The Impact of Regulations and Institutional Quality on Entrepreneurship

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Abstract

This paper examines the impact of start-up regulations and institutional quality on the level of new business activity in a panel of 119 countries between 2001 and 2012. We find robust evidence that new business creation is significantly lower in countries with excessive barriers to entry, a lack of high-quality governmental institutions, or both. Specifically, increasing the number of steps required to start a new business by one step reduces entrepreneurial activity by approximately 9.7 percent. Furthermore, three measures of institutional quality (i.e., political stability, regulatory quality, and voice and accountability) are shown to promote entrepreneurship, whereby an increase of one standard deviation in these measures increases new business activity by 30 percent to 52 percent.

JEL codes: C23, D73, L26, L51

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1. Introduction

New business creation is a prominent feature of the entrepreneurial process, and many studies have demonstrated the positive effects of new business creation on growth and development. As noted by Klapper et al. (2006) and Djankov et al. (2002), newly established firms tend to be more efficient, and the competitive pressure that they exert on other firms enhances overall productivity and economic growth. Recently, Aghion (2017) has pointed out that growth is generated by innovations resulting from entrepreneurial investments. Earlier studies, including those by Aghion et al. (2009), Black and Strahan (2002), and Hause and Du Rietz (1984), have also shown that entrepreneurship has a positive impact on economic growth. Additionally, some studies demonstrate that start-ups and young businesses contribute much more to job creation than more mature firms (Ayyagari et al. 2011; Haltiwanger et al. 2010).

From a development perspective, the ability of a country's business environment to foster new enterprises is therefore important. In this paper, we analyze how entrepreneurship is influenced by two specific aspects of the business environment, namely business entry regulations (i.e., official regulations that affect a new domestically owned, limited liability business), and the quality of a nation's institutions.

In the literature analyzing the effects of entry regulations on entrepreneurship, that entrepreneurship is often measured by the rate of self-employment, by business ownership, and by the rate of new start-ups (see Naudé 2010; Desai 2009). Following Klapper and Love (2011), we use a World Bank measure of entrepreneurship called entry density, which is defined as the number of newly registered limited liability companies (LLCs) per 1,000 working-age population.

This measure is appealing because it captures a key aspect of entrepreneurship (new business creation) and because panel data on this measure have been collected by the World Bank for a very large sample of countries. Also, it is not static or dependent on the level of development like other measures of entrepreneurship based on self-employment. In addition, it overcomes the potential problem of overstating the rate of entrepreneurship that is associated with Global Entrepreneurship Monitor (GEM) measures of entrepreneurship by excluding firms that reregister.

A panel dataset of 119 countries spanning the period 2001 to 2012 is used to empirically analyze the effects of business entry regulations and institutional quality on new firm creation. We estimate cross-section and panel regressions and control for other important factors that influence new firm formation. Our results clearly demonstrate that a nation's regulatory and institutional environment play a crucial role in determining the level of entrepreneurship. Specifically, we find robust evidence that new firm creation is significantly lower in countries with greater entry regulations. Specifically, increasing start-up procedures by one step is associated with an approximate 9.7 percent decline in new business activity. We interpret this result as evidence favoring the public choice theory: Stricter regulation of entry is associated with less efficient market outcomes as exemplified by a reduction in entrepreneurship. We explain this in more detail in the next section.

Entrepreneurship is also significantly harmed by a lack of high-quality institutions. This conclusion is obtained by using a comprehensive indicator of institutions, which is measured along six dimensions of governance quality: voice and accountability, political stability and the absence of violence, government effectiveness, regulatory quality, rule of law, and the control of corruption. Overall, three of these measures—political stability, regulatory quality, and voice and accountability—are shown to promote entrepreneurship, whereby a one standard deviation

increase in these measures increases new business activity by 30 percent to 52 percent. As observed by Baumol (1990), Nyström (2008), and Boettke and Coyne (2009), the type of entrepreneurial activity observed can be explained by the payoffs established by the institutional context. Superior quality institutions reward productive entrepreneurship and reduce incentives for rent-seeking behavior. They thus divert resources toward more productive activities, thereby crowding in entrepreneurship.

The results of this study contribute to a growing strand of literature that finds that entry deregulation is generally associated with superior economic outcomes such as higher per capita income, reduction in the size of the unofficial economy, less corruption, and improvement in productivity (Xu 2011, Freund and Bolaky 2008, Djankov et al. 2002, and World Bank 2003).

The remainder of this paper proceeds as follows. In section 2, we develop a conceptual framework that relates entrepreneurship to the institutional and regulatory environments for business entry, and we also review related theoretical and empirical literature. Section 3 provides the empirical framework, beginning with descriptions of the data used to measure entrepreneurship, business start-up regulations, institutional quality, and control variables. This is followed by a discussion of country selection, descriptive measures, and the empirical model that we estimate. The main findings from our empirical analysis, as well as robustness tests, are presented and discussed in section 4, and finally, section 5 summarizes the main findings and implications of the paper.

2. Conceptual Framework and Relevant Literature

In the subsections below, we discuss in detail the theoretical and empirical literature on the linkages between regulations, institutions, and entrepreneurship. The section also provides a

simple model that summarizes how institutional and regulatory environments potentially affect entrepreneurship.

2.1. Regulation and Entrepreneurship

Theories that seek to explain the role of government regulation can help us understand the nature of the relationship between entry regulations and entrepreneurship. The two principle theories are the public interest theory and the public choice theory. Public interest theory is associated with Arthur Pigou (1932) and holds that government regulation is required to protect the public from market failures. This theory therefore implies that government should regulate new firms to ensure that they comply with minimum standards for providing goods and services. Such regulations reduce the direct harm to consumers from poor-quality products and the indirect harm to the public from negative externalities such as pollution.

The public choice theory, on the other hand, points out that the government is not benevolent and regulation may in fact lead to inefficient outcomes. There are two arguments typically forwarded to support public choice theory. The first emphasizes that regulations serve to benefit politicians and government bureaucrats. For example, Shleifer and Vishny (1993) observe that in many cases, permits exist primarily to give government officials the power to deny issuing them in the first place. Thus, they can use this power to extract bribes in exchange for issuing permits to firms.

The second argument, as noted by Stigler (1971), points out that the process of regulation is often captured by industry incumbents for their own benefit. When this happens, regulation becomes a tool to erect barriers to entry so as to reduce competition and raise incumbent profits, which harms entrepreneurship through at least two main channels. The first is the negative

impact of entry regulations on new firms' investment activities. Bureaucratic entry regulations that are costly impede domestic investment by discouraging the entry of new firms. This has been confirmed by Klapper et al. (2006) and Desai et al. (2003), who find that excessive regulation deters the entry of new firms. According to the World Bank (2003), regulation of firm entry is generally greater in developing countries than in developed countries.

The second channel through which entry regulations harm entrepreneurship is the impact they have on the productivity of existing firms. Since nascent firms are the source of Schumpeterian forces of creative destruction that are essential for economic dynamism, higher bureaucratic barriers to entry reduce productivity growth of existing firms because the disciplinary effects of competition are inhibited. This may explain why some studies such as Xu (2011) find that value added per worker grows more slowly in countries with more onerous regulation of entry, and why deregulation in China and India—both of which once had higher initial level of entry regulation—had a spectacular impact on firm productivity.

In a cross-section study of 85 countries, Djankov et al. (2002) find evidence favoring the public choice theory: Stricter regulation of entry is associated with greater inefficiency of public institutions, such as more corruption and a larger unofficial economy. They find no evidence linking stricter regulation with superior product quality, increased market competition, or remedies for market failures. The findings of the World Bank (2003) study also conclude that heavier regulation is not associated with better quality of private or public goods, but it is generally associated with government inefficiency, corruption, and other negative outcomes. In fact, the study finds that in many developing countries, the regulatory burden pushes many entrepreneurs into the unofficial economy.

Interestingly, Dreher and Gassebner (2013) find that in highly regulated economies, corruption reduces the negative effect of regulations on entrepreneurship. This is because firms pay bribes to officials in order to circumvent regulations, for example to get permits issued. This in turn facilitates firm entry, which in fact means that corruption—in this case—actually greases the wheels of entrepreneurship.

2.2. Institutions and Entrepreneurship

In the Schumpeterian model, the entrepreneur undertakes a variety of activities, such as introducing a new product or a new production process, discovering new markets, implementing new firm organization, and so on. Since institutions provide the general rules (both formal and informal) that facilitate economic, social, and political interactions (as explained by North, 1991), they also create or change incentives associated with undertaking certain activities by determining the payoffs from pursuing these activities. Baumol (1990) observes that, by determining the structure of payoffs, the rules of the game play a central role in the allocation of entrepreneurs among productive, unproductive, and destructive activities.

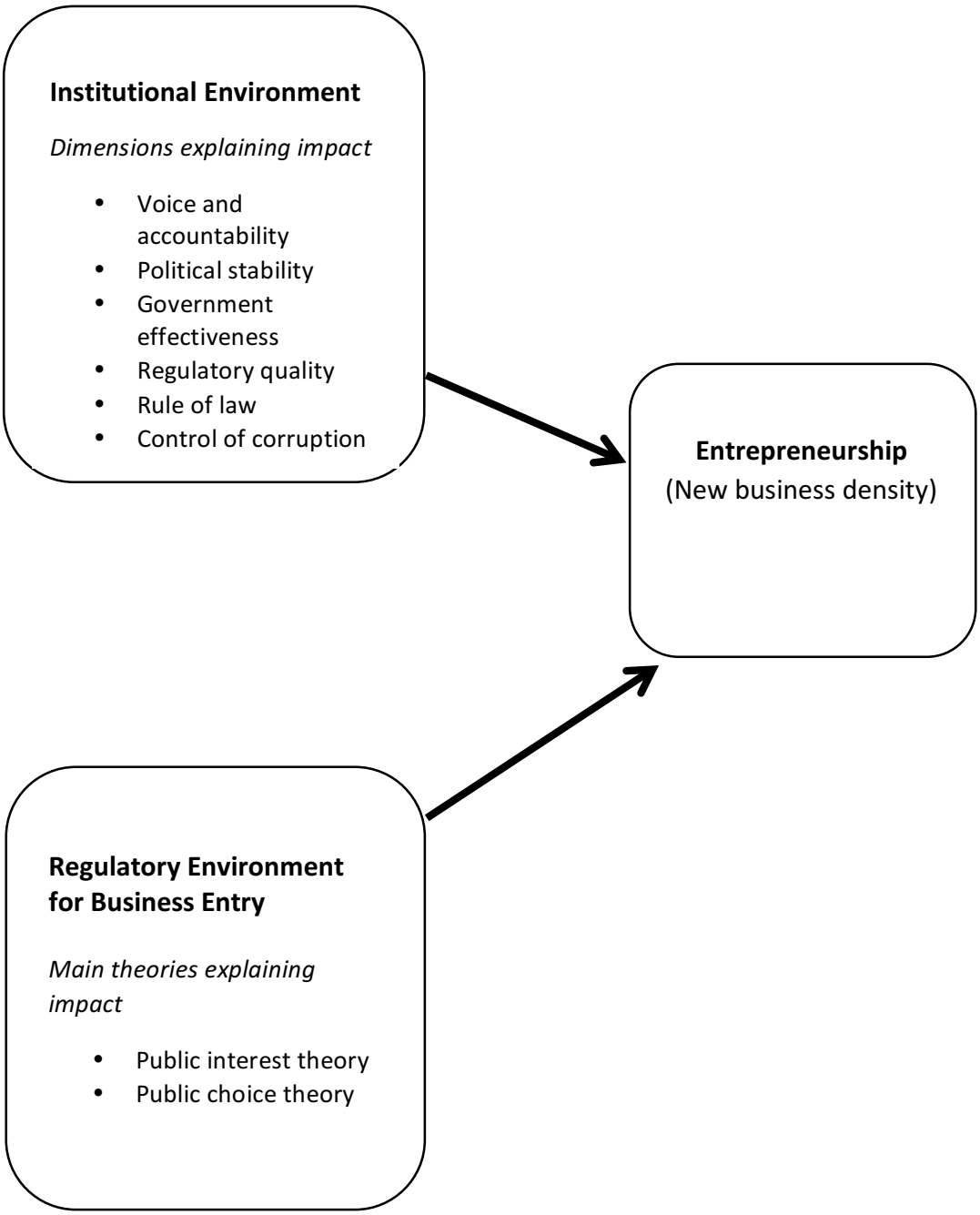
Productive activities, such as arbitrage and innovation, are positive and wealth creating, but activities such as rent seeking (e.g., lobbying efforts for tariffs, subsidies, and other barriers to competition) are unproductive because they simply redistribute existing income or wealth between individuals or groups of individuals. In addition to being an unproductive activity, destructive entrepreneurship also destroys existing resources through theft or conflict. Subsequent studies, including Nyström (2008) and Boettke and Coyne (2009), also point out that the payoffs of entrepreneurial activities are directly related to the existing institutional environment.

Empirical evidence has also shown that the type of entrepreneurial activity observed can be explained by the payoffs established by the institutional context. For example, poor quality institutions have been shown to facilitate corruption, weak rule of law, and other forms of bad governance, which disadvantages producers while rewarding rent-seeking behavior, thus diverting resources away from more productive activities (Gelb 1988, Auty 2001, Ross 2001) and thereby crowding out entrepreneurship. Another way bad institutions crowd out entrepreneurship is by increasing the cost of doing business. For example, obtaining permits, licenses, tax documents, and other necessary documents is very costly in the presence of corruption.

Institutions have different dimensions. Kaufmann et al. (2010) consider six dimensions that capture the quality of institutions. Two of these dimensions, voice and accountability and political stability and absence of violence, focus on the process by which governments are selected, monitored, and replaced. The next two dimensions, government effectiveness and regulatory quality, correspond to the capacity of the government to effectively formulate and implement sound policies, while the remaining two dimensions, rule of law and control of corruption, focus on the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Figure 1 summarizes how the institutional and regulatory environments jointly influence entrepreneurship.

Figure 1. Institutional Quality, Regulatory Effects, and Entrepreneurship



3. Data and Methodology

In the following subsections, we provide a detailed account of how this study is empirically implemented, including variable choice, specification of the empirical model, and data used in the analysis.

3.1. Entrepreneurship: Concept and Measurement

Bjørnskov and Foss (2008) make a distinction between three main concepts of entrepreneurship that have been discussed in the literature. The first and most commonly used concept associates entrepreneurship with innovation activities that are the source of Schumpeterian forces of creative destruction, such as the introduction of new products, new production processes, and new organizational modes. A second concept associates entrepreneurship with the notion of being alert to profit opportunities that may arise from arbitrage opportunities and from the discovery of new products or superior production processes, and then exploiting these profit opportunities before potential competitors seize them. The third concept views an entrepreneur as someone who makes business decisions under conditions of uncertainty.

Most definitions of entrepreneurship are broadly based on at least one of these concepts. Wennekers and Thurik (1999, 46–47), for example, define entrepreneurship as "the manifest ability and willingness of individuals" to perceive new economic opportunities and take advantage of them under conditions of market uncertainty. Other studies adopt a similar definition (see, Bjørnskov and Foss 2008; Dreher and Gassebner 2013).

Empirically, it is difficult to find a measure of entrepreneurship that covers all of the aspects discussed above. Some studies have used self-employment rates to measure entrepreneurship (see Avnimelech et al. 2014; Dau and Cuervo-Cazurra 2014; Bjørnskov and

Foss 2008, 2013; Bowen and De Clercq 2008; Nyström 2008). While this measure may capture the role of an entrepreneur as a risk taker, one of its major drawbacks is that it may be correlated with the level of development. Other studies utilize survey-based responses from the Global Entrepreneurship Monitor, which provide data on respondents who have the intention of starting a business, are in the process of starting a new business, or are engaged in early-stage entrepreneurial activity (see, Dreher and Gassebner 2013; Bjørnskov and Foss 2008). However, as noted by Nyström (2008), GEM data do not measure formal and informal entrepreneurship separately, and that data can easily overstate the rate of entrepreneurship if some individuals who claim to be in the process of starting a business ultimately fail to do so.

As already stated in the introductory section, our preferred measure of entrepreneurship is new business density, which is more appealing for a number of reasons. Data on new business density are published in the World Bank's Doing Business database (www.doingbusiness.org). However, it should also be noted that this measure has its own drawbacks. Its coverage is limited to the formal sector. The informal sector, which is an important component of entrepreneurship in some developing countries, is excluded due to a lack of data on the number of firms operating within that sector. Within the formal sector, the focus is only on firms with limited liability because other types of formal businesses, such as partnerships and sole proprietorships, differ with respect to definition and regulation, making cross-country comparisons difficult.

3.2. Business Regulations and Institutional Quality

Turning to business regulations, studies on entrepreneurship and business creation have particularly focused on the regulatory environment for business start-ups. Following the previous literature (see Djankov et al. 2002; World Bank 2003), the number of start-up procedures

required to register a business is used as a measure of business start-up regulations. Data on this measure are included in the World Bank's Doing Business database. Klapper et al. (2006), Klapper and Love (2011), Djankov et al. (2010), and others have shown that an increase in start-up regulations has a negative effect on new business creation.

Data on the quality of institutions come from the World Bank's Worldwide Governance Indicators (WGI) database, which is derived from perception-based surveys of nongovernmental organizations, think tanks, public officials, aid donors, firms, risk-rating agencies, and other respondents contained in over 30 individual data sources. The detailed methodology used to collect the data is described in Kaufmann et al., where they define governance (our proxy for institutional quality) as "the traditions and institutions by which authority in a country is exercised" (2010, 4).

Based on this definition, Kaufmann et al. (2010) measure the quality of governance along the six dimensions described in section 2.2 (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption). Each of the dimensions is measured on a scale ranging from -2.5 to 2.5, with higher values corresponding to better outcomes. The overall measure of the quality of institutions is equal to the simple average of the six governance dimensions described above. To verify that this is an appropriate and informationally efficient way to aggregate these underlying measures, we perform principle component analysis (PCA) to determine the variance-maximizing linear combination of the governance measures.[1] The resulting weights are very similar to the uniform weights from the simple average (1/6 = 0.167): 0.173 (control of corruption), 0.174 (government

[1] PCA proceeds by standardizing each pairwise-matched data series (i.e., demeaning each series by its sample average and normalizing the resulting values by its sample standard deviation), combining the standardized data into a single matrix and calculating the underlying eigenvalues and eigenvectors. The eigenvector associated with the largest eigenvalue represents the set of weights that maximize the variance of the weighted sum of the data series, and hence, maximizes the informational content therein. Overall, 85 percent of the collective variation in the governance measures is explained by this optimally weighted sum. Finally, we normalize the resulting eigenvector so that the component weights sum to one.

effectiveness), 0.148 (political stability), 0.170 (regulatory quality), 0.177 (rule of law), and 0.160 (voice and accountability).

Indeed, when the overall quality of institutions is calculated both ways (i.e., the simple average and the weighted average according to the PCA weights), the correlation coefficient between the two series is 0.99. Therefore, we measure the overall quality of institutions by way of the simple average of the underlying six governance measures.

3.3. Selection of Remaining Control Variables

The relatively few studies that have employed new business density as the measure of entrepreneurship also control for a country's development and performance (measured by the level and growth in real GDP per capita). These studies find that both the level of real GDP per capita and its growth have a positive effect on entrepreneurship. In the empirical analysis that follows, the level and growth in real GDP per capita—from the World Bank's World Development Indicators (WDI) database—are used as control variables.[2] Therefore, we follow the existing literature and adopt these control variables as well.

Additionally, there is evidence that financial development stimulates entrepreneurship by relaxing the access constraints to financial credit facing small and medium enterprises (SMEs), as well as new enterprises (see Beck and Demirguc-Kunt 2006; Klapper et al. 2010). Domestic credit to the private sector (as a percent of GDP) is used to measure financial market development. This measure is preferred because it is more comprehensive than other available

[2] Previous studies that utilize alternative, perception-based GEM measures of entrepreneurship use a wide array of control variables. Dreher and Gassebner (2013) find that GDP per capita, communist heritage, average income tax, secondary school enrollment, and share of tax revenue in GDP are the robust determinants of entrepreneurship. Given the differences with GEM measures of entrepreneurship, we instead adopt the covariates common to the literature on business density, as our paper is more focused on this particular strand of the entrepreneurship literature.

measures, such as domestic credit provided by the financial sector or domestic credit to the private sector by banks. Stock market measures of financial development could not be used because data availability is limited for many countries in the sample. For these reasons, domestic credit to the private sector is the measure widely used in other studies as well (see Demirguc-Kunt and Levine 1996; Hermes and Lensink 2003).

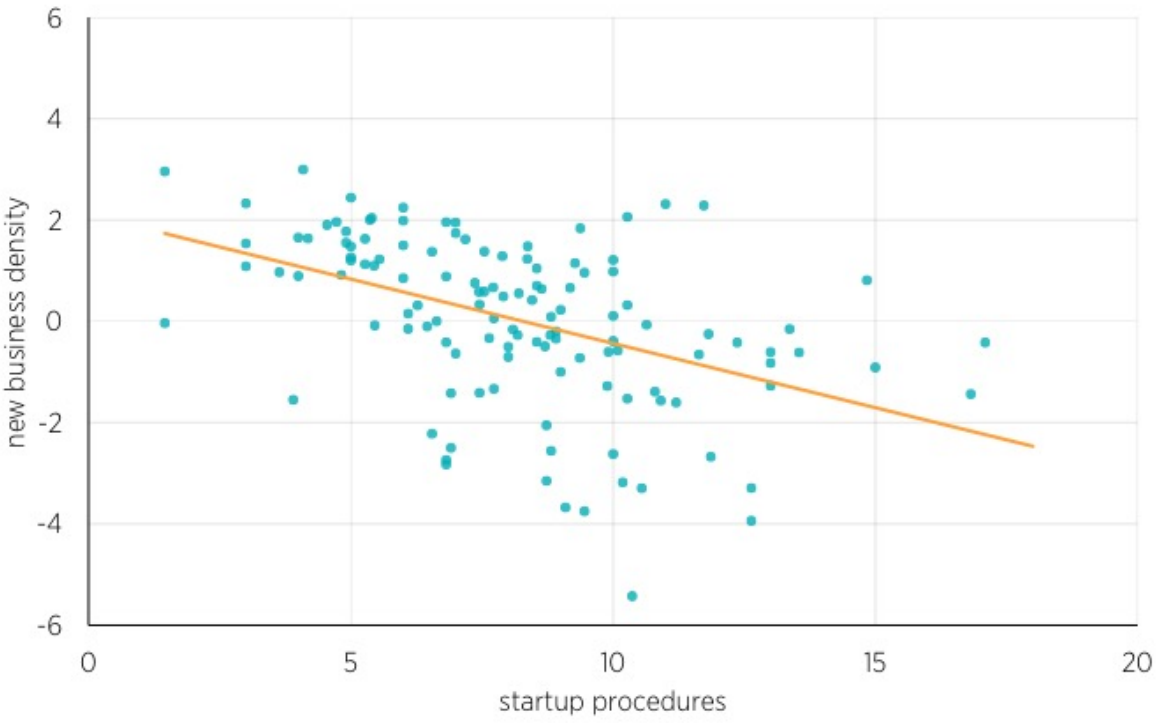
3.4. Country Selection and Descriptive Measures

The sample contains a combination of low-, middle-, and high-income countries. There are eight countries that are categorized as offshore financial centers by the International Monetary Fund: Belize, Cyprus, Liechtenstein, Malaysia, Panama, Samoa, Vanuatu, and the Isle of Man. These countries were removed from the final sample because a large proportion of firms in these countries are registered there mainly for tax purposes (shell companies), and not for the production of goods or services. Table 1 (page 30) lists the countries with data on new business density in the dataset.

The definitions and summary statistics of variables used in the paper are shown in table 2 (page 31). As a first pass, it is useful to examine data on business start-up procedures and the indicators of institutional quality using scatter plots. Figure 2 clearly reveals a negative relationship between start-up regulations and entrepreneurship, implying that higher business entry regulations are associated with a lower new business density. There is also a strong, positive relationship between entrepreneurship and the average of the six dimensions of institutional quality in figure 3A, which implies that higher institutional quality is associated with greater new business activity. The same relationship is also observed when individual measures of institutions are plotted separately in figure 3B through figure 3G. Further investigation is

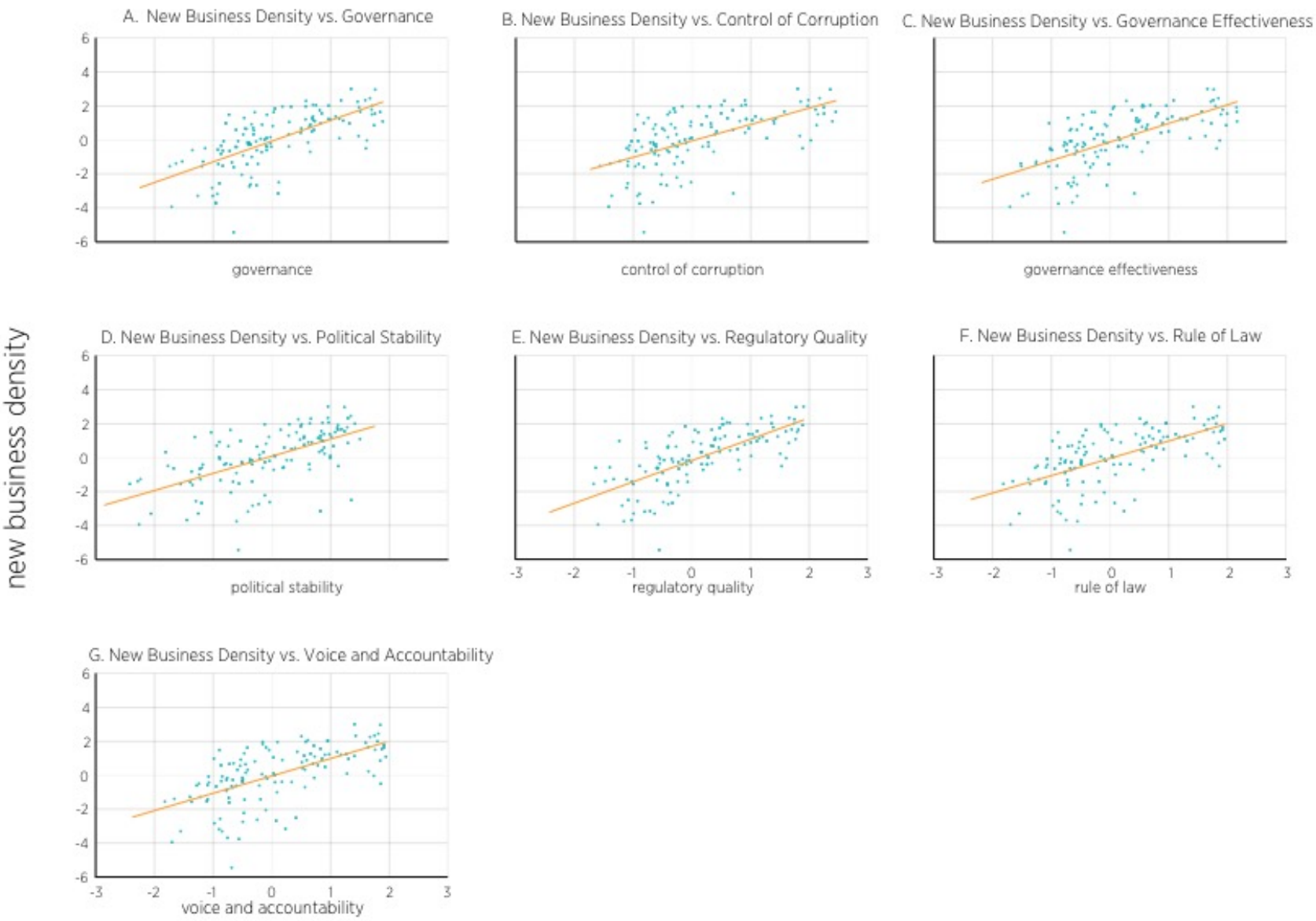
warranted to determine if the observed relationships between these business environment variables and entrepreneurship are causal.

Figure 2. Average New Business Density vs. Average Start-up Procedures



Notes: Each dot denotes the mean ln(density) for a particular country. The line denotes fitted values. New business density equals the new registrations per 1,000 people age 15–64.

Figure 3. Average New Business Density vs. Average Institutional Quality



Notes: Each dot denotes the mean ln(density) for a particular country. The lines denote fitted values. New business density equals the new registrations per 1,000 people age 15–64.

3.5. Model Specification

To empirically examine the effects of the regulatory environment and the quality of institutions on entrepreneurship, we estimate cross-country and panel data models for the sample of 119 countries in the dataset. The cross-country model is specified in equation 1:

$$NewFirms_{it+1} = b_1 StartupRegs_{it} + b_2 InstitutionQuality_{it} + b_3 Credit_{it} + b_4 EconomicGrowth_{it} + b_5 GDP_{it} + a + e_{it} \quad (1)$$

Subscripts i and t represent country and time, respectively. The dependent variable ($NewFirms$) is the natural log of new business density for the ith country. The variable $StartupRegs$ captures the regulatory environment for business start-ups (measured by start-up procedures to register a business). $InstitutionQuality$ represents the six indicators of the quality of institutions (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, control of corruption), and overall institutional quality, which is the mean value of these six measures.

In addition to these main variables of interest, we include three additional control variables that have been identified by the literature as good predictors of entrepreneurial activity at the country level: (1) financial development, as measured by the natural log of domestic credit to private sector ($Credit$); (2) economic growth, as measured by per capita GDP growth ($EconomicGrowth$); and (3) economic development, as measured by log per capita real GDP in PPP-adjusted 2011 dollars (GDP). The parameter a is a constant term, while the variable e_{it} is the disturbance term.

Initially, data on new business density are averaged over the period t+1 (2007–2012), while data for all the independent variables are averaged over the previous six-year period (2001–2006). In other words, the model examines how business start-up regulations, the quality of institutions, and other factors affect subsequent new business density across countries over the following six years. This approach, by abstracting from year-to-year variations, minimizes the impact of business cycles, thereby revealing a better picture of the long-term effects of the independent variables on entrepreneurship.

While the cross-sectional model provides an estimate of the long-run relationship between new business formation and our model's covariates, we follow the literature and also estimate this relationship in a panel framework.[3] The panel model in equation 2 captures the contemporaneous relationship among these variables:

$$NewFirms_{it} = \beta_1 StartupRegs_{it} + \beta_2 InstitutionQuality_{it} + \beta_3 Credit_{it} + \beta_4 EconomicGrowth_{it} + \beta_5 InitialGDP_{i0} + \alpha + \varepsilon_{it} \quad (2)$$

We include initial log GDP per capita as an alternative control variable to minimize potential endogeneity between contemporaneous output and entrepreneurship in a panel framework.[4] The parameter α is a pooled constant term, while the rest of the variables are defined as before.[5]

[3] Previous studies that have also used panel data models to investigate how entrepreneurship is related to institutions and other factors include Nyström (2008) and Dreher and Gassebner (2013).
[4] This is not a concern in the cross-sectional model, as the dependent variable is averaged over the period 2007–2012, while the independent variables are averaged over an earlier period (2001–2006).
[5] We opt for a pooled intercept for two reasons. First, by including initial log output in equation 2, country-specific heterogeneity as it relates to economic development is already captured by the model. Second, a large proportion of the variation in the dependent variable is cross-sectional rather than temporal. As such, modeling country-specific heterogeneity via fixed effects is inappropriate, as they effectively "dummy out" most of the variation in new business formation, leaving insufficient variation for the model to explain.

4. Empirical Results

The following sections provide the empirical estimates of the cross-section and panel models described in section 3.5.

4.1. Cross-Section Model

Table 3 (page 32) summarizes the estimation results from the cross-section model (equation 1) with Huber-White robust standard errors (shown in parentheses). The business regulatory environment is an important factor that clearly affects entrepreneurship. The estimated coefficient on start-up procedures is negative and statistically significant in all seven estimations. This means that a regulatory environment characterized by excessive or burdensome bureaucratic procedures to register and legally operate a business increases the cost of doing business and significantly curtails new firm creation.

The quality of institutions, on the other hand, plays an important role in facilitating entrepreneurship. All of the estimated coefficients on the various measures of institutional quality are positive, and half of these are statistically significant: political stability (column 4), regulatory quality (column 5), and voice & accountability (column 7). Consistent with Mehlum et al. (2006), this implies that nations possessing strong, producer-friendly institutions attract and foster entrepreneurship. Overall, these results support Baumol (1990), Nyström (2008), and Boettke and Coyne (2009), who point out that the payoffs of entrepreneurial activities are directly related to the quality of existing institutions, and Djankov et al. (2010), who demonstrate that good institutions (measured by an index of security of property rights) have a positive effect on entrepreneurship.

Unfortunately, we find no relationship between financial development and entrepreneurship. Given the very high correlation coefficient (0.76) between financial development (natural log of domestic credit to private sector) and the overall level of economic development (real log per capita GDP), we suspect that multicollinearity may be to blame. Indeed, when log per capita GDP is removed from the cross-section regression (results not reported but available upon request), the coefficients on financial development are universally positive, and statistically significant in columns 2 and 4. Therefore, we do not interpret our results as strong evidence against the importance of access to credit in promoting entrepreneurship. Indeed, our panel model estimates (see section 4.2) find strong empirical evidence that financial development is a key factor in promoting entrepreneurship.

We would also expect an increase in economic growth to be accompanied by greater opportunities for new business start-ups. Not surprisingly, the estimated coefficient on a country's per capita GDP growth is positive and statistically significant in all the estimations. Likewise, more economically developed nations (as measured by log per capita GDP) produce a much wider array of goods and services, have households with greater disposable income, and are likely to be more entrepreneurial. Our regression results confirm this as well (i.e., the coefficient estimates are positive and statistically significant in all versions of the cross-section model).

4.2. Panel Model

Table 4 (page 33) summarizes the panel regression results for equation 2 with robust standard errors, clustered by country (shown in parentheses). Regardless of how institutional quality is measured, start-up regulations have a negative and statistically significant effect on entrepreneurship, after controlling for credit availability, economic growth, and initial output.

The coefficient estimates are very similar in magnitude, ranging from -0.090 (column 5) to -0.114 (column 3). In column 1, where the quality of institutions is measured using the overall average of the six dimensions of governance, the start-up regulation coefficient equals -0.097. Therefore, increasing start-up procedures by one step is associated with a 9.7 percent decline in new business density.

Similar to Djankov et al. (2002) and World Bank (2003), these results favor the public choice theory: Stricter regulation of entry is associated with greater inefficiency of public institutions, which results in negative outcomes (less entrepreneurial activity in this case). It is, however, important to point out the findings by Dreher and Gassebner (2013), which suggest that, in highly regulated economies, corruption reduces the negative effect of regulations on entrepreneurship. The reason is that firms pay bribes to officials in order to circumvent regulations, which in fact means that corruption actually greases the wheels of entrepreneurship in these economies.

The initial regression model also provides weak evidence that the quality of institutions promotes entrepreneurship, with positive and statistically significant coefficients on overall governance (0.360, column 1), political stability (0.301, column 4), regulatory quality (0.520, column 5), and voice and accountability (0.452, column 7). All of these variables have standard deviations approximately equal to 1.00, which implies that a one standard deviation improvement in institutional quality is associated with a 30 percent to 52 percent increase in log business density. Thus, consistent with our cross-sectional model results, the panel results also support Mehlum et al. (2006), in which producer-friendly institutions encourage entrepreneurship. Likewise, the panel model results support Baumol (1990), Nyström (2008),

Boettke and Coyne (2009), and Djankov et al. (2010), all of whom observe that the payoffs from high-quality institutions directly facilitate greater productive entrepreneurial activities.

With regard to the remaining control variables, the provision of credit to the private sector is statistically significant in five of the seven model specifications. This stands in contrast to results from the cross-section model, and it supports the prior findings of Beck and Demirguc-Kunt (2006) and other studies, which demonstrate that financial development stimulates entrepreneurship by relaxing the access constraints to finance facing SMEs. These SMEs account for a large share of enterprises, especially in developing countries. The result may also reflect the influence of business cycle effects, in that variation in credit over time (rather than across countries) results in statistical significance. Therefore, credit and entrepreneurship may be simultaneously driven by a common business cycle factor.

Economic growth, which is a proxy for new business opportunity and economic health, is positive and statistically significant in all model specifications, with an average coefficient value of 0.041. Therefore, a one percentage-point increase in the rate of economic growth implies a 4.1 percent increase in new business density. Finally, initial real log per capita GDP, which is a proxy for the overall level of initial economic development, is positive and statistically significant in all model specifications, with an average coefficient value of 0.609. Therefore, a 10 percent increase in initial log per capita real output increases new business density by 6.1 percent.

As a final test of the robustness of these results, we re-estimate our panel model (equation 2) using a random effects specification. Recall that we could not use country-specific fixed effects because a large proportion of the variation in the dependent variable is cross-sectional rather than temporal. As such, modeling country-specific heterogeneity via fixed effects is inappropriate, as they effectively "dummy out" most of the variation in new business formation,

leaving insufficient variation for the model to explain. Random effects estimation overcomes this problem by assuming that country-specific heterogeneity is omitted from the regression model, while also assuming that these invariant differences are drawn from a common distribution. This information can be exploited through a feasible generalized least squares (FGLS) weighting procedure, derived from the model's residuals. In order for the results to be valid, the omitted country-specific heterogeneity must not be correlated with the model's independent variables. We formally test that this condition is satisfied by way of a Hausman test, which assumes that this independence condition holds under the null hypothesis.

Table 5 (page 34) reports the random effects panel estimation results. With regard to the validity of the random effects model, five of the seven models pass the Hausman test (i.e., we fail to reject the null hypothesis that the omitted country-specific effects are not correlated with the independent variables). When institutional quality is measured via political stability or voice and accountability, the resulting random effects model fails the Hausman test (and hence the results of those two models are invalid). The coefficient estimates from the five valid models are very similar to our preferred panel specification (see table 4).

Of chief interest in table 5, the coefficient on start-up regulations remains negative and statistically significant at the 1 percent level, regardless of the measure of institutional quality. The average coefficient estimate on start-up regulations equals -0.070, implying that a one-step increase in the number of required procedures to start a business leads to a 7 percent decline in entrepreneurship (as measured by business density). The importance of institutions is diminished in the random effects model, with only regulatory quality possessing a positive and statistically significant coefficient. The remaining control variables (financial development, economic

growth, and initial output) remain positive and statistically significant, varying little in magnitude with changes in the measure of institutional quality.

5. Summary and Conclusions

This paper examines the impact of start-up regulations and institutional quality on the level of new business formation, which is a critical measure of entrepreneurial activity. In a panel of 119 countries, spanning the period 2001 to 2012, we confirm that a nation's regulatory and institutional environment play a crucial role in determining the level of entrepreneurship. More precisely, we find robust evidence that new firm creation is significantly lower in countries with an excessive number of entry regulations. Specifically, increasing start-up procedures by one step is associated with an approximate 9.7 percent decline in new business activity.

Entrepreneurship is also significantly harmed by a lack of high-quality institutions. Regardless of estimation method or model, two measures of institutional quality have a statistically significant, positive impact on entrepreneurial activity: regulation quality and voice and accountability. A third measure of institutional quality, political stability, is positive and statistically significant in both the cross-section and the preferred panel model. The remaining measures of institutional quality promote entrepreneurship in some models but not others, while three measures are universally statistically insignificant: the control of corruption, government effectiveness, and the rule of law.

The policy implications are clear: If a nation wishes to promote higher levels of domestic entrepreneurship in both the short and long run, top priority should be given to reducing barriers to entry for new firms and to improving overall institutional quality (especially political stability, regulatory quality, and voice and accountability).

This study and its findings relate to a growing strand of literature that finds that cutting entry-related red tape is generally associated with superior economic outcomes, such as higher per capita income, reduction in the size of the unofficial economy, less corruption, and improvement in productivity.

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Appendix: Tables

Table 1. Sample Countries with Data on New Business Density, 2001–2012

Country	Income	Country	Income	Country	Income
Afghanistan	low	Haiti	low	Pakistan	middle
Albania	middle	Hong Kong, China	high	Peru	middle
Algeria	middle	Hungary	middle	Philippines	middle
Argentina	middle	Iceland	oecd	Poland	oecd
Armenia	middle	India	middle	Portugal	oecd
Austria	oecd	Indonesia	middle	Qatar	high
Australia	oecd	Iraq	middle	Romania	middle
Azerbaijan	middle	Ireland	oecd	Russian Federation	high
Bangladesh	low	Israel	oecd	Rwanda	low
Belarus	middle	Italy	oecd	Sao Tome & Principe	middle
Belgium	oecd	Jamaica	middle	Senegal	middle
Bhutan	middle	Japan	oecd	Serbia	middle
Bolivia	middle	Jordan	middle	Sierra Leone	low
Bosnia & Herzegovina	middle	Kazakhstan	middle	Singapore	high
Botswana	middle	Kenya	low	Slovak Republic	oecd
Brazil	middle	Kiribati	middle	Slovenia	oecd
Bulgaria	middle	Korea, Rep.	oecd	South Africa	middle
Burkina Faso	low	Kosovo	middle	South Sudan	middle
Cambodia	low	Kyrgyz Republic	middle	Spain	oecd
Canada	oecd	Lao PDR	middle	Sri Lanka	middle
Chile	oecd	Latvia	high	St. Kitts & Nevis	high
Colombia	middle	Lesotho	middle	St. Lucia	middle
Congo, Dem. Rep.	low	Lithuania	high	St. Vincent & Grenadines	middle
Costa Rica	middle	Luxembourg	oecd	Suriname	middle
Croatia	high	Macedonia, FYR	middle	Sweden	oecd
Czech Republic	oecd	Madagascar	low	Switzerland	oecd
Denmark	oecd	Malawi	low	Syrian Arab Republic	middle
Dominica	middle	Maldives	middle	Tajikistan	low
Dominican Republic	middle	Malta	high	Thailand	middle
Egypt, Arab Rep.	middle	Mauritius	middle	Timor-Leste	middle
El Salvador	middle	Mexico	middle	Togo	low
Estonia	oecd	Moldova	middle	Tonga	middle
Ethiopia	low	Montenegro	middle	Tunisia	middle
Finland	oecd	Morocco	middle	Turkey	middle
France	oecd	Namibia	middle	Uganda	low
Gabon	middle	Nepal	low	Ukraine	middle
Georgia	middle	Netherlands	oecd	United Arab Emirates	high
Germany	oecd	New Zealand	oecd	United Kingdom	oecd
Ghana	middle	Niger	low	Uruguay	high
Greece	oecd	Nigeria	middle	Uzbekistan	middle
Guatemala	middle	Norway	oecd	Zambia	middle
Guinea	low	Oman	high		

Notes: Definitions of low-, middle-, and high-income nations are from the World Bank. Member nations of the Organisation for Economic Co-operation and Development (OECD) are labeled *oecd*. All OECD members are high-income countries.

Table 2. Definitions and Summary Statistics

Variable	Obs.	Description	Mean	Standard deviation	Min	Max
New business density	976	New firm registrations per 1,000 people ages 15–64)	2.82	3.82	0.002	28.12
Domestic credit to private sector	2,363	Financial resources provided to the private sector (% of GDP) by financial corporations that establish a claim for repayment	49.63	46.77	0.20	319.46
Start-up procedures	1,874	Start-up procedures to register a business (number)	8.54	3.40	1.00	19.00
GDP per capita	2,540	GDP per capita (PPP-adjusted 2011 international $)	16,211	19,828	441	138,025
Governance	2,467	Average of six governance indicators (control of corruption, government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability)	−0.07	0.93	−2.49	1.99
Control of corruption	2,492	The extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interests	−0.05	1.01	−1.92	2.59
Government effectiveness	2,487	Captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	−0.06	1.00	−2.45	2.43
Political stability	2,499	Measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism	−0.08	1.01	−3.32	1.94
Regulatory quality	2,486	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development	−0.05	1.00	−2.68	2.20
Rule of law	2,528	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	−0.07	1.00	−2.67	2.00
Voice & accountability	2,533	Captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media	−0.06	1.01	−2.28	1.83
Growth	2,608	GDP per capita growth (annual %)	2.57	5.54	−62.47	102.78

Source: World Bank, Worldwide Governance Indicators.

Table 3. Cross-Section Estimation Results

	Institutional Quality Measures						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Governance	Control of corruption	Government effectiveness	Political stability	Regulatory quality	Rule of law	Voice & accountability
Start-up regulations	−0.070*	−0.090**	−0.095**	−0.080**	−0.077**	−0.089**	−0.072**
	(0.038)	(0.037)	(0.039)	(0.033)	(0.035)	(0.041)	(0.034)
Institutional quality	0.474	0.123	0.060	0.294*	0.506*	0.121	0.558***
	(0.295)	(0.225)	(0.276)	(0.178)	(0.273)	(0.266)	(0.193)
Credit	−0.072	0.057	0.079	0.036	−0.084	0.051	−0.116
	(0.196)	(0.186)	(0.196)	(0.158)	(0.185)	(0.206)	(0.17)
Economic growth	0.106***	0.099***	0.094***	0.095***	0.098***	0.097***	0.111***
	(0.033)	(0.035)	(0.034)	(0.033)	(0.034)	(0.034)	(0.031)
Per capita GDP	0.599***	0.699***	0.720***	0.646***	0.574***	0.709***	0.625***
	(0.166)	(0.163)	(0.180)	(0.147)	(0.158)	(0.161)	(0.138)
Observations	117	117	117	117	117	117	117
Goodness of fit	0.565	0.552	0.551	0.566	0.568	0.552	0.590

Notes: Dependent variable is the log of new business density. Intercept included but not reported. Huber-White robust standard errors in parentheses. The superscripts ***, **, and * denote 1 percent statistical significance, 5 percent statistical significance, and 10 percent statistical significance respectively.

Table 4. Panel Estimation Results

	Institutional Quality Measures						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Governance	Control of corruption	Government effectiveness	Political stability	Regulatory quality	Rule of law	Voice & accountability
Start-up regulations	−0.097***	−0.113***	−0.114***	−0.094***	−0.090***	−0.112***	−0.105***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)
Institutional quality	0.360***	0.003	−0.020	0.301***	0.520***	0.013	0.452***
	(0.046)	(0.036)	(0.040)	(0.031)	(0.048)	(0.050)	(0.019)
Log Credit	0.129***	0.264***	0.273***	0.215***	0.071	0.258***	0.056
	(0.045)	(0.051)	(0.048)	(0.043)	(0.050)	(0.051)	(0.036)
Economic growth	0.040***	0.041***	0.041***	0.041***	0.039***	0.041***	0.041***
	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.015)	(0.015)
Initial output	0.557***	0.677***	0.686***	0.577***	0.497***	0.674***	0.596***
	(0.052)	(0.047)	(0.049)	(0.048)	(0.048)	(0.050)	(0.037)
Goodness of fit	0.543	0.533	0.533	0.551	0.553	0.533	0.565
Observations	873	873	873	873	873	873	873

Notes: Dependent variable is the log of new business density. Intercept included but not reported. White cross-section (clustered by country) robust period standard errors in parenthesis. The superscripts ***, **, and * denote 1 percent statistical significance, 5 percent statistical significance, and 10 percent statistical significance respectively.

Table 5. Random Effects Panel Estimation Results

	Institutional Quality Measures						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Governance	Control of corruption	Government effectiveness	Political stability	Regulatory quality	Rule of law	Voice & accountability
Start-up regulations	−0.070***	−0.070***	−0.070***	−0.070***	−0.067***	−0.071***	−0.072***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Institutional quality	0.112	−0.011	0.052	−0.002	0.182***	−0.189	0.240***
	(0.157)	(0.079)	(0.076)	(0.071)	(0.067)	(0.127)	(0.082)
Log credit	0.266***	0.280***	0.274***	0.279***	0.257***	0.302***	0.252***
	(0.075)	(0.069)	(0.068)	(0.067)	(0.067)	(0.073)	(0.067)
Economic growth	0.015***	0.015***	0.015***	0.015***	0.015***	0.015***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Initial output	0.663***	0.727***	0.690***	0.721***	0.630***	0.825***	0.621***
	(0.190)	(0.154)	(0.153)	(0.147)	(0.156)	(0.174)	(0.136)
Hausman statistic	7.263	5.147	5.252	12.553***	7.226	7.197	10.723**
Hausman p-value	0.12	0.27	0.26	0.01	0.12	0.13	0.03
Goodness of fit	0.528	0.521	0.522	0.521	0.535	0.513	0.547
Observations	873	873	873	873	873	873	873

Notes: Dependent variable is the log of new business density. Intercept included by not reported. White cross-section (clustered by country) robust period standard errors in parenthesis. Hausman test statistic chi-square distributed under the null hypothesis that the omitted idiosyncratic effect is uncorrelated with the independent variables. The superscripts ***, **, and * denote 1 percent statistical significance, 5 percent statistical significance, and 10 percent statistical significance respectively.