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Job Growth and Finance

Are Some Financial Institutions Better Suited to Early Stages of Development Than Others?

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Abstract

This paper combines firm-level data from 89 countries with updated country-level data on financial structure, and uses two estimation approaches. It finds that in low-income countries, labor growth is swifter in countries with a higher level of private credit/gross domestic product; the positive effect of bank credit is especially pronounced in industries that depend heavily on external finance; and banking development is positively associated with more physical and human capital investment. These findings are consistent with predictions from new structural economics. In high-income countries, labor growth rates are increasing in the level of stock market capitalization, which is also consistent with predictions from new structural economics, although the analysis is unable to provide evidence that the association is causal. It finds no evidence that small-scale firms in low-income countries benefit most from private credit market development. Rather, the labor growth rates of larger, capital-intensive firms increase more with the level of private credit market development, a finding consistent with the history-based political economy view that banking systems in low-income countries serve the interests of the elite, rather than providing broad-based access to financial services.

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Job Growth and Finance: Are Some Financial Institutions Better Suited to Early Stages of Development Than Others?[1]

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I. Introduction

The relative advantages of different types of financial systems have been long debated, most notably in comparisons between market-based and bank-based financial structures (Gershenkron, 1962; Goldsmith, 1969; Allen and Gale, 1991; Demirguc-Kunt and Levine, 2001). Banks, for example, are able to exploit economies in processing information about the creditworthiness of prospective borrowers, and often form long-run relationships with firms that reduce information asymmetries and permit effective monitoring of the firms' activities. Securities markets provide an incentive to gather information about firms, provide a liquid platform for investors to buy and sell shares in those firms, and can improve corporate governance of firms by facilitating takeovers. More generally, markets are likely to do a better job of aggregating and transmitting information signals to investors than banks, which could improve the allocation of financial resources and thus promote growth.[2]

While the relative advantages of bank- and market-based systems have been elucidated well in the literature, the available empirical evidence does not indicate that either type holds an advantage in promoting growth. Indeed, cross-country evidence shows that it is the overall *level* of financial development rather than its institutional composition that is robustly linked with economic growth (Demirguc-Kunt and Levine, 2001; Levine, 2002). While cross-country indicators of financial development have proliferated and have been refined in the past decade, they necessarily carry limitations when describing the nuances of financial structure in a given country. It is possible, even likely, therefore that in a given country or at a specific time, productive activities would be better supported by banks or markets.

This theme has been developed recently in the "New Structural Economics" approach to studying economic development (Lin, 2010). Under that approach, factors endowments at each stage of an economy's development determine the optimal industrial structure in the real sector. That optimal mix of firms – their size distribution, sectors, and risk characteristics – is, in turn, better served by some types of financial institutions than others. As a result, proponents of this approach hold that there is an endogenously determined optimal financial structure at each stage of an economy's development. Measurement problems are a key challenge to testing this

[2] See Levine 2002 for an extensive review of the literature on the relative merits of banks versus markets.

approach to financial development empirically. Case studies of individual countries lack sufficient variation in financial structure over time to permit formal hypothesis testing and, though cross-country financial indicators have come a long way in a short time, they remain relatively crude. Determining a country's optimal industrial structure and assessing the suitability of its financial structure using only cross-country regressions would be a daunting task.[3]

Moreover, economic and financial historians have devoted considerable effort to documenting the idiosyncratic, path-dependent processes that generated the diverse set of local financial intermediaries that came to exist across developed countries (Davis and Gallman, 2001; Cull et al., 2006; Allen et al, 2011). The consensus view is that the specific financial institutions that evolved were certainly influenced by economic and political considerations. In that sense, financial development was not necessarily endogenous to an optimal matching with industrial structure, but to a much broader range of influences. Moreover, in the best studied developed economies, governments were not particularly active in promoting specific financial structures. They generally did little to inhibit the formation of financial intermediaries, but they also played little role in their creation—beyond providing a secure property-rights environment and establishing national financial institutions, such as central banks, that helped to mitigate local shocks. Nor were governments generally able to jumpstart economic growth by promoting local financial institutions in regions where there was insufficient demand for their services (Cull et al., 2006). The financial institutions that emerged were therefore generally endogenous to the demand for specific financial services.

[3] However, Demirguc-Kunt, Feyen, and Levine (2011) define optimal financial structures at different stages of development based on cross-country regressions, and then calculate countries' distances from them. To construct a measure of optimal financial structure at each level of development, the authors regress a measure of financial structure (such as the ratio of bank development to securities market development) on GDP per capita for the sample of OECD countries, while also controlling for key institutional, geographic, and structural traits of those countries. The maintained hypothesis is that conditional on these traits, the OECD countries provide information on how the optimal financial structure varies with economic development. Next, the authors use the coefficients from the OECD regression to compute the estimated optimal financial structure for each country in each year. They then compute a "financial structure gap" which is equal to the natural logarithm of the absolute value of the difference between the actual and the estimated optimal financial structure. They find that deviations in an economy's actual financial structure from its estimated optimal one (i.e., the size of the financial development gap) are associated with reduced economic output even when controlling for the level of bank development, securities market development, a standard set of controls, and country fixed effects.

Proponents of new structuralism might view the financial histories of developed economies as promising for their approach – since the evolution of financial intermediaries was endogenous to demand for financial services from the real sector, an optimal financial structure might be a by-product of an optimal industrial structure. And yet, the industrial structures that emerged in many countries were far from optimal, and thus the financial structures that evolved did not function as well as they might have. As described in Calomiris and Haber (2011), in less developed economies financial intermediaries are often created by coalitions that include the government and business interests. Those business interests must be assured that the government will not expropriate the intermediaries that they create, nor will it promote the entry of competing intermediaries, because those intermediaries could finance firms that would compete with those of the members of the coalition. The result is a financial system comprised of a small number of relatively large banks and other intermediaries that service affiliated firms, but that do not promote widespread access to financial services, especially credit. This is at odds with the optimal financial structure during early stages of development from the new structural perspective, where a large number of relatively small banks would service small-scale entrepreneurs.

The foregoing discussion leads to (at least) two questions. First, can it be shown that the countries that come closer to achieving the optimal financial structure for their stage of development also achieve higher rates of growth? More specifically, do countries in early stages of development fare better under a bank-based system that harnesses local information rather than a market-based system that does not? Second, if there is evidence supportive of the notion that optimal financial structure varies with the stage of development, why is it that some countries come closer to achieving those structures than others? This paper provides empirical evidence from firm surveys to address the first question. Addressing the second question is beyond the scope of the paper, though we note that if countries were equally successful in achieving an optimal financial structure, we would see little variation in financial structure indicators for a given level of development and find no significant relationships between those indicators and firm growth. A quick glance at Table 2 reveals relatively wide variation in indicators of financial development within countries at similar stages of economic development as reflected in per capita income, and we do find significant relationships between financial

development indicators and firm growth in what follows, relationships that vary with per capita income.

Our approach relies on a measure of firm growth from the World Bank Enterprise Surveys (WBES) database – the percentage increase in the number of workers over the two years prior to the survey. While labor growth is a topic of intense interest, there are also practical reasons for focusing on that measure in this analysis.[4] Other measures of firm growth (such as sales growth) are also available, but our measure of labor growth is available for a much larger set of firms and countries. Testing the hypothesis that financial structure affects firm growth differentially, depending on a country's level of economic development, requires as wide a sample of countries as possible, since the financial structure indicators are measured at the country level. Our most expansive regression models employ information from over 49,000 firms in 89 countries.[5] Relying on labor (rather than sales) growth has another side advantage: labor is likely to be measured with less error than sales for both accounting and tax reasons, and such measurement errors may differ systematically by the level of development.

To foreshadow our main result, we find that firms grow faster in countries with low levels of income per capita when the banking system is relatively well-developed. We find no such results for other measures of financial structure, including measures of stock market development. Moreover, we find no strong relationships between financial structure and firm labor growth for countries with high levels of per capita income, in line with previous findings in the literature (Levine, 2002; Demirguc-Kunt and Levine, 2001). Our results are robust to using the instrumental variables method to deal with the potential endogeneity of our financial structure variables.

We also apply the regression methodology pioneered by Rajan and Zingales (1998) (henceforth RZ) to test whether firms in industries that rely heavily on external financing have higher labor growth rates in countries with relatively well developed financial sectors. We find evidence consistent with that proposition, but only for firms in low-income countries with

[4] For example, job growth is the topic of the upcoming World Development Report for 2013, and a key concern of the current U.S. administration.

[5] Not only the firm-level survey information, but also a steady expansion in the number of countries that have financial structure data available enables us to undertake this analysis. For comparison, the original financial structure indicators presented in Levine (2002) were available for only 48 countries.

relatively well developed banking sectors. While the instrumental variables approaches focus on between-country differences, the RZ approach captures within-country, between-industry differences in labor growth rates. That both approaches yield similar results provides support for the plausibility of our findings. Our confidence regarding the beneficial role of banks in poor countries is further boosted by our finding that a more developed banking system is associated with higher investment rates, more employee training, and larger firm sizes *only* in poor countries, which suggest that banks spur both physical and human capital investment besides boosting job growth in such countries.

The WBES also contains a substantial amount of information on firm characteristics (size, industry, ownership structure, legal status) that enable us to further pinpoint the types of firms that benefit from a relatively well developed banking system in countries at early stages of development. Although banks appear to be the financial institutions best suited to serve firms in low income countries based on our results, it does not appear that they disproportionately serve the small-scale firms that are said to characterize the early stages of economic development. In low-income countries, labor growth increases with the size of the banking sector primarily for relatively large, capital-intensive firms.

The rest of the paper is organized as follows. Section II describes the enterprise survey and financial structure data in greater detail and presents summary statistics. Section III describes the variables that we use as instruments for our indicators of financial development in firm growth regressions. It also shows how those variables are related to each other and to our indicators of financial development. Section IV explains both our estimation approach based on instrumental variables and that based on the RZ methodology, and presents our main regression results. Section V examines the types of firms that are most affected by financial structure in high- and low-income countries. Section VI examines whether other firm characteristics and performance measures are related to financial development, so as to better understand potential mechanisms by which banking sector development fosters firm growth in low-income countries. Section VII concludes.

II. Data

Sampling from the universe of registered businesses and following a uniform stratified random sampling methodology, the core WBES uses a standardized survey instrument to benchmark the investment climate of individual economies across the world.[6] The survey contains sufficient information to allow for firm performance analyses. The surveys also report detailed information on firm employment, age, industry, ownership, legal status, and the number of establishments.

As noted above, our analysis is designed to explain variation in firm labor growth. We use the percentage growth in the number of full-time employees over the two years prior to the survey as the dependent variable in our regressions because that information was asked of firms in a wider sample of countries than, for example, information about sales growth. In addition, the information provided by firm owners regarding their number of employees is likely to be more accurate than information about their sales, especially for smaller firms that either do not keep good accounting records or are reluctant to fully report their sales (e.g., because of potential tax consequences). For the 89 countries whose firms enter our regressions, the WBES surveys were conducted at different points in time between 2000 and 2009.

We use three firm characteristics as controls in our firm growth regressions: age, size as measured by the current number of employees, and the percentage of shares held by foreign owners. Both firm age and number of employees enter the regressions in logged form. We do not have strong priors about how these characteristics affect firms' labor growth, though if older firms are more likely to have reached their equilibrium size, they might have slower growth than younger firms. Percentage growth in employees might be greater for smaller firms, as they are starting from a low base of employees, but larger firms may have advantages, especially in terms of access to finance, that make hiring additional workers easier. It is also unclear whether firms with high shares of foreign ownership would expand employment more or less quickly than firms with higher shares of domestic ownership. Better access to finance by foreign firms would allow faster expansion, but a shorter-term focus on the part of those firms may limit firm expansion.

[6] A detailed description of the sample design and sample frame can be found at: http://www.enterprisesurveys.org/documents/Sampling_Note.pdf.

The key explanatory variables in our analysis are indicators of financial structure that are drawn from the World Bank Database on Financial Development and Structure, which was updated in November 2010.[7] We rely on two primary variables that are intended to capture different aspects of each country's financial structure – the ratio of private credit to GDP and the ratio of stock market capitalization to GDP. From previous research on the finance-growth nexus, we would expect growth in employment to be positively linked to both of these measures. However, the new structural economics predicts that the association between firm growth and private credit relative to GDP, which is a bank-based measure of financial development, should be stronger for countries in early stages of development. By contrast, the association between employment growth and stock market capitalization (relative to GDP) is likely to be stronger for countries in more advanced stages of economic development.

Another aspect of financial structure that could impact firm growth is the nature of ownership—the extent to which the banking sector is state-owned or foreign. As we shall later show, however, neither state nor foreign ownership of banks explains variation in labor growth in our sample. The ratios of private credit to GDP and stock market capitalization to GDP are therefore the focus of the empirical analysis that follows.[8]

Perhaps the first thing to notice from Table 2, which provides summary statistics for our four indicators of financial development, is that country coverage is broader for the private credit

[7] More detailed descriptions of the dataset can be found in Beck, Demirguc-Kunt, and Levine (2000) and Beck and Demirguc-Kunt (2009). The permanent URL for accessing the dataset is: http://go.worldbank.org/X23UD9QUX0.

[8] In banking systems characterized by a high degree of ownership by the government, banks' credit growth, portfolio quality, profitability, and productivity tend to suffer (Barth, Caprio, and Levine 2001; 2004; La Porta, Lopez-de-Silanes, and Shleifer 2002). We would therefore expect the employment growth of firms to be slower in countries with state-dominated banking systems. Our data on the share of banking sector assets held by state-owned banks is taken from Micco, Panizza, and Yañez (2007). We do not have a strong prior about whether any pernicious effects of state ownership of banks would be stronger or weaker in countries in early development stages.
The share of foreign bank ownership could also affect firms' employment growth. On the one hand, foreign banks tend to be more efficient than domestic banks in developing countries (see, e.g., Claessens, Demirguc-Kunt, and Huizinga, 2001). Their presence could therefore impose competitive pressure, resulting in lower interest rates on loans and, perhaps, a search for new borrowers, thus expanding the outreach of the banking system. All of these aspects of foreign bank participation could boost firms' labor growth. At the same time, there are longstanding concerns about the tendency of foreign banks to focus their lending on large, well-established firms. In banking sectors dominated by foreign banks, medium and small-sized borrowers might suffer in terms of access to credit, resulting in slower labor growth. Proponents of New Structural Economics would be especially concerned about the mismatch between foreign-owned banks and the large share of small businesses in developing countries. We test these ideas in our labor growth regressions using data on the share of banking sector assets held by majority-foreign-owned banks from Claessens and Van Horen (2009).

measure, with 46 countries at or below the sample median for income per capita, and 45 countries above the median. This is another reason that private credit is the financial indicator that plays the primary role in our analysis. For stock market capitalization/GDP and the shares of banking sector assets held by state and foreign-owned banks, the sample tilts in favor of high income countries (37-40 country observations) as opposed to lower income countries (21-22 observations). In part, this could reflect that stock markets and large shares of foreign bank participation are more likely to be features of the financial systems of advanced countries than of developing countries. For the share of sector assets held by state-owned banks, however, this is not true. The prevalence of observations from richer countries on that indicator likely indicates the relative difficulty of collecting data summarizing financial development in low-income countries. In any event, for the indicators other than private credit/GDP, the relatively small set of lower income countries makes it more difficult to test hypotheses about optimal financial structure based on predictions from new structural economics.

As expected, higher income countries have more developed financial sectors in terms of their average private credit/GDP, stock market capitalization/GDP, and the share of assets held by foreign-owned banks (Table 2). The average share of sector assets held by state-owned banks tips slightly in favor of lower income countries (0.20 vs. 0.16 for higher income countries), though the median state-owned bank asset share is almost identical for the two groups.

At least two other features of the summary statistics for the financial indicators stand out. First, although higher income countries tend to have more developed financial sectors, there is overlap in the distributions of the financial indicators between higher and lower income countries. For example, among lower income countries, those in the top ten percentile have private credit/GDP ratios of 37.8% or higher, which would rank them at or above the median for higher income countries. A second feature is that within the group of low (or high) income countries, there is substantial variation on all financial development indicators despite relatively small sample sizes. For example, the ratio of stock market capitalization to GDP runs from 1% at the tenth percentile to 34% at the 90^{th} percentile for countries in the lower income sample. On the one hand, this suggests that if there is an optimal financial structure that varies with stage of development as reflected per capita income levels, a sizable fraction of the countries in our sample are not achieving it. On the other hand, and perhaps more practically, the fact that there is

substantial variation in financial structure within both the high and low income samples enables us to test whether certain structures yield better outcomes in terms of employment growth, and whether those structures differ depending on the income level of a country.

III. Instruments

Endogeneity poses the major challenge for identifying a causal relation between financial structure and firm growth at different stages of economic development. In particular, we are worried about two possibilities. First, there might be omitted variables that are correlated with both labor growth and our financial structure variables. For instance, omitted business environment indicators might be correlated with both financial development and firm growth (Xu 2011). Second, the causality may run both ways, both from finance to growth and from growth to finance.

While the next section describes both our instrumental variables regressions and those based on the RZ methodology as means of confronting this endogeneity, we begin first with a discussion of potential instruments in this section. The earliest approaches to address the endogeneity of financial development in cross-country growth regressions focused on legal origin variables as instruments (LaPorta, Lopes-de-Silanes, Shleifer and Vishny, 1998; Levine, Loayza, and Beck, 2000). French legal origin, in particular, was associated with lower levels of financial development relative to English and, especially, German legal origin. A parallel line of research designed to explain broader institutional development and its impact on growth emphasizes the role of endowments. In particular, commodity endowments (Engerman and Sokoloff, 1997, 2000) and settler mortality rates (Acemoglu, Johnson, and Robinson, 2001, 2002) explain substantial variation in the quality of institutions, which in turn explain variation in long-run growth trajectories as reflected in current per capita income levels. Another offshoot of the literature uses aspects of a country's population, namely ethnolinguistic fractionalization (Alesina, Baqir, and Easterly, 1999; Easterly and Levine, 1997) and trust levels among citizens (Zak and Knack, 2001), to explain the quality of institutions and their relationship with economic growth.

We prefer to explain financial development and structure using endowments as instruments because they are more deeply rooted in a theory that connects initial exogenous

conditions with the creation, quality, and persistence of institutions. To some extent, ethnolinguistic fractionalization could also be a product of those initial conditions, while trust levels could be a manifestation of homogeneous societies and the relatively egalitarian distributions of income that derived from some endowment structures. While our preference is to explain financial development using variables that summarize initial endowments, we are mindful of the warning from Easterly and Levine (2000) that exogeneity is not the sole criteria for selection of economically meaningful instrumental variables in this context: there must also be compelling reasons to expect that a variable is closely linked to the behavior of financial intermediaries. They therefore opted for the legal origin variables in their work. We acknowledge the advantages and disadvantages of the endowments and legal origins variables as instruments, and thus perform an exploratory analysis to see which variables best explain variation in the broader set of countries for which financial development indicators are now available. A brief description of the specific variables that we try and their motivation for inclusion as instruments follows.

Commodities, Natural Resources

Engerman and Sokoloff (1997) argue that the land endowments of Latin America were amenable to commodities that featured economies of scale in production and thus the use of a large share of slave and indigenous labor (sugar cane, rice, silver). Power was thus historically concentrated in the hands of the plantation and mining elite, and the institutional structure that arose and persisted offered economic opportunity to only a small group. In contrast, the endowments of North America lent themselves to commodities grown on family farms (particularly wheat and maize) which fostered the growth of a relatively large middle class in which power was widely distributed. The institutions that arose and persisted came to reflect this relative equality of economic opportunity. These factors help account for the disparity in income per capita between North America and Latin America. We therefore include dummy variables indicating whether any of a given commodity is grown in each country as potential instruments. Corn, maize, and wheat growth are our proxies for the egalitarian institutions emphasized by Engerman and Sokoloff, which we expect to be positively linked to financial development.

A related literature examines whether endowments of natural resources, particularly oil, are associated with lower levels of economic development. The existence of a so-called resource curse has been analyzed and debated extensively (Sachs and Warner 1995, 2001; Lederman and Maloney, 2008; van der Ploeg, 2011). The ease with which profits can be generated from natural resources could be associated with less investment in other forms of production, such as manufacturing. In turn, there might be less incentive to invest in the research and development, human capital, and institutions (property rights protection, contractual frameworks, and courts) needed to support the market-based exchange that characterizes non-resource based production (Besley and Persson, 2010). In terms of financial development and structure, broad-based access to financial services is less likely to be provided in resource-based economies. In fact, recent evidence shows that the outreach of the financial systems of the resource-based economies is narrow, as firms in those economies are less likely to use any form of external finance and they receive substantially less credit from banks (Beck 2011). We therefore include a measure of an economy's dependence on oil, the net exports of petroleum per worker, in the set of potential instruments. We expect that variable to be negatively associated with financial development indicators. A key advantage of using this measure is that it is available for most countries. Moreover, Maloney and Lederman (2008) show that measures based on net exports are more closely linked to actual natural resource reserves than other trade-based endowment measures.

Settler Mortality

Another influential strand of the literature on the effects of endowments on institutional development and growth trajectories focuses on rates of settler mortality (Acemoglu, Johnson, and Robinson, 2001, 2002). In climates and environments that were inhospitable for development as reflected in high rates of settler mortality, Europeans created states and institutions that enabled elites to extract wealth from colonies, usually in the form of minerals and cash crops. By contrast, in more hospitable environments, settler colonies emerged in which institutions were created to protect property rights and thus foster more broad-based economic opportunity. Indeed, Acemoglu, Johnson and Robinson (2001) find robust evidence that settler mortality has a pervasive influence on a whole series of key property rights institutions such as protection against expropriation by the government, constraints on the executive, and the establishment of democracy. Since relatively widespread access to financial services is likely to

be reflective of the more egalitarian institutions that emerged in settler colonies, we include the logarithm of annualized deaths per thousand European soldiers in the set of potential instruments, which we expect to be negatively associated with financial development indicators.

Fractionalization and Trust

Zak and Knack (2001) develop a theoretical model of the effect of trust on growth. In it, consumers are randomly matched with a broker who makes an investment on their behalf. Prior to the payout from that investment, consumers decide how much time and effort to spend investigating the quality of the broker's investment. Aside from the consumer's investigation, two sets of institutions are incorporated into the model to provide incentives for untrustworthy brokers to reduce the amount of the payout that they cheat consumers out of. The first, which is operationalized in the model as a partial loss of the broker's fee, represents formal institutions such as investigative agencies and the judicial system that detect and punish brokers for abuses. The second, which is operationalized as the social proximity between consumer and broker, represents informal institutions that can impose sanctions on cheating brokers through social ties. These sanctions could include the guilt associated with violating social norms, religious dictates concerning, for example, the afterlife, social ostracism, or loss of profits due to reputational effects.

The key insight from the model is that the amount of investment is declining in the level of distrust between consumers and brokers, because consumers spend more resources investigating their brokers. Lower investment has an adverse impact on growth. In turn, trust is lower (and cheating by brokers more likely) when social distances are greater, formal institutions are weaker, and informal social sanctions are less effective. Cross-country regressions validate the predictions of the theoretical model in that trust among citizens is strongly positively linked to both investment levels and growth rates.

We hypothesize that trust, which arises as a manifestation of the social and institutional environment, could help facilitate financial intermediation. A higher level of trust, for instance, may lower information asymmetry between lenders and borrowers; it may also facilitate the social norm of not defaulting on debts. We therefore include the average level of trust in a country from 1981 to 2006 among the potential instruments and we expect it to be positively

linked to indicators of financial development.[9] We use the average from 1981 to 2006 (rather than from the actual year of the WBES survey) because data on trust are available for distinct years for different countries, and relying on the survey year would lead to too many missing values for trust for our countries. Averaging also has the benefit of smoothing the measurement errors of trust.

Zak and Knack also note that their framework can help account for other findings from the cross-country growth literature. For example, the negative link between ethnic fractionalization and growth found in Easterly and Levine (1997) and between income inequality and growth in Easterly (1999) are both substantially weakened when levels of interpersonal trust are included in regressions. Although the channels through which social ties and the institutional environment affect trust are more clearly laid out than for the polarization measures, we include measures of ethnic and linguistic fractionalization among the set of potential instruments. We expect them to be negatively linked to financial development indicators.

Legal Origin

LaPorta, Lopez-de-Silanes, Shleifer, and Vishny (LLSV) (1997, 1998) first documented that the legal protection of outside investors was stronger in common law countries (English legal origin) than in civil law countries rooted in Roman legal traditions, particularly those of French legal origin. Their interpretation was that English common law traditions evolved to protect private property and support private market outcomes, whereas French civil law tended to unify the legal system and cement state control of the judicial system often to the detriment of private market development. Because legal traditions were introduced in most countries by outside colonizers, LLSV argued that legal origin could be treated as exogenous in regressions explaining financial development and growth. Using legal origin as an instrument for investor protection, they then demonstrated a strong link between those protections and measures of financial development. We therefore include dummy variables for English and French legal origins in the set of potential instruments. We expect English (French) legal origin to be positively (negatively) linked to financial development.

[9] The measure is based on information from the World Values Survey. See Knack and Zak (2001) for details of its construction.

To summarize the discussion to this point, we are able to exploit three advantages over previous studies: (1) a large firm-level database drawn from extensive surveys which provide a precise measure of firm growth as well as valuable information on firm characteristics, (2) updated data on financial structure, which enables us to include a broader set of countries in our regressions than what was used in previous studies of bank-based versus market-based financial systems, and (3) a broader set of potential instruments, many of them tied directly to theoretical arguments about how endowments shape institutions, including financial ones.

Table 3 presents correlations between financial development indicators, potential instruments for financial development, and the firm characteristics that we include in the labor growth regressions. Table 4 presents regressions of financial development on firm characteristics and potential instruments, each added to the regression separately. The strongest correlations are negative ones between settler mortality and financial development (private credit/GDP; stock market capitalization/GDP). Next are the positive correlations between financial development and interpersonal trust. Note that the ethnic fractionalization measure was not strongly linked to financial development (results not in the table) and so we present only the trust measure in Tables 3 and 4.

Surprisingly, neither the legal origin variables nor our resource-based measures of endowments (commodities dummies, net oil exports) are significantly correlated with financial development. Though we tried a variety of variables, we found no strong positive relationships between grains and financial development, as we had expected from our reading of Engerman and Sokoloff, and thus we do not present the commodities dummies in the tables. We do present the net oil exports variable. Though it is not strongly correlated with our measures of financial development, it has some explanatory power for both variables (with t-statistics between 1.2 and 1.3). Similarly, though only English legal origin appears in the tables, we experimented with French legal origin and combinations of legal origins (e.g., non-English, non-French) and found no strong relationships with our measures of financial development.

For the most part, the regressions that control for firm characteristics in Table 4 confirm the correlations in Table 3. For example, private credit is significantly negatively linked to settler mortality and significantly positively linked to interpersonal trust. We also obtain the expected

signs for net petroleum exports (negative) and British legal origin (positive), though neither achieves significance. The instruments do a poorer job of explaining variation in stock market capitalization, with the exception of settler mortality which is negative and significant. Trust and British legal origin both have the expected signs, and the trust coefficient comes reasonably close to significance. Weaker relationships between the potential instruments and stock market capitalization could be due to the smaller sample size for that variable relative to private credit.

Based on Tables 3 and 4, settler mortality and trust appear to be the most relevant instruments for explaining financial development. Note, however, that the net petroleum exports variable becomes significantly negative in the private credit regressions when it appears with other instruments. For example, in the first stage of the GMM regressions that we describe in the next section, both trust and net petroleum exports are highly significant predictors of private credit (see Appendix A. for an example).

In the end, settler mortality does not appear in the first stage results despite its strong association with financial development in Tables 3 and 4. This is because the instrument set does not pass Hansen's J test of over-identifying restrictions when settler mortality is included. For the exclusion restrictions to be satisfied, the instruments should affect labor growth only through their effects on financial development. Because settler mortality has been shown to be so strongly linked to broad measures of institutional and economic development (Acemoglu, Johnson, and Robinson, 2001, 2002)—for instance, we can conceivably see how settler mortality may directly affect local infrastructure and labor regulation, both of which may directly affect firm growth (Xu 2011)—it does not surprise us that its inclusion results in failure of the over-identification restriction test (i.e., Hansen's J test).

Because trust, especially as formulated in the Knack and Zak (2002) framework, could have a strong influence on contracting arrangements, we find it more plausible that its effects on labor growth could work largely through its positive impact on private credit levels. Similarly, the strong negative links between measures of countries' reliance on oil exports and various measures of financial development recently documented in Beck (2011) indicate that widespread access to financial services, particularly credit, is rare in resource-based economies. Therefore, the notion that net oil exports affects labor growth largely through its effects on financial

development and structure also does not seem farfetched. In the GMM regressions that follow, we will show that the test of over-indentifying restrictions is passed when trust and net oil exports are used as instruments in most cases, and we will offer additional estimation approaches in the few cases when the test is not passed.

Our approach in this section has been to experiment with a wide set of potential instruments suggested by the literature, and to let the data inform us about which ones best explain variation in financial development. At the same time, we bear in mind that legitimate instruments must affect firm labor growth only through their effect on financial development. Our assessment is that trust and net oil exports best meet those criteria, and thus those two variables form the instrument set in the instrumental variables regressions that follow.

IV. Regressions

A. OLS

We estimate the following base regression:

$$\Delta L_{ij} = \alpha + \beta FIRM_{ij} + \gamma FIN_j + \varepsilon_{ij} \quad (1)$$

Where ΔL is the percentage change in the number of workers employed by firm *i* in country *j* over the two years prior to the enterprise survey, as described above. *FIRM* represents the three firm characteristics that we use as controls: age, size measured in (logarithm of) total workers, and the share of foreign ownership.[10] As described in Section 2, we expect that labor growth would be slower for older, better established firms. We have no strong priors about how firm size or foreign ownership share affect labor growth. *FIN* represents the indicators of financial development and structure that are the focus of the analysis. These include private credit/GDP, stock market capitalization/GDP, and the shares of sector assets held by foreign and state banks.

We begin with ordinary least square (OLS) regressions describing the associations between indicators of financial development and structure and labor growth. We present results for the full sample of countries, and for high- and low-income sub-samples. We divide countries into high and low-income based on the median per capita income level for the 91 countries for

[10] In unreported specifications, we include industry dummy variables. Qualitative results are similar to those presented here.

which we have private credit/GDP figures, as we did for the summary statistics in Table 2. Standard errors are clustered at the country level in all models to avoid exaggeration of precision in firm-level regressions with country-level variables (Moulton 1990).

The OLS regressions do suggest relationships between financial indicators and firm labor growth that are consistent with predictions from new structural economics (Table 5). For example, private credit/GDP is significantly positively associated with labor growth only for the sample of low-income countries, while stock market development/GDP is positively associated with labor growth among the high-income group. The magnitude of those coefficients is also large. For example, a one-standard deviation increase in private credit/GDP in the low-income group yields roughly a twenty percentage point increase in labor growth, compared to a mean labor growth rate of 58.8 percent (37.8 percent median) for that sample.[11] A one-standard deviation increase in stock market capitalization/GDP in the high income group is associated with a 17-27 percentage point increase in labor growth, compared to the 31 percent mean (24 percent median) growth rate for that sample.

In the low-income sample, the coefficient for stock market capitalization is positive in one specification, but does not achieve statistical significance. In the high-income sample, the coefficient for private credit/GDP is negative and significant in one specification, but that is likely due to the high correlation between the private credit and stock market capitalization indicators. Among the 64 countries that have values for both of those indicators, which is biased toward high-income countries since many low-income countries do not have information on stock market capitalization, the correlation is .66. When the stock market capitalization variable is dropped, the private credit variable is no longer significant in the high-income sample (regressions unreported).[12] In all, the associations between private credit and labor growth are strong in the low- income sample, while stock market capitalization is not linked to labor growth. The reverse is true among the high-income countries.

Among the control variables, there is a strong negative relationship between firm age and labor growth across both high- and low-income countries. There is also a significant positive

[11] Keep in mind that all labor growth rates are based on a two-year period.
[12] Note also that when the private credit variable is dropped from Table 5, model 9, the stock market capitalization variable remains positive and significant in the regressions for the high-income sample. Results are unreported but available from the authors.

association for some models between firm size and labor growth. The share of foreign ownership in a firm is not strongly associated with labor growth for either sample. Because we split the sample by the level of per capita income, there is less need to include that variable in the labor growth regressions. However, in the regressions that pool all countries, that variable is negative and significant indicating that labor growth is slower in countries with high incomes (Table 5, model 3). For the sub-sample regressions, the coefficient for per capita income is also negative, and it is significant in the low-income sample. Perhaps more importantly, its inclusion does not qualitatively change results for other variables (Table 5, models 6 and 9).

In Appendix B, we present OLS regressions that control for additional country-level variables to assess the robustness of our findings regarding financial development and firm labor growth. Because job growth likely depends on the quality of the institutional environment and the general level of stability, we include two variables: an index of adherence to rule of law and another measuring political stability. Certain industries may have experienced more rapid job growth during the period in which our surveys were conducted, and thus we also include variables that measure the share of GDP attributable to agriculture, manufacturing, and services (the omitted category) in our analysis. While these control variables are often significant, they do not change the coefficients for our indicators of financial development much. Private credit/GDP remains significantly positively linked to labor growth within the low-income sample; stock market capitalization/GDP is positively linked to labor growth in the high-income sample.

B. Instrumental Variables Regressions

Because labor growth is as likely to affect financial structure as the reverse, or some omitted factors could be driving both high labor growth and financial development, it is important to investigate whether the associations between financial structure and firm labor growth in Table 5 are causal. To address these concerns regarding the endogeneity of the financial structure variables, we present Generalized Method of Moments (GMM) estimates in Table 6.[13] As described above, we use the average level of interpersonal trust from 1981 to 2006 and net petroleum exports per worker as instruments. Both are measured at the country level. The first-

[13] We choose GMM over two-stage least squares because GMM can account for heteroskedasticity of unknown form (Woolridge, 2001). In practice, the two-stage least squares results were qualitatively similar to the GMM results presented here.

stage F statistics for the excluded instruments and Shea's adjusted partial R-squared statistics indicate that the instruments are strong predictors of financial development in the poor sub-sample. They also perform reasonably well for the full sample and for the rich sub-sample when private credit/GDP is the endogenous variable. They do not perform as well when stock market capitalization is treated as endogenous. This is not surprising because, as shown above, trust levels and net petroleum exports are not as strongly correlated with stock market capitalization.

The main finding from the GMM regressions in Table 6 is that private credit/GDP remains positively associated with labor growth in the sample of low-income countries, though the coefficient is smaller than in the OLS regressions. We view this as evidence consistent with predictions from new structural economics and Gerschenkron (1962): in the early stages of economic development, banks are better able to foster firm growth than are stock markets. The p-values for Hansen's J test of over-identifying restrictions are far larger than critical values, providing additional support for the validity of our instruments.

Stock market capitalization/GDP is not significantly linked to labor growth in the sample of high-income countries, in contrast to the OLS regressions. The first-stage F statistics for the excluded instruments are small (around 2) whenever stock market capitalization is the endogenous financial structure variable in the GMM regressions. This reflects the low degree of correlation between stock market capitalization and our instruments. The instruments also do not pass Hansen's J test of over-identifying restrictions when stock market capitalization appears in the GMM regressions, indicating that trust and net petroleum exports likely do not affect labor growth only through their effects on market capitalization. In all, the GMM regressions do not provide support for a causal link between stock market capitalization and labor growth among firms in high-income countries.

Since weak instruments could be the cause of the non-results for stock market capitalization in the GMM regressions, we also present Limited Information Maximum Likelihood (LIML) estimates (Appendix C). Weak instruments cause less serious problems when estimation is conducted by LIML than by GMM. However, qualitative results are similar for stock market capitalization in the LIML and GMM regressions, again providing no support for a causal link between that variable and labor growth in our sample. Indeed, the coefficients

for market capitalization are negative in the high-income sample. At the same time, we recognize that this does not necessarily rule out a causal link. Our process for indentifying potential instruments simply failed to come up with candidates that worked well for stock market capitalization. In short, the positive coefficient for that variable in the OLS regressions might or might not reflect a causal link with firms' labor growth but our analysis did not uncover an instrument that could reveal the 'true' relationship.

We also present LIML results for private credit/GDP in Appendix C. Although the statistical tests from the GMM models supported the relevance and validity of our instruments (implying that recourse to LIML is not necessary), the LIML results for low-income countries are similar to the GMM results, though significance levels are a bit lower. Still, the one result that is consistent across all estimation techniques in this section is the positive, significant relationship between private credit and firm labor growth in low-income countries.

C. Rajan-Zingales Methodology

Another widely used method for identifying a causal link between financial sector development and growth comes from Rajan and Zingales (1998), focusing on how industry-level growth rates vary with both dependence on external sources of finance and the level of financial sector development in a country.[14] The key identifying assumption is that capital markets in the United States are relatively frictionless, and thus an industry's reliance on external finance in that country is a reliable indication of its true technological demand for external financing. Industry-level dependence on external finance computed from U.S. data is therefore the key exogenous source of variation in their analysis.

The equation that we estimate is:

$$\Delta L_{ijk} = \alpha + \beta_j + \gamma_k + \delta EXTDEP_j + \theta EXTDEP_j * FIN_k + \varepsilon_{ijk} \qquad (2)$$

where ΔL is the percentage change in the number of workers employed by firm *i* in industry *j* in country *k* over the two years prior to the enterprise survey, as described above. β_j represents

[14] See, for example, Fisman and Love (2007) and Kroszner, Laeven, and Klingebiel (2007) for applications of this method, and Xu (2011) for summary of the use of this method in identifying the effects of business environment in general.

dummy variables for each industry; γ_k represents dummies for each country. *EXTDEP* is the industry-level dependence on external finance based on U.S. data, which is equal to external finance (capital expenditures minus cash flow from operations) divided by capital expenditures, as defined in Rajan and Zingales (1998). We then interact that variable with *FIN*, which represents our indicators of financial development (private credit/GDP and stock market capitalization/GDP) in each country. A positive, significant coefficient for that interaction term is supportive of the notion that the labor growth of firms in externally dependent industries is faster relative to other industries in countries with relatively well developed financial sectors. Since our aggregate variable now varies at the country-industry level, we cluster our standard errors at the country-industry level in our analysis.

Because it focuses on within-industry, between-country differences in labor growth, this approach is complementary to our instrumental variables regressions (which focus on cross-country differences). Moreover, the inclusion of country and industry dummy variables makes this approach less susceptible to criticism about omitted variable bias and model mis-specification than more traditional cross-country regressions. RZ relied on industry-level data because it provided the most disaggregated comprehensive data on growth at that time, whereas our surveys enable us to examine firm-level growth in a consistent manner across countries. Finer disaggregation should improve the precision of our estimates relative to industry-level approaches.

Our main finding is that the interaction between industry-level dependence on external finance and private credit/GDP is significantly positively linked to labor growth in the sample of low-income countries (Table 7). By contrast, there is no significant relationship between labor growth and the interaction between stock market development and dependence on external finance in the sample of low-income countries. This is the same pattern as in our instrumental variables regressions. Our finding indicates that, when evaluated at the median industry level of external finance (0.24), the country at the 90th percentile of banking development would have a labor growth rate higher by 8.4 percentage points relative to the country at the 10th percentile of

banking development.[15] This higher labor growth rate amounts to 16% of the standard deviation of labor growth for the poor country sample.

Perhaps surprisingly, we find a negative relationship between labor growth and interactions between industry-level dependence on external finance and indicators of financial development within the sample of high-income countries (Table 7, models 7 and 8). This could indicate that firms in externally financially dependent industries in countries with well-developed financial sectors were more likely to be down-sizing at the time of our surveys than firms in other industries. However, our sample is weighted heavily towards manufacturing firms and away from services. This result could also therefore reflect the shift of employment from manufacturing to services in many industrialized countries during this period.

V. Interactions between Firm Characteristics and Financial Structure

In the previous section, we presented evidence consistent with a positive causal link between private credit/GDP and firm growth in poorer countries. To get a better idea of what types of firms are benefiting from bank finance in these poorer countries,[16] we interact the financial structure variables with firm characteristics using the following equation:

$$\Delta L_{ij} = \alpha + \beta FIRM_{ij} + \gamma FIN_j + \delta FIRM_{ij} FIN_j + \varepsilon_{ij} \qquad (3)$$

Notation is the same as in equation (1). We focus first on the relationship between firm size, financial structure and firm growth. Small firms are defined as those with ten or fewer workers; medium-sized firms have from eleven to fifty workers; and large firms have more than fifty workers. Note that our definitions of size cutoffs are somewhat smaller than many studies of mature economies, reflecting the fact that our sample has many more developing countries, which feature smaller firms in general than mature economies.

In models where private credit/GDP is the financial structure variable, the coefficients for medium- and large-size are negative, and the one for large-size is significant indicating that the growth rates of small firms are higher than for others.[17] The negative coefficients for medium- and large-size are offset, however, by positive coefficients on the interactions between firm size

[15] That is, 1.108 * 0.24 * (0.378 – 0.060).
[16] We do not find strong and consistent patterns for the rich subsample.
[17] Those coefficients are not shown in Table 8, but are discussed in the table notes.

and private credit/GDP. The one for large firms is significant in the OLS regression and the ones for both medium and large-sized firms are significant in the GMM regressions (Table 8).[18] Those coefficients imply that labor growth rates for large firms in the low-income sample begin to exceed those for small firms only when private credit reaches 30-35 percent of GDP. Within the low income sample, only about a fifth of the countries meets or exceeds that standard.

This suggests that the positive relationships between private credit/GDP and labor growth for the poorer countries in the previous section were driven by large firms in a small set of countries with well-developed credit markets. This would seem to be at odds with predictions from new structural economics in which banks are hypothesized to be well-positioned to help small-scale entrepreneurs in the earliest stages of development.[19]

We next divide firms by age, with old, mid-age, and young corresponding to the top, middle, and bottom thirds of the age distribution in our sample (Table 8). In the low-income sample, labor growth is declining in firm age, indicating that better established firms are less likely to be in an expansionary phase requiring the hiring of new workers.[20] Also, because we compute labor growth on a percentage basis as (L(t) – L(t-2))/L(t-2), incremental gains in employment affect small firms much more than they do large ones. Within the low-income sample, the beneficial effects of private credit development on the labor growth of firms appear to be largely independent of firm age. The coefficients on all of the interactions between firm age and private credit in the OLS regressions are positive, significant, and of almost identical magnitude. In the GMM regressions, coefficients on the interactions are also positive and of similar size across age categories, though they are only significant for middle-age and old firms.

While firm age does not appear to have strong effects on the relationship between financial structure and firm labor growth, those relationships are sensitive to firms' capital intensity (Table 8). We divide firms into high, mid, and low capital intensity, corresponding to the top, middle, and bottom thirds of the sample as measured by the ratio of capital to labor at the

[18] In GMM estimation, the interaction terms of financial structure variables with firm characteristics are considered endogenous. Instruments consist of the interaction of our old instrumental variables with firm characteristics.
[19] Of course, well-developed banks might have enabled these firms to grow from small to large over time.
[20] This is also true for the high-income sample, though results for that sample are not shown in Table 8.

industry level. Within the sample of poorer countries, the positive effects of private credit/GDP on labor growth rates are higher among more capital-intensive firms. Similar to the results for firm size, this casts doubt on whether relatively well-developed credit markets in low income countries improve labor growth rates for less capital-intensive firms. This, too, would seem to be at odds with predictions from new structural economics.[21]

To summarize, contrary to predictions from new structural economics that banks should disproportionately benefit small-scale entrepreneurs and manufacturers in the early stages of economic development, our results indicate that the labor growth rates of larger, capital-intensive firms are increasing in the level of private credit to GDP. While banks appear to be more important than stock markets for generating firm growth in low income economies, they do not seem to target the clients that new structural economics predicts would be most natural. We cannot, however, rule out the possibility that banks enabled a subset of small firms to grow and become more capital-intensive over time. Of course, why only a subset of firms would have benefited from bank finance remains an open question.

VI. Mechanisms through Which Bank Finance Spurs Firm Development

As a final empirical exercise and to further assess the plausibility of our main finding, we examine the relationships between our indicators of financial development and other firm-level performance variables (Table 9). Within the sample of low-income countries, we find that private credit/GDP is positively and significantly associated with firms' investment rates, which indicates that the labor growth associated with banking sector development is accompanied by capital investment. Similarly, private credit/GDP is positively associated with a dummy variable indicating that the firm provides training to its employees. This suggests that bank finance is associated not only with increasing the number of workers at firms in low-income countries, but also with developing their human capital, presumably to achieve productivity gains. Finally, in low-income countries private credit is also positively associated with firm size measured by number of employees. One concern was that our measure of labor growth focused on a short time horizon (2 years). The positive significant link between private credit and firm size is

[21] Again, a relatively well developed banking sector might have might have enabled a subset of firms to become more capital-intensive over time.

consistent with the idea that bank finance sustains firms over longer periods enabling them to expand over time.

In contrast, neither private credit nor stock market capitalization is significantly associated with investment rates, firm size, or employee training within the sample of high-income countries. Further, there is no strong relationship between stock market capitalization and the other firm outcome variables within the sample of low-income countries. These patterns mimic the ones that we found for labor growth and thus support our interpretation of our main finding regarding the beneficial effects of banking sector development in lower-income countries.

VII. Conclusions

We have combined data from detailed firm surveys with indicators of financial development and structure that cover a broader set of countries than in earlier studies in order to study the relationships between firm growth, financial structure, and stage of economic development. In low-income countries, we find evidence that labor growth is swifter in countries with a higher level of private credit/GDP, consistent with predictions from new structural economics. This conclusion holds using two well-established estimation approaches for identifying the causal impact of financial development on growth: instrumental variables regressions and the Rajan-Zingales methodology. The plausibility of the finding of the beneficial role of banks in poor countries is further boosted by our finding that a more developed banking system is associated with higher investment rates, more employee training, and larger firm sizes only in poor countries, which suggests that banks spur both physical and human capital investments besides boosting job growth in such countries. In high-income countries, we find that labor growth rates are increasing in the level of stock market capitalization, which could also be viewed as being consistent with predictions from new structural economics, though we are unable to provide evidence that the association is causal.

At the same time, when we examine the types of firms that appear to benefit from well-developed private credit markets in low-income countries, we find no evidence that it is the small-scale firms that benefit most. Rather, labor growth rates are increasing in the level of private credit market development for larger, capital-intensive firms. This pattern is more

consistent with political economy explanations of how banking systems in low-income countries serve the interests of the elite, rather than providing broad-based access to financial services.

We acknowledge that our approach comes with caveats and highlights gaps in our knowledge about the effects of financial structure. For example, our inability to find a suitable instrument for stock market development makes it difficult to study whether market capitalization enables firms to grow more quickly in high-income countries. Though again, our results using the RZ methodology also show no evidence of a positive link between stock market development and labor growth of firms in industries that depend heavily on external finance.

Perhaps more importantly, though the enterprise surveys that we use offer rich information across a wide range of countries, our labor growth rates can only be computed over a two-year window. We are therefore relying on a snapshot of firm growth to draw inferences. Case studies of firm financing patterns and financial development in low income countries over longer periods are likely to offer a more complete picture of how firms grow. To the extent that some low-income countries have been better able to achieve financial inclusion, those case studies could shed light on how banks can foster growth across a broader spectrum of firms during the early stages of development. However, to the extent that the political economic incentives that limit the inclusiveness of financial systems in low-income countries cannot be overcome, it would be wise to explore how alternative policies and intermediaries could better achieve that aim.

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Table 1. Variable definitions and sources

Variable name	Definitions
Lgrow (labor growth)	Firm-level employment growth rate, from ICA data (i.e., the investment climate data).
Private credit/GDP	Private Credit/GDP, from World Bank Financial Development and Structure Database. (Also available from WDI).
Stock market/GDP	Stock Market Capitalization/GDP, World Bank Financial Development and Structure Database.
Share of state banks	Share of banking sector assets held by government-owned banks, from Micco, Panizza, and Yanez (2007).
Share of foreign banks	Share of banking sector assets held by foreign-owned banks, from Claessens and Van Horen (2009).
Ln(L)	Log(firm size in terms of the number of employees), from ICA.
Ln(firm age)	Log(firm age), from ICA.
Ln(GDP per capita)	Log(GDP per capita), country level, WDI data.

Table 2. Variations in poor and rich countries

For the poor region

	N	mean	sd	p10	p25	p50	p75	p90	CV	p75/p25	p90/p10
Labor growth	46.000	0.588	0.495	0.126	0.233	0.378	0.826	1.179	0.842	3.538	9.366
Private credit/GDP	46.000	0.203	0.196	0.060	0.076	0.153	0.234	0.378	0.965	3.064	6.342
Stock market cap./GDP	21.000	0.145	0.127	0.011	0.037	0.101	0.226	0.342	0.874	6.117	31.290
Share of state banks	22.000	0.204	0.252	0.000	0.000	0.083	0.315	0.688	1.238	n.a.	n.a.
Share of foreign banks	22.000	0.363	0.275	0.057	0.134	0.330	0.487	0.757	0.758	3.634	13.279
Investment Rate	41.000	0.045	0.031	0.015	0.024	0.043	0.059	0.072	0.699	2.430	4.723
Training dummy	46.000	0.333	0.169	0.126	0.204	0.318	0.438	0.512	0.509	2.144	4.063
Ln(workers)	46.000	3.296	0.769	2.213	2.887	3.240	3.662	4.311	0.233	1.268	1.948

For the rich region

	N	mean	sd	p10	p25	p50	p75	p90	CV	p75/p25	p90/p10
Labor growth	45.000	0.308	0.237	0.120	0.171	0.239	0.327	0.743	0.770	1.914	6.191
Private credit/GDP	45.000	0.567	0.432	0.185	0.284	0.379	0.767	1.458	0.762	2.698	7.878
Stock market cap./GDP	40.000	0.440	0.473	0.078	0.169	0.318	0.476	0.961	1.075	2.810	12.267
Share of state banks	37.000	0.162	0.199	0.000	0.010	0.096	0.203	0.452	1.230	20.300	n.a.
Share of foreign banks	37.000	0.460	0.326	0.065	0.181	0.435	0.730	0.917	0.708	4.033	14.043
Investment Rate	24.000	0.038	0.026	0.012	0.018	0.035	0.048	0.077	0.688	2.621	6.363
Training dummy	45.000	0.507	0.182	0.297	0.398	0.466	0.660	0.745	0.358	1.660	2.508
Ln(workers)	45.000	3.282	0.530	2.680	2.929	3.226	3.504	4.030	0.161	1.196	1.504

Note. The poor and the rich samples each account for 50 percent of the (collapsed) country sample that deletes firms that have missing observations for labor growth and our base control variables. “N” is the number of countries. “sd” is standard deviation. “CV” is coefficient of variation. “p10, p25, p50, p75, p90” represent the 10th,25th, 50th, 75th, and 90th percentile, respectively.

Table 3. Correlation matrix of key variables

	Labor growth	Priv Credit/GDP	Stock Mkt Cap/GDP	Ln(workers)	Ln(firm age)	% foreign ownership	Trust	Net Petrol. Exp/worker	British Legal Origin
Private Credit/ GDP	-0.2053 0.0536 89								
Stock Market Capitalization/GDP	0.049 0.7102 60	0.6625 0 64							
Ln(workers)	-0.1868 0.0779 90	0.0824 0.4222 97	0.0941 0.4596 64						
Ln(firm age)	-0.4425 0 90	0.3731 0.0002 97	0.1781 0.1591 64	0.4932 0 98					
% foreign Ownership	0.1682 0.1129 90	-0.1197 0.2429 97	-0.018 0.8878 64	0.0742 0.4675 98	-0.2563 0.0109 98				
Trust	0.0835 0.5564 52	0.3569 0.0069 56	0.2564 0.0891 45	0.3525 0.0077 56	0.2382 0.077 56	-0.2288 0.0899 56			
Net Petroleum Exports per worker	-0.0421 0.6935 90	-0.084 0.4136 97	0.1981 0.1167 64	0.1167 0.2525 98	0.0443 0.6651 98	-0.0975 0.3398 98	0.2875 0.0317 56		
British Legal Origin	0.1538 0.249 58	0.1228 0.3376 63	-0.0147 0.9271 41	0.1748 0.1672 64	-0.2012 0.1109 64	0.3061 0.0139 64	0.1101 0.5419 33	-0.0222 0.8618 64	
Settler Mortality Rate	0.3123 0.044 42	-0.5626 0 46	-0.5048 0.0072 27	-0.305 0.0371 47	-0.4241 0.003 47	0.4961 0.0004 47	-0.1148 0.5846 25	0.132 0.3764 47	-0.0893 0.5508 47

Note. The three numbers for each variable pair are the correlation coefficient, the p-value of statistical significance, and the number of observations.

Table 4. Regressions of Financial Development on Potential Instruments and Firm Controls

	Private Credit/GDP	StockMarket Cap/GDP	Private Credit/GDP	StockMarket Cap/GDP	Private Credit/GDP	StockMarket Cap/GDP	Private Credit/GDP	StockMarket Cap/GDP
intercept	1.315***	1.882**	0.258***	0.262***	-0.044	0.121	0.219***	0.227***
	(3.486)	(2.159)	(4.718)	(2.860)	(-0.400)	(0.950)	(3.381)	(4.275)
ln(firm age)	0.024	0.014	0.040**	0.026*	0.046***	0.028**	0.045**	0.029***
	(1.203)	(0.891)	(1.999)	(1.782)	(2.998)	(2.066)	(2.161)	(2.678)
foreign ownership	0.002	0.031	-0.044	0.009	0.009	0.026	-0.045	-0.006
	(0.033)	(0.761)	(-0.720)	(0.226)	(0.236)	(0.683)	(-0.758)	(-0.153)
ln(L)	0.015	0.014	0.025	0.010	0.005	0.004	0.023	0.013
	(0.658)	(1.087)	(1.182)	(0.862)	(0.363)	(0.310)	(1.052)	(1.024)
Settler Mortality	-0.221***	-0.367**						
	(-2.929)	(-1.991)						
Net Petroleum			-0.055	0.093				
Exports per Worker			(-1.162)	(1.276)				
Trust					0.015***	0.007		
					(2.928)	(1.442)		
British Legal Origin							0.094	0.059
							(0.697)	(0.344)
Number of observations	62,485	50,648	62,532	50,648	62,303	50,466	62,485	50,648
Adjusted R2	0.161	0.232	0.034	0.042	0.171	0.038	0.032	0.010

Note. The table reports OLS regressions of indicators of financial development on potential instrumental variables and a set of controls. *, ** and *** represent statistical significance at the 10, 5, and 1 percent levels; t-statistics are in parentheses.
We have also tried dummies for commodity production as explanatory variables. They tend to have insignificant coefficients for private credit/GDP and stock market capitalization/GDP; when they are significant, they are often of different sign than in Easterly and Levine (2003).

Table 5. OLS Regressions of labor growth on financial structure: Pooled, poor and rich samples

	Pooled			Poor			Rich		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
ln(workers)	0.035*	0.043	0.026	-0.000	0.043	0.011	0.029***	0.022	0.013
	(1.684)	(1.611)	(1.462)	(0.011)	(1.225)	(0.547)	(2.664)	(1.591)	(1.012)
ln(firm age)	-0.197***	-0.199***	-0.173***	-0.188***	-0.220***	-0.161***	-0.168***	-0.170***	-0.158***
	(7.786)	(7.535)	(-9.657)	(9.461)	(7.698)	(-9.481)	(9.111)	(8.421)	(-9.365)
foreign ownership	0.006	-0.000	0.014	0.079	0.009	0.140*	0.022	0.026	0.047
	(0.100)	(0.002)	(0.218)	(1.436)	(0.068)	(1.689)	(0.431)	(0.446)	(0.919)
private credit	-0.040		0.075	0.345*		0.746***	-0.028		-0.258*
	(0.253)		(0.352)	(1.937)		(2.673)	(0.178)		(-1.722)
Stock mkt cap/GDP		0.045	0.134		0.205	-0.604		0.178	0.339**
		(0.252)	(0.761)		(0.249)	(-0.548)		(1.199)	(2.096)
ln(GDP per capita)			-0.156***			-0.271**			-0.029
			(-2.872)			(-2.070)			(-0.462)
Intercept	0.835***	0.766***	1.904***	0.963***	1.012***	2.582***	0.665***	0.597***	0.911*
	(10.799)	(8.513)	(4.763)	(8.585)	(5.534)	(3.101)	(8.404)	(8.156)	(1.853)
Number of observations	49,366	40,522	40,522	19,736	12,573	12,573	29,630	27,949	27,949
Adjusted R2	0.040	0.041	0.087	0.055	0.048	0.114	0.033	0.046	0.066

Standard errors clustered at the country level.
*, **, and ***: significance at the 10, 5, and 1 percent levels; t-statistics are in parentheses.

Table 6. GMM estimates of determinants of labor growth: the pooled, poor, and rich samples

	Pooled sample				Poor sub-sample				Rich sub-sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(6)	(8)	(9)	(10)	(11)	(12)
ln(GDP per capita)			-0.117***	-0.122***			-0.169**	-0.184			-0.024	-0.064
			(2.749)	(2.711)			(2.304)	(1.210)			(0.361)	(1.391)
ln(workers)	0.030**	0.039***	0.024**	0.021	-0.006	0.006	0.010	0.018	0.027***	0.036**	0.026**	0.028*
	(2.129)	(2.859)	(2.153)	(1.478)	(0.237)	(0.137)	(0.474)	(0.469)	(3.119)	(2.462)	(2.522)	(1.929)
ln(firm age)	-0.204***	-0.188***	-0.169***	-0.164***	-0.188***	-0.211***	-0.178***	-0.194***	-0.160***	-0.157***	-0.161***	-0.153***
	(8.342)	(8.348)	(11.627)	(11.513)	(9.403)	(10.388)	(8.795)	(9.765)	(9.044)	(8.252)	(10.466)	(8.480)
foreign ownership	0.013	0.019	0.025	0.040	0.080*	0.115*	0.062	0.137**	0.043	0.030	0.043	0.033
	(0.297)	(0.393)	(0.593)	(0.856)	(1.772)	(1.824)	(1.167)	(1.964)	(1.066)	(0.653)	(1.000)	(0.709)
private credit	0.147		0.079		0.404*		0.494**		-0.191		-0.111	
	(0.452)		(0.387)		(1.690)		(2.166)		(0.927)		(0.508)	
Stock mkt cap/GDP		-0.095		0.053		1.228		1.486		-0.262		-0.140
		(0.379)		(0.304)		(1.002)		(1.253)		(0.844)		(0.507)
Intercept	0.780***	0.797***	1.625***	1.685***	0.954***	0.948***	1.922***	2.015**	0.731***	0.739***	0.899*	1.235***
	(6.940)	(7.915)	(5.706)	(4.817)	(8.536)	(4.246)	(4.211)	(1.988)	(6.908)	(6.058)	(1.826)	(3.236)
Number of observations	49,162	40,364	49,162	40,364	19,690	12,573	19,690	12,573	29,472	27,791	29,472	27,791
Adjusted R2	0.028	0.034	0.077	0.080	0.055	0.017	0.076	0.029	0.022	.	0.031	0.002
First-stage F for excluded IVs	8.33	1.69	8.80	1.38	14.24	11.22	17.00	12.07	3.32	2.24	8.57	1.91
p-value, Hansen's J	0.227	0.053	0.227	0.035	0.671	0.281	0.666	0.205	0.119	0.062	0.081	0.053
Shea's adj. partial R-sq	0.861	0.702	0.531	0.521	0.550	0.704	0.793	0.472	0.390	0.484	0.426	0.568

standard errors clustered at the country level. *, **, and ***: significance at the 10, 5, and 1 percent levels; t-statistics are in parentheses.
The two financial variables (private credit/GDP and stock market capitalization/GDP) are considered endogenous. Instruments are: petroleum net exports per capita (lagged), average trust 1981-2006.

Table 7. Rajan-Zingales Approach: The Effect of Financial Development on Labor Growth by Dependence on External Finance

	Poor				Rich			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(L)	0.044**	0.078**	0.065***	0.079***	0.018*	0.012	0.031***	0.031***
	(2.378)	(2.508)	(8.593)	(6.634)	(1.888)	(1.050)	(6.718)	(6.337)
ln(firm age)	-0.180***	-0.207***	-0.187***	-0.204***	-0.161***	-0.154***	-0.191***	-0.188***
	(8.978)	(7.831)	(17.349)	(13.996)	(10.131)	(8.385)	(20.216)	(19.113)
foreign ownership	-0.017	-0.090	-0.039	-0.083	0.005	-0.002	-0.013	-0.017
	(0.219)	(0.618)	(1.145)	(1.187)	(0.140)	(0.037)	(0.671)	(0.829)
ln(GDPpc)	-0.118	-0.116	-0.166	0.122	-0.014	-0.035	0.003	-0.007
	(1.463)	(0.809)	(1.439)	(0.818)	(0.286)	(0.718)	(0.149)	(0.273)
external dependence	-0.305***	-0.085			0.051	-0.127		
	(2.789)	(0.352)			(0.421)	(0.748)		
Private credit*Ext. Dep.	0.890***		1.108***		-0.123		-0.149***	
	(6.754)		(5.116)		(0.703)		(3.439)	
Stock market cap*Ext.		0.786		-0.791		0.138		-0.130***
Dep.		(0.649)		(1.155)		(0.529)		(3.073)
Country Dummies	NO	NO	YES	YES	NO	NO	YES	YES
Industry Dummies	NO	NO	YES	YES	NO	NO	YES	YES
Number of observations	14,132	9,384	14,132	9,384	19,660	18,547	19,660	18,547
Adjusted R2	0.080	0.063	0.244	0.232	0.034	0.034	0.155	0.158

Notes. The Table shows OLS regressions; standard errors clustered at the country-industry level. *,**, and *** represent significance at the 10, 5, and 1 per cent levels; t-statistics are in parentheses. External dependence is the industry-level dependence on external finance based on U.S. data, which is equal to external finance (capital expenditures minus cash flow from operations) divided by capital expenditures, as defined in Rajan and Zingales (1998). The correspondence between the industry classifications in the Rajan and Zingales paper and in our dataset is as follows:

1 "Textiles": same

2 "Leather": same

3 "Garments": same

4 "Agroindustry": average of “beverage” and “food products” from RZ.

5 "Food": same.

6 "Beverages": same
7 "Metals and machinery": metal products.
8 "Electronics": electric machinery (which contains electronic components)
9 "Chemicals and pharmaceutics": average of “drugs” and “other chemicals” from RZ.
10 "Construction": “transportation equipment”
23 "Transport": “transportation equipment”
11 "Wood and furniture": same.
12 "Nonmetallic and plastic materials": plastic products.
13 "Paper": average of “pulp, paper” and “paper and paper products” from RZ.
14 "Sport goods": “other industries”.
15 "IT services": missing.
16 "Other manufacturing": “other industries”.
26 "Auto and auto components": “motor vehicles”.
27 "Other transport equipment": “ships”.
The following industries (mostly services) in our data are coded as missing, because external financial dependence measures are not available for them from RZ: Other unclassified, Telecommunications, Accounting and finance, Advertising and marketing, Other services, Retail and wholesale trade, Hotels and restaurants, Real estate and rental services, Mining and quarrying.

Table 8. Private Credit and Labor Growth by Firm Characteristics, Poor Sub-sample

	OLS	GMM
Private Credit by Firm Size		
Priv*Small (<= 10 workers)	-0.529	-0.202
	(-0.989)	(-0.246)
Priv*Medium (11-50 workers)	0.348	0.747**
	(1.531)	(2.451)
Priv*Large (>50 workers)	0.669***	0.791***
	(7.293)	(9.038)
Private Credit by Firm Age		
Priv*Young	0.498***	0.388
	(3.205)	(1.591)
Priv*Middle-aged	0.497***	0.484**
	(2.838)	(2.142)
Priv*Old	0.497***	0.508**
	(3.102)	(2.565)
Private credit by Firm Capital Intensity		
Priv*Low	0.381	0.284
	(1.571)	(0.876)
Priv*Medium	0.615***	0.524***
	(4.787)	(3.008)
Priv*High	0.472***	0.302
	(3.740)	(1.116)

Notes. This table shows regression coefficients for the interaction between private credit/GDP and various firm characteristics (size, age, and capital intensity). The interaction terms for each characteristic were included in separate regressions. In addition to the firm characteristics, the regressions also control for the share of foreign ownership in the firm and the logarithm of GDP per capita in each country. Standard errors are clustered at the country level. *,**, and *** represent significance at the 10, 5, and 1 per cent levels. Firm characteristics enter the regressions not only as part of an interaction with private credit, but also on their own. For reference, the coefficients for the medium and large firm dummies for the OLS regression described in the top third of the table are -.097 and -.221**, respectively. The coefficients for the middle-aged and old dummies for the OLS regression described in the middle third of the table are -.126*** and -.311***, respectively. The coefficients for the medium and high capital intensity dummies for the OLS regression described in the bottom third of the table are -.122*** and 0.038, respectively.

Table 9. Potential Mechanisms through Which Financial Development Spurs Firm Development

Explanatory Variable	**Dependent Variable**		
	Investment Rate	Training	Firm Size
Private Credit			
Poor Sub-sample	0.032***	0.441***	1.588***
	(5.026)	(3.670)	(7.582)
Rich Sub-sample	-0.001	-0.063	0.190
	(-0.093)	(-1.139)	(0.816)
Stock Market Capitalization			
Poor Sub-sample	-0.005	-0.127	2.198*
	(-0.135)	(-0.286)	(1.733)
Rich Sub-sample	-0.010	-0.063	0.364
	(-1.551)	(-1.455)	(1.296)

This table shows coefficients for indicators of financial development from OLS regressions of firm outcomes (Investment rate, training, and firm size) on financial indicators and other controls. Each coefficient in the table comes from a separate regression. Those regressions also control for firm characteristics (number of workers, age, and share of foreign ownership in the firm) and per capita income in each country. Standard errors are clustered at the country level. *,**, and *** represent significance at the 10, 5, and 1 per cent levels. Training is a dummy variable indicting whether the firm offers training to its employees. Firm size is measured by (log of) total workers.

Appendix A.

First stage results

	Private Credit/GDP	**Stock Mkt. Capitalization/GDP**
ln(firm age)	4.546***	0.029**
	(3.144)	(2.075)
foreign ownership	0.363	0.029
	(0.098)	(0.809)
ln(workers)	0.620	0.003
	(0.483)	(0.213)
Trust	1.559***	0.005
	(3.206)	(1.443)
Petroleum net export per worker	-9.032**	0.080
	(-2.410)	(1.220)
Intercept	-6.773	0.146
	(-0.624)	(1.277)
Number of observations	62,303	50,466
Adjusted R2	0.200	0.063

Appendix B. Sensitivity Checks, Industry Controls, Rule of Law, Political stability

	Poor				Rich			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(L)	-0.002	0.022	0.015	0.050**	0.035***	0.028***	0.020*	0.011
	(0.101)	(1.018)	(1.282)	(2.305)	(3.735)	(2.869)	(1.931)	(0.969)
ln(firm age)	-0.187***	-0.176***	-0.172***	-0.215***	-0.176***	-0.179***	-0.161***	-0.153***
	(9.640)	(8.113)	(7.741)	(6.209)	(6.804)	(7.332)	(8.136)	(8.024)
foreign ownership	0.103*	0.053	0.064	-0.026	0.015	0.029	0.038	0.040
	(1.707)	(0.567)	(1.302)	(0.274)	(0.334)	(0.631)	(0.773)	(0.798)
private credit	0.611**		0.498***		0.145		0.113	
	(2.476)		(3.419)		(0.684)		(0.536)	
stock/GDP		-0.077		0.448		0.299***		0.256*
		(0.079)		(0.603)		(2.826)		(1.933)
Agri./GDP	0.872	1.591*			-0.059	1.820		
	(1.622)	(1.789)			(0.057)	(1.638)		
Maufacture/GDP	-0.738	2.584*			-1.746**	-2.344***		
	(0.638)	(1.925)			(2.535)	(4.039)		
rule of law			-0.520***	-0.630***			-0.150	-0.236***
			(3.643)	(3.421)			(1.336)	(2.653)
political stability			0.105	0.253			0.004	0.083
			(0.727)	(1.229)			(0.050)	(0.906)
intercept	0.790***	0.229	0.565***	0.778***	0.952***	0.910***	0.610***	0.585***
	(2.790)	(0.538)	(3.656)	(3.865)	(6.716)	(6.750)	(5.638)	(7.381)
Number of observations	18,868	12,573	19,736	12,573	24,062	22,580	29,630	27,949
Adjusted R2	0.077	0.090	0.105	0.114	0.052	0.088	0.048	0.075

The table reports OLS regressions of labor growth on indicators of financial development, firm characteristics, and country-level controls. Standard errors clustered at the country level.

*, **, and ***: significance at the 10, 5, and 1 percent levels; t-statistics are in parentheses.

Appendix C. LIML estimates of determinants of labor growth: the pooled, poor, and rich samples

	Pooled sample				Poor sub-sample				Rich sub-sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(GDP per capita)			-0.148**	-0.179			-0.164**	-0.320			0.007	-0.053
			(2.273)	(1.522)			(2.154)	(1.349)			(0.084)	(1.046)
ln(workers)	0.029**	0.042**	0.024**	0.019	-0.003	-0.000	0.011	0.005	0.028***	0.039**	0.029***	0.031*
	(2.041)	(2.513)	(2.040)	(0.924)	(0.137)	(0.007)	(0.502)	(0.104)	(3.227)	(2.477)	(2.623)	(1.896)
ln(firm age)	-0.201***	-0.200***	-0.173***	-0.176***	-0.187***	-0.212***	-0.178***	-0.193***	-0.156***	-0.157***	-0.158***	-0.152***
	(7.074)	(4.724)	(10.664)	(6.743)	(9.232)	(10.257)	(8.718)	(8.597)	(8.778)	(8.176)	(10.722)	(8.339)
foreign ownership	0.016	0.002	0.014	0.017	0.086*	0.099	0.067	0.097	0.036	0.018	0.035	0.023
	(0.342)	(0.023)	(0.301)	(0.271)	(1.869)	(1.240)	(1.197)	(0.905)	(0.936)	(0.373)	(0.869)	(0.467)
private credit	0.113		0.235		0.374		0.475*		-0.254		-0.235	
	(0.298)		(0.736)		(1.496)		(1.944)		(1.114)		(0.807)	
Stock mkt cap/GDP		0.112		0.412		1.461		2.354		-0.306		-0.211
		(0.168)		(0.542)		(1.083)		(1.440)		(0.879)		(0.612)
Intercept	0.791***	0.750***	1.794***	2.042***	0.962***	0.912***	1.898***	2.766*	0.768***	0.747***	0.702	1.161***
	(6.067)	(4.271)	(4.525)	(2.701)	(8.620)	(3.641)	(4.059)	(1.902)	(6.468)	(5.688)	(1.216)	(2.828)
Observations	49,162	40,364	49,162	40,364	19,690	12,573	19,690	12,573	29,472	27,791	29,472	27,791
Adjusted R2	0.032	0.039	0.077	0.069	0.055	0.002	0.076	.	0.012	.	0.015	.

standard errors clustered at the country level. *, **, and ***: significance at the 10, 5, and 1 percent levels; t-statistics are in parentheses.
The two financial variables are considered endogenous. Instruments are: net petroleum export per worker (2000-2005 average), average trust 1981-2006.