.98
390	Other Manufacturing Industries	13.14	0.78	2.17	4.73	15.34	28.50
3211	Spinning, weaving and finishing textiles	1.00	0.61	1.46	2.85	10.00	26.75
3411	Manufacture of pulp, paper and paperboard	0.26					8.74
3511	Manufacture of basic industrial chemicals except fertilizers	0.65	0.38	0.87	1.83	7.23	15.46
3513	Manufacture of synthetic resins, plastic materials and fibers	0.65	0.19	0.43	1.11	5.86	12.90
3522	Manufacture of drugs and medicines	3.89	0.33	0.91	2.13	8.93	20.94
3825	Manufacture of office, computing and accounting machinery	0.35	0.47	1.29	2.81	9.42	20.31
3832	Manufacture of radio, television and communication equipment	0.57	0.51	1.34	3.00	11.50	27.45
3841	Ship building and repairing	5.73	2.12	4.63	8.01	19.44	36.19
3843	Manufacture of motor vehicles	0.83	0.31	0.87	1.91	6.97	17.12
Average		6.27	0.94	2.51	5.43	17.56	33.28