

Business Environment, Economic Agglomeration and Job Creation around The World

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November 2013



Abstract

Based on a comprehensive worldwide firm survey, this paper looks at how the business environment and economic agglomeration affect job creation, holding constant conventional determinants of firm growth, such as firm ownership, size, and age. The analysis finds that economic agglomeration is most important, especially modern telecommunications, access to export markets,

concentration of economic activity in large cities, and capacity agglomeration (the concentration of large firms in a city). Although the business environment affects job growth less than agglomeration does, some elements of the business environment matter, such as labor flexibility, unionization, and local skill levels. There is strong heterogeneity in job creation across firm size and age.

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BUSINESS ENVIRONMENT, ECONOMIC AGGLOMERATION AND JOB CREATION AROUND THE WORLD¹

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JEL codes: J20, J50, L50, O10.

Key words: job creation, business environment, agglomeration, firms.

Sector Board: FSE

¹ We are grateful to comments and discussions of Martin Rama. The research has benefited from the support of the World Development Report on jobs in 2013.

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Introduction

Policy makers want to create jobs, especially in developing countries where rural residents are rapidly moving to cities. Although many studies have looked at the determinants of economic growth, we know less about policies that create jobs.² In this paper, we use firm-level data from the World Bank's Enterprise Surveys to examine how firm characteristics, the local business environment, agglomeration and trading costs affect job growth in developing countries.

Previous studies have found that different types of firms create jobs at different rates. Many have found that small and young firms expand their workforces faster than other firms in developing countries (Ayyagari and others, 2011). Although different firms expand at different rates, policy makers have little control over size, age and ownership. We, therefore, also look at the business environment and economic agglomeration—things that policy can affect.³ We focus on several areas of the business environment: inflation, infrastructure, crime and corruption, access to finance, labor regulation, and worker education and skills. The business environment can affect employment growth directly by affecting economic growth. As discussed below, if the business environment affects growth in a factor neutral way, demand for workers should increase. In developing countries, where underemployed workers in the informal economy can enter the formal sector, increased demand should result in increased employment.

Some areas of the business environment, such as labor regulation and access to finance, however, might not be factor neutral. They might encourage firms to expand employment faster or slower than they would otherwise by affecting the relative cost of labor and capital. Changes that encourage firms to replace labor with capital might, therefore, have an ambiguous effect on employment growth even if they encourage economic growth.

The final factors that we look at are agglomeration or trading costs. These include measures of the size of the local market, the national market, access to international markets, and a measure of capacity agglomeration (the share of firms that employ more than 50 employees).

² See World Bank (2012c) for comprehensive surveys on job creation.

³ Policy can affect agglomeration in several ways. For example, governments can offer location-based subsidies to shift regional agglomeration (Kline and Moretti, 2013).

We find agglomeration and trading costs are more strongly correlated with employment growth than the business environment is. Firms with access to large domestic and international markets expand employment more quickly than other firms do. Firms that are exposed to strong capacity, as proxied by the share of large firms in the city, also tend to expand employment faster. Although fewer business environment variables are robustly correlated with job growth, crime and labor inflexibility negatively affect it.

We also look at whether the business environment and agglomeration affect employment growth differently in large and small firms, and in old and young firms. We find several differences across types of firms. For example, young firms benefit more from telecommunications development and capacity agglomeration.

Empirical Framework

Many things that affect economic growth, such as access to finance (Levine, 1997), might also increase demand for labor and, thus, employment growth. Given that most of the mostly small and medium-sized firms in the Enterprise Surveys—the data used in this study—primarily serve domestic customers, we would expect demand for these firms' products to increase as the economy grows. If growth is factor neutral, we would expect that firms' demand for workers would grow as the domestic economy grows. Thus, improving access to finance might encourage job growth. If the economy was already at full employment, increased demand for labor might have only a modest impact on employment growth (i.e., it would mostly increase wages). However, many developing countries have large, unproductive, informal and rural sectors that could provide workers to formal firms and thus increase employment. We would therefore expect factors that affect economic growth to also affect employment growth in developing countries.

Other things might also affect employment growth without necessarily affecting economic growth. In particular, policies that favor small firms might encourage firms to remain small. For example, if regulations are more heavily enforced for large firms, burdensome regulations might discourage firms from becoming large and reduce employment growth at the firm level even if they do not affect economic growth.

Finally, some things that affect economic growth might alter the relative prices of labor and capital. For example, improving access to finance might also affect the relative price of capital and, therefore, encourage firms to substitute capital for labor. This could reduce or even negate any positive correlation between access to finance and employment growth.

Firm Characteristics. It is commonly believed that small firms create most new jobs (Haltiwanger and others, 2010). The relationship between firm size and growth, however, can be confounded by the relationship between age and growth since young firms are usually small. If young firms grow faster than old firms, this could lead to a spurious correlation between size and growth. After controlling for age, Haltiwanger and others (2010) do not find that small firms in the United States grow faster than large firms. They do, however, find that young firms grow faster than older firms. In contrast, studies have found employment growth is faster for both small and young firms in developing countries (Ayyagari and others, 2011).

Ownership might also affect employment growth. First, state-owned firms might have better access to finance, encouraging them to substitute capital for labor, reducing employment growth. Second, SOEs tend to be inefficient due to the lack of incentives (Megginson and Netter, 2001), potentially reducing employment growth. Third, SOEs might also increase employment growth if politicians pressure state-owned firms to expand by increasing employment rather than capital (Shleifer and Vishny, 1994). Foreign-owned firms might have different growth prospects from domestic firms. In particular, they might not be as reliant on the domestic markets as domestic firms and might have better access to finance (Clarke and others, 2006).

Inflation. Growth might be more difficult in countries where the macroeconomy is unstable. High and variable inflation makes it hard for enterprises to assess price signals and might affect the availability of financing. Moreover, inflation tends to shorten the duration of contracts and can make it more difficult to get trade credit (Temple, 2000). However, if inflation discourages firms from making long-term investments, they might substitute temporary labor for long-term capital, and the net effect on employment growth is thus ambiguous.

Infrastructure. Infrastructure might affect economic performance. Indeed, Dollar and others (2005) and Fernandez (2008) find that firms in developing countries are more productive

when infrastructure is better developed. Harrison and others (forthcoming) find that the lack of infrastructure is important in explaining Africa's disadvantage relative to other well-performing countries at the firm level. If poor infrastructure constrains firm growth, it might also affect employment growth.

Although poor infrastructure might discourage growth, it also affects the relative cost of capital. If capital intensive firms rely more heavily on power and other infrastructure, firms might substitute labor—especially unskilled labor—for capital when access is limited or quality is poor. This could encourage faster employment growth in countries where infrastructure is a serious constraint.

Institutional Development and Corruption. Although there are many dimensions to institutional development, the different measures, are highly correlated with each other (Langbein and Knack, 2010). Because of this, rather than trying to control for multiple dimensions simultaneously, we restrict our analysis to two specific measures, a measure of crime and a measure of corruption. These variables, however, will also serve as proxies for other aspects of institutional development.

Both crime and corruption might affect employment growth. When crime is high, firms cannot be sure that they will be able to recover any investment they make. Because of this, they might expand employment more slowly than they would otherwise.

Similar to being charged additional taxes, corruption might also affect economic and firm growth adversely (Cai and others, 2011; Fisman and Svensson, 2007; Mauro, 1995). Moreover, corruption might also affect employment growth directly. If small firms can remain hidden or out-of-sight, corruption is likely to discourage them from expanding, potentially strengthening a negative correlation between firm growth and corruption. Corruption might, however, might also encourage firms to substitute labor for capital (Svensson, 2003). This is because capital intensive firms will find it more difficult to refuse to pay bribes than labor intensive firms when they cannot exit easily and redeploy capital to other uses (e.g., when capital is firm or industry specific). The net effect of corruption is thus ambiguous.

Access to Finance. There is a strong correlation between economic growth and financial sector development (Levine 1997). Employment might therefore grow faster in countries with

better developed financial sectors. Access to finance, however, is unlikely to be factor neutral. That is, growing firms will find it easier to purchase machinery and equipment when access to finance is easier. Although improved access to finance might encourage growth, it might also make it easier for firms to substitute capital for labor.

Access to finance is also likely to affect different firms to different degrees. Small firms, in particular, tend to be more credit constrained than large firms in developing and transition economies (Clarke and others, 2012). We might therefore expect access to finance to affect small firms more than large firms.

Restrictions on hiring and firing. Labor regulations, and potentially unionization, might also affect employment growth. If firm growth is slower in countries where there are more restrictions on hiring and firing, we would expect employment growth to also be slower in these countries. Further strengthening the negative effect of labor regulation on employment growth, labor regulation increases the cost of labor relative to capital (Besley and Burgess, 2004), and firms are likely to adopt labor saving technologies such as computers (Amin 2009).

Finally, if labor regulation affects large firms more than small firms, firms might choose to remain small. There are several reasons why this might occur. First, small firms are sometimes exempt from burdensome regulations (Acemoglu and Angrist, 2001). Second, even when small enterprises are not formally exempt, labor regulations might not be enforced as strictly for small formal firms as they are for large formal firms—especially in countries with limited administrative resources (Almeida and Carneiro, 2009). Consistent with this, large firms are more concerned about labor regulation than small firm are (Pierre and Scarpetta, 2006).

Labor Education and Skills. Both the quantity and quality of education appear to affect economic growth (Barro, 2001). One reason is that education and skills may have an important spillover effect on innovation and therefore job creation (Jacobs, 1970). In addition, improving education and skills might increase labor supply. If more highly educated workers might find it easier to move from the unproductive informal sector when demand for labor increases (Nelson and Phelps, 1966; Schultz, 1975), improving education and skills might encourage efficient labor reallocation and job creation. To the extent that economic growth that results from these forces is factor neutral, we would expect it to also positively affect employment growth. Economic

growth that results from high levels of education might not, however, be factor neutral. That is, growth might be capital—and technology—intensive. If the growth is highly capital intensive, high levels of education and skills might not result in faster employment growth.

Agglomeration. Trading costs might also affect employment growth. Firms that have access to large markets can specialize more and thus are able to grow larger. Moreover, large markets can support more specialized input markets. Firms in large cities might find it easier to find workers if agglomeration fosters skill acquisition, improves matching, and makes access to raw materials and intermediate inputs easier (Ellison and others, 2010; Feldman and Audretsch, 1999). If inter-firm spillovers are mostly local, there will be more spillovers from other firms in large markets (Greenstone and others, 2010). A large market will therefore support more productive and larger firms, accelerating employment growth. For this reason, firms located in large cities or heavily urbanized countries might find it easier to grow.

Firms with access to foreign markets have greater potential for expansion. Access to foreign markets, however, varies greatly across countries. While it takes about 5 days and costs about \$456 to transport a standard export container to port and fulfill all customs, administrative, and port requirements in Singapore, it takes about 71 days and costs about \$8,450 to do the same in Tajikistan (World Bank, 2012a). Information and communication technologies might also affect access to foreign markets. When it is easier and cheaper for firms to find foreign partners, they might be more likely to export (Freund and Weinhold, 2004).

Capacity agglomeration, defined as the concentration of firms with high capacity either in technology, management or in adaptation to changes, should facilitate job creation. The proxy for high-capacity firms that we use in this study is the percent of firms with at least 50 workers. This seems appropriate given that many studies have shown that large firms have stronger capacity than other firms in developing countries.⁴ For example, large firms are more productive and export more (Bernard and others, 2007; Melitz and Ottaviano, 2008), are more innovative (Cohen and Levin, 1989) and conduct R&D more efficiently (Cohen and Klepper, 1996). Perhaps because the R&D centers of large firms provide key spillovers for small firms (Acs and

⁴ This might not be as true in developed countries, where small, specialized firms can achieve their technological and innovation potential. In developing countries, where innovation mostly occurs in large firms and where external specialized research institutes and universities cannot be relied on, this is less likely to be the case.

others, 1994), large firms are associated with higher industrial agglomeration (Barrios and others, 2006; Holmes and Stevens, 2002). The empirical evidence is consistent with the idea the share of large firms in the area is a good proxy for capacity agglomeration. First, firms are more likely to become large when located with other large firms (Li and others, 2012). Second, the share of large firms in a city is positively related to more capital-intensive technology and higher R&D intensity (Li and others, 2013). Third, there is evidence that large firms provide positive externalities to other firms. Greenstone and others (2010) find an exogenous re-location of a large firm positively affects incumbent firms' TFP. Finally, the comprehensive evidence that modern cities depend critically on density in speeding up the flow of ideas again highlights the key role that capacity agglomeration may play in facilitating local development (Glaeser and Gottlieb, 2009).

In summary, capacity agglomeration, through its spillover effects on productivity, could increase job creation. Since small firms in developing countries focus mostly on low-tech activities, they might benefit less from capacity agglomeration than medium-sized and large firms. Similarly, new firms that are founded by exiting employees or managers of high-capacity large firms might be most able to exploit the externality provided by the capacity of existing firms.

With so many factors that might affect firm employment growth and relatively little guidance from the literature as to which matter most, it seems useful to assess which are most strongly linked to employment growth. We allow the effects of these factors to differ by firm size and age. Different types of firms might face different constraints in growth and so the impact of these factors might differ for different firms. For example, small firms may primarily serve local markets and therefore be less affected by things such as export costs and Internet access than large firms. Similarly, younger firms might find it more difficult to obtain financing because they do not have long credit histories and because of information asymmetries. They might, therefore, be more affected by access to finance.

Data

The main source of our data is the World Bank's Enterprise Surveys. The data are collected using a standard and rigorous approach across countries. The surveys provide representative samples of each country's private sector including manufacturing, construction, services and retail and wholesale trade.⁵

Although Enterprise Surveys were conducted before 2006, we only include data collected after 2006. We do this because there was considerable heterogeneity across countries and regions in terms of sectors covered, questionnaire format, coverage of microenterprises, and sampling methodology before 2006. Moreover, the samples for surveys conducted before 2006 were not generally representative. Data from the Enterprise Surveys is supplemented with data from other sources. A complete list of variables and the sources of this data is shown in Table 1.

Econometric methodology

Before presenting results, it is useful to note several important issues when using cross-country firm-level data. The first issue is whether to use weights or not. In the empirical analysis, we will focus on unweighted regressions, that is, using the "model approach" (Ayyagari and others, 2011; Cameron and Trivedi, 2005). We do this for several practical reasons. First, although the Enterprise Surveys use a standard methodology for sampling and weighting (World Bank, 2007b), the quality of the sampling frames varies significantly across countries. Although in most cases the initial sample frame is constructed based on lists collected by government agencies, the quality and coverage of these lists can vary significantly. In Kenya, for example, the firm conducting the surveys had to combine lists from Kenya National Bureau of Statistics, the Kenya Association of Manufacturers, the Kenya National Chamber of Commerce, the Kenya Private Sector Alliance, and from the Federation of Kenya Employers to obtain a satisfactory sampling frame (World Bank, 2007a). Finally, in some countries including Botswana, since no lists were available, the sample frame was constructed through block enumeration (World Bank, 2006). Second, we want to use variation in agglomeration and business environment variables across countries and regions to identify the characteristics that affect firm growth throughout the

⁵ See <http://www.enterprisesurveys.org> for a more complete description of the data.

world. Including weights would mean that we mostly focus on China and India, where most firms are located. These two countries, however, are not the focus of this paper.

A second concern is that some variables have many missing observations. Although most variables are available for most countries, including all variables in a single regression would result in many observations and countries being dropped. In fact, if we omitted all observations with missing values, we would drop more than 80 percent of firms. To avoid this, we impute values for the variables that account for the most missing observations. The imputed variables include: average level of schooling (8% missing values); the share of the population living in cities with more than 1 million residents (17% missing); and a dummy variable indicating that the firm is located in the capital city (34% missing); the average share of workers that are unionized (68% missing); and the average share of skilled worker in total workforce (46% missing). The country level variables are imputed using quartile dummies for GDP per capita and regional dummies (i.e., Africa, East Asia and Pacific, Europe and Central Asia, Mideast and North Africa, and South Asia). The local averages are imputed using the variables listed above, along with a service industry dummy, and three firm size dummies (i.e., with employees between 10 and 20, 21 to 60, and more than 60). For all variables with missing indicators, we also include a dummy variable indicating that the variable is missing for that observation to pick up any systematic differences between firms with missing and non-missing observations.

The final concern is that many important right-hand-side variables are potentially endogenous. Although it might be possible to find instruments for one or two of them, it is not possible to do this for all of them. We therefore rely on an approach that is commonly used in studies linking investment climate variables to firm performance. Rather than including the potentially endogenous variables directly in the regression, we instead include either country-level or local-level variables (see Table 1).⁶ For expositional convenience, we refer to city-industry-year averages as local averages. To the extent the aggregate variables are uncorrelated with the firm-level residuals after controlling for firm characteristics and other investment

⁶ See Aterido and others (2011); Dollar and others (2005); Fisman and Svensson (2007); Harrison and others (2013), and Svensson (2003).

climate variables, inclusion of these variables could result in consistent estimates of the effect of business environment and agglomeration (Xu, 2011). The main concern when using local averages is that there might be some omitted local variables that are correlated with employment growth and the included variables. To avoid this, we include many local variables and test whether the results are robust to the inclusion of additional local variables. In addition, we compare the patterns of the correlation of our key variables with the outcomes for different types of firms to see if they form a coherent pattern that can be explained by simple and intuitive conjectures.

Econometric Model and Results

The basic model is:

$$Emp.Growth_{ijk} = \alpha_k + \gamma_j + \beta FC_{ijk} + \delta BE_{ijk} + \theta Agg_{ijk} + \varepsilon_{ijk} \quad (1)$$

The dependent variable is employment growth for firm i in sector j and period k . Following Davis and Haltiwanger (1999), we calculate growth rates by dividing change in employment between the year of the survey and three years earlier by the simple average of employment in the survey year and three years earlier (see Table 1). This bounds growth between -2 and 2 and reduces the influence of outliers. All regressions include sector and time dummies (γ_j and α_k) to control for sector differences that might affect firm growth and worldwide macroeconomic factors such as the great recession.

The regressions also include several variables to control for firm characteristics (FC), the business environment (BE) and agglomeration effects/trading costs (Agg) (see Table 1). The firm characteristics include two dummies indicating firm age, two dummies indicating firm size based on initial employment, and two variables representing state and foreign ownership. The regression also includes several business environment variables representing macroeconomic stability (inflation), the quality of infrastructure (the number of power outages), the institutional environment (control of corruption and crime), labor flexibility (the share of employees in unions and an index indicating difficulty of firing), and labor skills (average years of schooling and the share of workers that are skilled). Finally, the regression includes several agglomeration

variables indicating international openness (cost of exporting and share of firms with website), size of national market (population, urban population and per capita GDP), size of local markets (whether firm is in a capital city), and a proxy for capacity agglomeration. As discussed above, the business environment variables are typically local (city-industry-year) averages rather than the firm's own reported values. For the country-level macroeconomic variables, we use lagged values to reduce the likelihood of reverse causation.

Base Results

Ownership. Foreign-owned firms increased employment faster than private domestic firms (see Table 2). The parameter estimate suggests that employment at fully foreign-owned firms grows by about 0.4 percentage points more than at a fully domestic firm. This could reflect advantages in access to finance and foreign markets. In contrast, state-owned firms grow about 0.1 percentage points slower than private domestic firms. Although inconsistent with the assertion that political pressure encourages these firms to expand employment, it could reflect poor growth performance.

Firm Size and Age. Our findings are consistent with previous studies that have found small and young firms grow faster in developing countries (Ayyagari and others, 2011). The coefficients on the size and age dummies are negative and statistically significant in all cases. Since the omitted variable is for the smallest firms (fewer than 20 employees), the estimates suggest that the average medium-sized and large firms grew about 5 percentage points and 7 percentage points slower than the average small firm. Similarly, since the omitted age dummy is for the youngest firms (less than 5 years old), the coefficient indicates that firms between 6 and 10 years old and older than 10 years old grow about 4 percentage points slower and 6 percentage points slower than young firms.

Business Environment. Most of the coefficients on the business environment variables are statistically insignificant. In particular, the coefficient on the variables representing macroeconomic stability (inflation), basic infrastructure (power outage), and access to finance (overdrafts) are all statistically insignificant. In contrast, the coefficient of crime is negative and significant, though its effect is small—a one standard deviation increase in crime is associated with a 0.02 percentage point drop in employment growth.

Firms are less likely to expand employment in countries where firing is more difficult. This could be because forward-looking firms are reluctant to hire new workers when it is difficult to fire them. The effect, however, is relatively modest. A one standard deviation increase in this variable reduces employment growth by only about 0.1 percentage point.

The coefficient on unionization is positive and statistically significant. To the extent that unions encourage high wages—and therefore encourage firms to substitute capital for labor or to invest in human capital—this might not be expected. It is possible, however, that the positive coefficient is due to unions resisting firms' efforts to become more capital intensive. That is, they might resist innovations they believe will result in job losses. The coefficient suggests that increasing the percentage of firms that are unionized by ten percentage points (about one standard deviation) would increase growth by less than 0.1 percentage points.

Finally, job growth is slower when workers are more skilled. This could be because most developing countries do not have a comparative advantage in skill-intensive products.

Agglomeration. In contrast to the coefficients on the business environment variables, many of the coefficients on the agglomeration/trading costs variables were statistically significant. The coefficients suggest that the benefits of agglomeration are large. Increasing the percent of the population in large cities by one standard deviation (i.e., about 12 percentage points) would increase employment growth by over 12 percentage points. Similarly, increasing population by about 10 percent would increase growth by about 0.1 percentage points. Finally, firms in the capital city grew about 0.3 percentage points faster than firms in smaller cities. The coefficients on the other two variables representing domestic market size—per capita GDP and urban population—are statistically insignificant. The positive and significant coefficient on population in large cities and the statistically insignificant coefficient on urban population suggest that urbanization affects job creation more when the urban population is concentrated in large cities.

Access to foreign markets also appears to be important. Firms grow faster when the cost of exporting is low. Increasing the cost of exporting by 10 percent decreases employment growth by 0.05 percentage points. Employment growth also appears to be higher when Internet access is easier.

The coefficient on the proxy for capacity agglomeration (i.e., the local share of large firms) is close to statistical significance and quantitatively large. Increasing the share of large firms in the city by one standard deviation (i.e., 0.143) would increase job growth by 0.4 percentage points.

The main conclusion from Table 2 is that the key determinants of job growth are agglomeration/trading costs. Most business environment variables, in contrast, are not highly correlated with employment growth. The most notable exception to this is that stringent labor regulations are negatively correlated with employment growth.

Firm size. Next, we run separate regressions for small (5-20 workers), medium-sized (21-100 workers), and large firms (more than 100 workers). The results are similar to the previous results (see Table 3). In particular, most coefficients on the business environment variables remain statistically insignificant. Moreover, the coefficients on the agglomeration variables are often statistically significant and mostly have the same signs in the three regressions. Although the statistical significance of the different coefficients varies between regressions, agglomeration and trading costs appear to affect firms of all sizes.

There are some differences, however. First, the coefficients on foreign-ownership are larger and more highly significant for small firms. Second, union membership is positively associated with job growth only for large and medium-sized firms, perhaps because few small firms are unionized. Third, only small firms grow more slowly when local workers are more highly skilled. This might be because small firms lose competitiveness and market shares relative to larger firms who benefit more from skill availability.

Finally, different aspects of agglomeration variables are significant in the different regressions. Only small firms are affected by access to the Internet. Interestingly, while large firms benefit most from being located in the capital city, small- and medium-sized cities benefit more from being located in large cities. Consistent with the idea that larger firms will benefit more from capacity agglomeration, employment grows faster only for medium-sized and large that are located in cities with more large firms.

Firm Age. In Table 4, we run separate regression for young firms (less than 5 years old), middle aged firms (between 5 and 10 years old) and old firms (over 10 years old).

The most notable difference is that young firms are less affected by some elements of agglomeration than middle-aged and old firms. Whereas the coefficients on the variables representing access to domestic and foreign markets are statistically significant for middle-aged and old firms, they are mostly statistically insignificant and smaller in absolute value for young firms. In contrast, young firms benefit more from capacity agglomeration and Internet access. Internet access is significantly correlated with employment growth for middle-aged firms, and with a slightly larger magnitude for young firms (though statistically insignificant), but with almost no effect for older firms. This might be because Internet access allows young firms to leapfrog older firms in terms of market access. Relatedly, capacity agglomeration has positive effect only for young firms, consistent with our earlier discussion that capacity agglomeration has important spillover effects for founding new firms. Increasing capacity agglomeration by one standard deviation of 0.143 is associated with an increase in employment growth by 1.9 percent points for young firms, a fairly pronounced effect.

Another notable difference is that young firms appear to grow faster when better access to finance is better. This is probably because young firms have both the most urgent need for financing and the most severe information asymmetry problems due to the lack of a well-established credit history and bank connections.

Imputation. As noted earlier several variables have many missing values. For those with the most, we imputed values to avoid losing observations. Table 5 presents some additional results replacing the imputed values with true values one at a time. We do not replace all imputations simultaneously because this would seriously reduce sample size.

Most results are robust. For example, the coefficients for the variables representing agglomeration and training costs remain statistically significant with similar signs to the base regression in most cases. While insignificant in the base specification, capacity agglomeration is significant now in three of the five cases. Similarly, the coefficients on the variable representing access to finance (i.e., the share of firms with overdrafts) and basic infrastructure (i.e., power outage) become statistically significant in several regressions.

Additional variables. Table 6 presents results with some additional variables included. The first variable represents the quality of education in the country. Although the average years

of schooling capture quantity, quality might also vary across countries. The second set of variables represent managers' perceptions about whether the firm faces severe constraints in several areas of the business environment including transportation, labor regulation, competition from informal firms, worker education and skills, and courts. The third represents whether the country has been involved in any major conflicts within the past 10 years.

Overall, the results are robust. In particular, adding the extra variables does not affect the agglomeration/trading cost variables significantly. The business environment variables also remain mostly statistically insignificant. Most of the coefficients on the additional control variables are statistically insignificant.

Conclusions

The literature on employment growth has mostly focused how firm characteristics such as age and size affect job creation. In contrast, we know little about how the business environment and agglomeration affect job growth. This paper contributes to our understanding of job growth by focusing on how these other factors affect job growth. Our novel results suggest that agglomeration and trading costs affect firm-level employment growth more than the business environment does, especially for older firms. Our results also highlight the positive effect of capacity agglomeration.

Because government policy can affect the business environment more easily than it can affect agglomeration, these new findings might seem discouraging. However, even if this is the case, this does not mean that government policy has no effect on agglomeration. For example, although population size might seem largely outside the control of policy makers, the government can affect it through immigration policy. Policy makers have even greater control over some other areas related to agglomeration. The first area where the government has significant control is internationalization. Improving ports and inland transport and streamlining customs procedures will reduce the cost of exporting and speed up job growth. Improving access to the Internet might also encourage growth, especially among young firms. Reducing the regulatory burden on Internet providers would be one way to do this (Wallsten, 2005).

Subsidizing connectivity directly would, however, be more expensive. As noted above, improving export opportunities will disproportionately benefit manufacturing.

A second way that the government can affect agglomeration is through telecom facilitation. Modern telecommunications are important for job growth and can facilitate productivity and rural-urban migration (Harrison and others, 2013; Lu and others, 2013). This suggests that the government can set up a policy and regulatory environment to facilitate the development of the telecom sector to overcome potential coordination problems.

A third way is urbanization policy. Our findings suggest that urban population is less important for job growth than the share of the urban population living in large rather than small cities. This is consistent with some recent studies. For example, World Bank (2008) emphasizes the benefits of agglomeration in large cities and Au and Henderson (2006) present systematic evidence that Chinese cities tend to be too small to achieve all of the benefits of development.

In contrast, few business environment variables were consistently and robustly correlated with job growth. An exception was related to labor markets. Reducing the burden of labor regulation, and especially reducing firing costs, might accelerate job growth in both manufacturing and service firms. Perhaps more importantly, stringent labor regulation could retard the growth of the formal sector and prevent firms from growing into large firms, and therefore have a secondary effect by reducing capacity agglomeration. This would further hinder employment growth (as shown in this paper) and productivity (Li and others, 2013).

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Table 1: Variable definitions, sources of data, and summary statistics

Variable	Definition	Mean	Standard Deviation	Source
Labor growth Rate	Employment growth rate based on number of permanent workers. To reduce influence of outliers, we calculate this using the formula: $\frac{(L_t - L_{t-3})}{\frac{1}{2}(L_t + L_{t-3})}$.	5.186	15.764	ES
Firm Characteristics				
Firm is between 6 and 10 years old	Dummy variable	0.236	0.425	ES
Firm is older than 10 years old	Dummy variable	0.626	0.484	ES
Medium-sized firm	Dummy Variable. Firm had between 21 to 100 permanent workers three years prior to survey	0.295	0.456	ES
Large firm	Dummy Variable. Firm had more than 100 permanent workers three years prior to survey	0.158	0.365	ES
Percent of firm that is state-owned	% of firm that is state owned.	0.007	0.064	ES
Percent of firm that is foreign-owned	% of firm that is foreign owned.	0.100	0.282	ES
Business Environment Controls				
Inflation	Natural log of inflation, lagged three years	0.070	0.044	WDI
Power outages	% of firms in city-industry-year group that had power outages (city-industry-year average)	0.583	0.256	ES
Control of Corruption	Control of corruption, period average between t-10 and t-3. Larger values mean less corruption.	-0.350	0.649	Gov. Ind.
Crime	% of firms that view crime as the most severe obstacles (city-industry-year average)	0.058	0.094	ES
% of firms with overdrafts	% of firms with bank overdraft facility (city-industry-year average)	0.472	0.283	ES
% of firms unionized	% of employees in unions (city-industry-year average)	0.131	0.194	ES
Difficulty of firing	Index of difficulty of firing. To avoid endogeneity, variable is average between t-3 and t-6. Data are available for 2004-07.	0.315	0.226	DB
Ave years of schooling	Average years of schooling, period average between t-10 and t-3.	7.758	2.244	WDI
% of workers that are skilled	Skilled workers as a % workers (city-industry-year average)	0.665	0.144	ES
Math scores	Natural log of average student math scores (OECD PISA test)	5.881	0.187	PISA
Transportation	% of firms that view transportation as the most severe obstacles (city-industry-year average)	0.026	0.050	ES
Labor regulation	% of firms that view labor regulation as the most severe obstacles (city-industry-year average)	0.040	0.066	ES
Worker skills	% of firms that view worker skills as the most severe obstacles (city-industry-year average)	0.074	0.091	ES
Courts	% of firms that view courts as the most severe obstacles (city-industry-year average)	0.010	0.028	ES
Informality	% of firms that view informal firms as the most severe obstacles (city-industry-year average)	0.144	0.122	ES
Agglomeration				
% of firms with website	% of firms that use websites to interact with business partners (city-industry-year average)	0.441	0.265	ES
Cost of exporting	Cost of exporting a 20-foot container (US\$, natural log)	7.001	0.461	DB
Firm located in capital city	Dummy variable.	0.242	0.429	ES
% of population in large cities	The share of population living in cities with more than one million people in the country.	24.611	11.822	WDI
Population	Natural log of population of country, lagged three years	16.620	1.435	WDI
Urban population	% of population in urban areas, lagged three years	58.168	21.303	WDI
Per capita GDP	Natural log of per capita GDP in constant US dollars, lagged three years ago	7.429	1.116	WDI
% of firms with over 50 workers in city	% of firms in the same city with over 50 workers	0.298	0.143	ES

Sources: *ES* is based on authors' calculations using data from the World Bank's *Enterprise Surveys* (<http://www.enterprisesurveys.org>), The World Bank. *Gov. Ind.* is from the *Worldwide Governance Indicators* project (<http://info.worldbank.org/governance/wgi/index.asp>) as described in Kaufmann and others (Kaufmann and others, 2010). *WDI* is from the World Bank's *World Development Indicators* (World Bank, 2012b). *DB* is from the World Bank's *Doing Business* Indicators (World Bank, 2011). *PISA* is from the OECD's Program of international student assessment scores (<http://www.oecd.org/pisa/>).

Table 2: Base Results

Observations	31,292	
Industry dummies	Yes	
Year dummies	Yes	
	Coefficient	S.E.
Firm characteristics		
Percent of firm that is state-owned	-0.143**	(0.06)
Percent of firm that is foreign-owned	0.387***	(0.12)
Medium-sized firm	-4.869***	(0.30)
Large firm	-7.073***	(0.52)
Firm is between 6 and 10 years old	-3.654***	(0.50)
Firm is older than 10 years old	-6.326***	(0.50)
Business environment		
Inflation	-0.284	(0.27)
Power outages	-0.408	(0.27)
Control of Corruption	-0.222	(0.38)
% of firms with overdrafts	0.370	(0.27)
Crime	-0.251*	(0.14)
% of firms unionized	0.688***	(0.19)
Difficulty of firing	-0.499**	(0.25)
Ave years of schooling	0.527	(0.36)
% of workers that are skilled	-0.574**	(0.23)
Agglomeration/trading costs		
% of firms with website	0.398	(0.25)
Cost of exporting	-0.512	(0.32)
Firm located in capital city	0.292**	(0.14)
% of population in large cities	1.159**	(0.45)
Population	0.784**	(0.34)
Urban population	-0.755	(0.66)
Per capita GDP	-0.899	(0.65)
% of firms with over 50 workers in city	2.707	(1.78)
Adjusted R²		

*, **, *** indicate significance level at the 10, 5 and 1 percent levels.

Notes: Standard errors are heteroskedasticity-consistent and clustered at the country level. The coefficients of variables indicating that missing indicators for % of firms unionized, average years of schooling, % of workers that are skilled, capital city and % of population in large cities are not reported.

Table 3: By Firm Size

	Small (20 or fewer workers)		Medium (21-100 workers)		Large (more than 100 workers)	
Observations	16,618		9,478		5,196	
Industry dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Firm characteristics						
Percent of firm that is state-owned	-0.009	0.195	-0.105	0.117	-0.168*	0.089
Percent of firm that is foreign-owned	0.744***	0.270	0.473***	0.157	-0.048	0.176
Medium-sized firm						
Large firm						
Firm is between 6 and 10 years old	-4.618***	0.656	-1.058	0.704	0.977	1.742
Firm is older than 10 years old	-8.026***	0.618	-3.379***	0.638	0.170	1.614
Business environment						
Inflation	-0.184	0.284	-0.461	0.370	-0.351	0.494
Power outages	-0.550*	0.322	-0.258	0.248	-0.467	0.337
Control of Corruption	-0.313	0.443	-0.350	0.358	0.250	0.711
% of firms with overdrafts	0.247	0.310	0.424	0.358	0.756*	0.407
Crime	-0.277	0.184	-0.383**	0.184	-0.167	0.223
% of firms unionized	0.436**	0.222	0.807***	0.234	1.564***	0.391
Difficulty of firing	-0.598**	0.298	-0.307	0.287	-0.672**	0.324
Ave years of schooling	0.676*	0.406	0.556	0.362	0.003	0.655
% of workers that are skilled	-0.818***	0.267	-0.414	0.307	-0.136	0.379
Agglomeration/trading costs						
% of firms with website	0.604*	0.309	-0.128	0.339	0.776	0.534
Cost of exporting	-0.504	0.369	-0.725**	0.345	-0.346	0.432
Firm located in capital city	0.346	0.231	0.057	0.194	0.435*	0.243
% of population in large cities	1.437***	0.475	0.872*	0.507	0.815	0.772
Population	0.871**	0.434	0.489	0.315	0.790	0.596
Urban population	-0.940	0.745	-1.031	0.782	0.345	1.477
Per capita GDP	-0.915	0.765	-0.096	0.712	-2.739**	1.306
% of firms with over 50 workers in city	-0.290	2.375	8.099***	2.427	6.655**	3.386
Adjusted R ²	0.051		0.036		0.031	

*, **, *** indicate significance level at the 10, 5 and 1 percent levels.

Note: Standard errors are heteroskedasticity-consistent and clustered at the country level; t-statistics is reported. The coefficient of city population missing is not reported.

Table 4: By Firm Age

	Less than 5 years old		Between 5 and 10 years old		More than 10 years old	
Observations	4,161		7,156		19,975	
Industry dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Firm characteristics						
Percent of firm that is state-owned	-0.252	0.194	-0.387**	0.170	-0.048	0.080
Percent of firm that is foreign-owned	0.722*	0.413	0.297	0.187	0.354***	0.124
Medium-sized firm	-9.630***	0.958	-4.964***	0.475	-4.019***	0.365
Large firm	-16.336***	2.024	-8.486***	0.803	-5.859***	0.572
Firm is between 6 and 10 years old						
Firm is older than 10 years old						
Business environment						
Inflation	-0.163	0.433	0.215	0.333	-0.491*	0.252
Power outages	0.004	0.497	-0.239	0.332	-0.611***	0.230
Control of Corruption	0.087	0.714	-0.340	0.643	-0.373	0.342
% of firms with overdrafts	1.151***	0.417	-0.147	0.385	0.449	0.319
Crime	-1.043***	0.335	-0.139	0.188	-0.137	0.150
% of firms unionized	0.469	0.446	0.838*	0.488	0.817***	0.180
Difficulty of firing	-0.154	0.409	-1.171***	0.398	-0.413*	0.244
Ave years of schooling	-0.650	0.588	1.071***	0.404	0.391	0.357
% of workers that are skilled	-0.835*	0.474	-1.094***	0.320	-0.302	0.238
Agglomeration/trading costs						
% of firms with website	0.862	0.667	0.791**	0.368	0.119	0.271
Cost of exporting	-0.231	0.431	-0.437	0.436	-0.661*	0.361
Firm located in capital city	-0.096	0.410	0.503**	0.251	0.296*	0.151
% of population in large cities	0.270	0.856	1.032*	0.574	1.397***	0.454
Population	-0.270	0.771	0.651	0.447	0.910***	0.348
Urban population	-0.634	1.144	-0.763	0.861	-0.807	0.591
Per capita GDP	0.528	1.219	-1.074	0.895	-1.015*	0.616
% of firms with over 50 workers in city	13.020***	4.740	0.681	2.732	1.864	1.600
Adjusted R ²	0.081		0.074		0.045	

*, **, *** indicate significance level at the 10, 5 and 1 percent levels.

Note: Standard errors are heteroskedasticity-consistent and clustered at the country level; t-statistics is reported. The coefficient of city population missing is not reported.

Table 5: Sensitivity to variable imputation

	base		No missing for % unionized		No missing for years of education		No missing for % skilled		No missing for Capital city		No missing for % in large cities	
Observations	31,292		9,830		29,280		16,934		20,721		25,237	
Industry dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes		Yes		Yes	
	Coef.	S. E.	Coef.	S. E.	Coef.	S.E.	Coef.	S. E.	Coef.	S. E.	Coef.	S.E.
Firm characteristics												
Percent of firm that is state-owned	-0.143**	(0.06)	-0.040	(0.11)	-0.098	(0.06)	-0.150	(0.10)	-0.210***	(0.08)	-0.167**	(0.07)
Percent of firm that is foreign-owned	0.387***	(0.12)	0.027	(0.12)	0.412***	(0.13)	0.374**	(0.17)	0.546***	(0.16)	0.258**	(0.12)
Medium-sized firm	-4.869***	(0.30)	-4.964***	(0.53)	-4.855***	(0.32)	-5.304***	(0.46)	-4.892***	(0.41)	-4.688***	(0.34)
Large firm	-7.073***	(0.52)	-6.459***	(0.78)	-7.002***	(0.52)	-7.184***	(0.64)	-7.284***	(0.61)	-6.496***	(0.55)
Firm is between 6 and 10 years old	-3.654***	(0.50)	-3.393***	(0.89)	-3.476***	(0.53)	-4.075***	(0.66)	-3.642***	(0.65)	-3.621***	(0.59)
Firm is older than 10 years old	-6.326***	(0.50)	-7.321***	(0.77)	-6.043***	(0.51)	-6.541***	(0.71)	-5.597***	(0.65)	-6.343***	(0.60)
Business environment												
Inflation	-0.284	(0.27)	-0.037	(0.28)	-0.108	(0.25)	-0.258	(0.34)	0.222	(0.27)	-0.177	(0.30)
Power outages	-0.408	(0.27)	-0.622*	(0.36)	-0.367	(0.27)	-0.677**	(0.27)	-0.315	(0.30)	-0.846***	(0.25)
Control of Corruption	-0.222	(0.38)	-0.193	(0.73)	0.175	(0.39)	-0.552	(0.48)	-0.561	(0.46)	-1.159***	(0.40)
% of firms with overdrafts	0.370	(0.27)	0.891**	(0.44)	0.412	(0.26)	0.294	(0.33)	0.577**	(0.27)	0.533*	(0.29)
Crime	-0.251*	(0.14)	-0.516**	(0.22)	-0.207	(0.14)	-0.123	(0.20)	-0.210	(0.14)	-0.346**	(0.16)
% of firms unionized	0.688***	(0.19)	4.040**	(1.75)	0.728***	(0.19)	0.668***	(0.23)	-0.402	(0.46)	0.608***	(0.19)
Difficulty of firing	-0.499**	(0.25)	-0.866***	(0.32)	-0.419	(0.26)	-0.568*	(0.31)	0.345	(0.31)	-0.608**	(0.30)
Ave years of schooling	0.527	(0.36)	0.286	(0.55)	0.214	(0.15)	0.578	(0.39)	0.336	(0.41)	0.481	(0.34)
% of workers that are skilled	-0.574**	(0.23)	0.005	(0.27)	-0.712***	(0.25)	-4.499***	(1.60)	-0.556**	(0.27)	-0.369	(0.25)
Agglomeration/trading costs												
% of firms with website	0.398	(0.25)	0.739*	(0.43)	0.392	(0.27)	0.588**	(0.26)	0.469*	(0.28)	0.338	(0.26)
Cost of exporting	-0.512	(0.32)	-0.096	(0.36)	-0.481	(0.36)	-0.747*	(0.42)	-0.776**	(0.35)	-0.970**	(0.43)
Firm located in capital city	0.292**	(0.14)	-5.058	(3.32)	0.352***	(0.13)	0.303*	(0.16)	0.860**	(0.35)	0.356***	(0.14)
% of population in large cities	1.159***	(0.45)	0.117	(0.77)	0.975*	(0.52)	1.591**	(0.63)	1.431***	(0.45)	0.136***	(0.04)
Population	0.784**	(0.34)	0.757	(0.55)	0.801**	(0.36)	0.803**	(0.38)	0.165	(0.38)	0.748**	(0.35)
Urban population	-0.755	(0.66)	-0.805	(1.34)	-0.767	(0.74)	-1.234	(0.99)	-0.172	(0.80)	-1.805*	(0.94)
Per capita GDP	-0.899	(0.65)	-0.392	(0.77)	-1.046	(0.68)	-1.101	(0.84)	-0.055	(0.79)	-0.072	(0.80)
% of firms with over 50 workers in city	2.707	(1.78)	8.012**	(3.26)	3.005*	(1.78)	1.041	(1.99)	4.813**	(2.15)	1.561	(1.85)
Adjusted R²	0.077		0.091		0.075		0.088		0.074		0.078	

*, **, *** indicate significance level at the 10, 5 and 1 percent levels.

Note: Standard errors are heteroskedasticity-consistent and clustered at the country level. The coefficients for missing dummies are not reported.

Table 6: Additional Control Variable included in regression

Observations	31,292		31,292		31,292		31,292	
Industry dummies	Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Firm characteristics								
Percent of firm that is state-owned	-0.143**	(0.06)	-0.146**	(0.06)	-0.152**	(0.06)	-0.144**	(0.06)
Percent of firm that is foreign-owned	0.387***	(0.12)	0.373***	(0.12)	0.380***	(0.12)	0.387***	(0.12)
Medium-sized firm	-4.869***	(0.30)	-4.869***	(0.30)	-4.874***	(0.30)	-4.869***	(0.30)
Large firm	-7.073***	(0.52)	-7.061***	(0.51)	-7.088***	(0.52)	-7.072***	(0.51)
Firm is between 6 and 10 years old	-3.654***	(0.50)	-3.640***	(0.50)	-3.645***	(0.50)	-3.653***	(0.50)
Firm is older than 10 years old	-6.326***	(0.50)	-6.308***	(0.50)	-6.293***	(0.50)	-6.327***	(0.50)
Business environment								
Inflation	-0.284	(0.27)	-0.240	(0.27)	-0.300	(0.27)	-0.283	(0.27)
Power outages	-0.408	(0.27)	-0.420	(0.28)	-0.382	(0.27)	-0.402	(0.27)
Control of Corruption	-0.222	(0.38)	-0.248	(0.37)	-0.183	(0.36)	-0.217	(0.38)
% of firms with overdrafts	0.370	(0.27)	0.309	(0.26)	0.377	(0.26)	0.367	(0.27)
Crime	-0.251*	(0.14)	-0.321*	(0.17)	-0.228	(0.14)	-0.255*	(0.14)
% of firms unionized	0.688***	(0.19)	0.642***	(0.20)	0.697***	(0.20)	0.674***	(0.20)
Difficulty of firing	-0.499**	(0.25)	-0.499**	(0.25)	-0.520**	(0.26)	-0.499**	(0.25)
Ave years of schooling	0.527	(0.36)	0.593	(0.37)	0.517	(0.36)	0.520	(0.36)
% of workers that are skilled	-0.574**	(0.23)	-0.529**	(0.23)	-0.576**	(0.23)	-0.576**	(0.23)
Agglomeration/trading costs								
% of firms with website	0.398	(0.25)	0.480*	(0.26)	0.361	(0.25)	0.409	(0.25)
Cost of exporting	-0.512	(0.32)	-0.433	(0.27)	-0.511	(0.32)	-0.508	(0.32)
Firm located in capital city	0.292**	(0.14)	0.283**	(0.14)	0.288**	(0.13)	0.289**	(0.13)
% of population in large cities	1.159***	(0.45)	1.047**	(0.50)	1.194***	(0.46)	1.161***	(0.44)
Population	0.784**	(0.34)	0.660*	(0.34)	0.802**	(0.34)	0.805**	(0.36)
Urban population	-0.755	(0.66)	-0.596	(0.70)	-0.674	(0.64)	-0.761	(0.66)
Per capita GDP	-0.899	(0.65)	-0.680	(0.67)	-1.021	(0.64)	-0.894	(0.65)
% of firms with over 50 workers in city	2.707	(1.78)	2.985*	(1.72)	2.421	(1.74)	2.619	(1.79)
Additional Controls								
Math scores			-0.465*	(0.55)				
Transportation					0.104	(0.15)		
Labor regulation					-0.029	(0.16)		
Informality					-0.153	(0.21)		
Worker skills					0.305**	(0.13)		
Courts					0.104	(0.11)		
Any Major Conflicts over past 10 years							-0.124	(0.83)
Adjusted R²	0.077		0.077		0.077		0.077	

Note. *, **, *** indicate significance level at the 10, 5 and 1 percent levels.

Standard errors are heteroskedasticity-consistent and clustered at the country level.

The coefficients of missing indicators are not reported. Also control for industry, year dummies.