Working Paper No. 183

Finance, the Business Environment and Firm Growth in Mexico

by

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April 2003

The connection between financial market development and economic growth was established long ago (McKinnon 1973). King and Levine (1993) provide evidence that the direction of causation goes from financial market development to growth rather than the other way around. The chorus supporting these findings is large and loud. Levine (1997) provides an excellent review of this literature. Financial market development matters because financial capital is channeled to more efficient use. Firms with productive investments are supplied capital to realize those investments.

But is the efficient supply of capital sufficient to ensure rapid growth? Under what circumstances does the firms' demand for capital play a predominant role in determining investment levels of firms? Johnson, McMillan and Woodruff (2002) show that in the extremely hostile business environments of Eastern Europe, firms are constrained not only by a lack of access to external finance, but also by an unwillingness to reinvest even internally generated profits. Using firm-level data from five Eastern European countries, they show that firms invest a significantly lower proportion of their profits in industries where extralegal payments to government officials and "protection" payments to private parties are common. The growth of firms, then, depends not only on

the supply of financial capital, but also on the demand for financial capital. Access to finance is not always the relevant constraint on firms' investments.

Data from recent cross country surveys suggests that Mexico is a country in which the business environment may be sufficiently hostile to constrain the demand for investment. For example, the most recent report of Transparency International's Corruption Perception Index ranks Mexico 57th out of 102 countries for whom the index was calculated, with a score of 3.6 out of 10. Among firms surveyed by the InterAmerican Development Bank in 1999, 80 percent of those located in Mexico reported that corruption was a significant obstacle to doing business, the third highest rate among the twenty Latin American countries surveyed (Gaviria 2002).

This paper explores the relevance of both the demand for investment finance and the access to capita in Mexico, using data from a new firm level survey on the business environment, the "Survey of Governance and Development of Enterprises in Mexico" (EGDE) . The survey gathered data from 3969 firms, a sample large enough to provide measures of the business environment in each of Mexico's 32 states. Data from the EGDE survey indicate that the quality of the business environment is not homogeneous across regions and states in Mexico. Some states, for example many of those located in the north-central part of the country, are seen by firms as having low costs of regulation and as characterized by low levels of bureaucratic corruption. Other states, for example many of those in the south, for example, are seen as having more hostile environments for business by both of these criteria. Access to external financial capital also varies across states and regions, especially among the small and medium sized firms that make up our sample. We exploit these regional differences in this paper to examine the extent to which the growth of Mexican firms is associated with regulation/corruption costs and access to finance.

We examine the growth rate of employment in the firms in the EGDE sample over the two year period leading up to the survey. We find strong and robust evidence

that higher regulatory and corruption costs are associated with lower rates of growth of firms. We also find evidence that more severe financial constraints are associated with slower rates of employment growth. Perhaps the most interesting finding comes from the interaction of these two constraints on growth. We find that financial constraints are particularly important where the costs of regulation/corruption are lowest, and conversely, that the detrimental impact of regulation/corruption costs is highest where capital constraints bind least. Hence, the data suggest that financial constraints matter, but only once the business environment is good enough to stimulate robust demand for investment by firms.

The paper relates most directly to recent work on regional development in India. Dollar, Iarossi and Mengistae (2002) examine differences in the business environment across states in India, finding a strong connection between productivity (value added per worker) and the quality of the business environment as assessed by businessmen operating in the region. Value added per worker is 44 percent lower in the state with the worst business climate, compared to the state with the best business climate. Besley and Burgess (2002) examine the impact of labor regulations on business development. Their data indicate that regulation of labor markets varies markedly across states in India, and that investment, employment, productivity, and output all decrease as the regulation of the labor markets increase.

The finding that the business environment is a fundamental determinant of firm growth rates is also consistent with prior research using cross country data, linking economic outcomes with security of property rights, the regulatory environment, and corruption. Initial work in this area focused on aggregate (country level) measures of output and investment (Mauro (1995); Knack and Keefer (1995)). Mauro, for example, finds a correlation between GDP growth rates and measures such as the likelihood businessmen place on confiscation of their investments by the state and the extent of

bureaucratic corruption. He also shows that investment as a percentage of GDP falls in countries with less secure property rights.

Similar findings using firm level data with institutional variation across countries is found in Johnson, McMillan and Woodruff (2002), Beck, Demirgüç-Kunt, and Maksimovic (2002), and Gaviria (2002). Beck, Demirgüç-Kunt, and Maksimovic uses data from 54 countries which were part of the World Bank's World Business Environment Survey (WBES), showing that firms reporting more severe financing constraints grow more slowly, as do firms reporting more serious problems with corruption and a less efficient legal system. Gaviria (2002) reports qualitatively similar findings using the WBES data from 20 Latin American countries.

Aside from the work in India, the existing research measures financial market development and the business environment at the country level.[1] This paper represents a one of a handful of efforts to examine the variation of business environments and financial market development within a single country. The focus on one country has both advantages and disadvantages over cross-country studies. The single country ensures that the results are not driven by country level factors, such as macroeconomic volatility. But the single-country data may also limit the variation caused by factors such as different legal structures. Another characteristics distinguishing this paper from the existing empirical literature in that the sample used here includes smaller firms than any of the previous research using firm-level data. Almost half of the sample was firms with 15 or fewer workers at the time the survey was administered.

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[1] In addition, several studies have exploited within country variance in financial market development. For example, Jayaratne and Strahan (1996) study the impact of banking deregulation in the United States, which was undertaken by different states at different times. They find that deregulation was followed by an increase in eh rate of growth of per capita income in the state, a finding they attribute to more efficient lending by banks following deregulation. Guiso, Sapienza and Zingales (2002) examine the impact of local financial market development in Italy on the entry and growth of firms, finding significant positive effects of financial market development on both entry and growth.

Section 2: A Simple Conceptual framework

High regulatory costs and a poor business environment raise the cost of doing business and reduce the net profitability of investments. These, in turn, reduce a firm's incentives to make investments, leading to lower rates of growth in employment. To fix ideas, we develop the following simple and straightforward framework.

A firm produces output Q using capital (K) and labor (L) according to a general production function Q=F(K,L), with F_L >0, F_K >0, F_{KL} >0, and F_{KK} <0 and F_{LL} <0. The positive cross partial implies that the marginal product of labor (capital) is increasing in the level of capital (labor) employed. Output is sold in the product market for price P. We model the costs of regulation/corruption as an increase in the firm's operating cost. Firms choose the levels of capital and labor to maximize profits, given by:

$$P*F(K,L) – \theta_L WL - \theta_K rK - \theta_O, \qquad\qquad (1)$$

where W is the wage rate faced by the firm, r is the cost of capital and θ_L, θ_K and θ_O are cost-equivalent measures of corruption and the regulatory burden affecting labor, capital expansion, and other operating costs, respectively, with θ_L>1, θ_K >1, and θ_O>0.[2] The interaction of the costs of regulations and corruption with the factors of production is meant to reflect the fact that these costs make hiring labor or expanding plant more expensive.

The firms in our data are all small relative to labor, product and capital markets. Hence, we treat them as price takers in all three markets. Assuming no fixed costs in

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[2] The survey data used here do not provide enough detail to separate regulatory costs into those affecting capital and labor. However, it is useful to think of regulatory costs as increasing in the level of capital and labor employed by the firm.

hiring labor, firms choose the level of labor by equating the marginal product of labor and the regulation-loaded wage rate:

$$PF_L = \theta_L W \qquad\qquad (2)$$

The firm's choice of capital is slightly more complicated given the possibility of capital constraints. Firms facing neither capital constraints nor regulatory costs will optimally equate marginal productivity of capital with its marginal value, or $PF_K = r$, where r is the market rate of interest. If capital constraints bind, then the marginal rate of capital may exceed the market rate of interest, allowing the possibility of an inequality $PF_K \geq r$. Finally, allowing for regulatory costs and capital constraints, firms invest such that:

$$PF_K \geq \theta_K r \qquad\qquad (3)$$

Note that while capital constraints reduce the level of capital supplied to the firm, regulatory costs reduce the firm's demand for capital. Indeed, it is possible for capital constraints to bind to such a degree that the costs of regulation do not affect the level of investment chosen by the firm. Hence, while we expect the investment level to be decreasing in both the cost of regulation and the degree to which capital is constrained, we would expect investment to be increasing in the interaction of these two factors. In other words, the costs of regulation/corruption and constraints on capital substitute for one another in constraining a firm's growth.

We are interested in the growth rate of employment over time rather than its level. From (2), changes in a firm's labor force will be determined by the market price of its product, P, the wage rate, W, the level of corruption affecting labor, θ_L, and changes in the marginal product of labor resulting from exogenous shocks or changes in the capital stock. On the latter, since $F_{KL} > 0$, F_L is increasing in the level of capital investment made

by the firm. We do not have data on market prices faced by the firm. Instead, we use the profit rate reported by other firms in the same state and industry to indicate the profitability of investment opportunities. The data measure profits after regulation/corruption expenses. With this in mind, we estimate the following reduced form equation for changes in the level of employment:

$$\Delta L = G(\pi, \Delta\theta_L, \theta_K, \Delta W, \Delta r, \overline{K}, \overline{K}\theta) \tag{4}$$

where ΔL is the change in employment, π represents the industry profit rate, $\overline{K}$ represents the extent to which the firm is impacted by capital constraints (which limit investment), $\overline{K}\theta$ indicates the interaction between capital constraints and regulatory/corruption costs and everything else is as defined above with Δ representing a change in a variable.

Theoretically, the relative size of θ_L and θ_K will affect the mix of capital and labor which firms use to expand output. Unfortunately, our data do not allow us to estimate regulation/corruption costs affecting labor and capital expansion separately. Hence, we include both the level and a proxy for recent changes in the level of regulation/corruption costs more broadly defined. We also lack data on variation of interest rates faced by individual firms across the sample, though we do have measures of capital constraints. Finally, changes in wage rates may be endogenous to changes in employment in the region caused by the other factors in the regression. For this reason, we use the change in wage rates lagged 2 years. [3]

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[3] Regulation and corruption may also prevent firms from entering in the first place, or push firms out of the regulated sector. The survey was based on a sample obtained from Mexico's National Statistical Institute (INEGI), and is limited to registered firms. Even registered firms may keep some part of their activities off of official firm accounts. To the extent that total employment differs from formally registered employment among the firms in our sample, we have no way of being sure whether firms responded to the employment questions with data representing all employees, or only registered employees.

Section 3: The Survey

The "Survey of Governance and Development of Enterprises in Mexico"(EGDE) was conducted between January and March of 2002 by researchers at the Monterrey Institute of Technology. In all, 3969 firms were surveyed in the manufacturing, construction, commerce, transportation, and personal services sectors of the economy. The initial sample draw included the 250 largest firms (by number of employees) in Mexico, the 30 largest firms in each state, and an additional sample of 120 small and medium sized firms in each state. The participation rate among this initial sample of about 4900 firms was approximately 80%. The resulting survey data are representative for each of Mexico's 32 states (including the Federal District). Each state is represented by between 107 firms (Baja California Sur) and 184 firms (Federal District). The sectors with the largest number of firms surveyed were personal services (43% of the sample) and commerce (36% of the sample). A smaller number of firms were surveyed in construction (14%), manufacturing (5%) and transportation (2%). The final sample is broadly representative with respect to firm size. Firms with 15 or fewer employees make up almost half (49%) of the final data set. Medium sized firms with 16-99 workers represent 29% of the final sample, and large firms with more than 100 workers the remaining 21%.[4]

The EGDE survey follows a methodology developed by the World Bank, previously implemented in surveys such as the World Business Environment Survey. (See Batra, Kaufmann and Stone 2002 for a more detailed description of the WBES.) The survey was administered in face to face interviews with either the firm's owner or general manager (58% of the time) or a senior administrator of the firm. The survey questions focus on obstacles to the firm's growth and the prevalence of corruption in government-

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[4] Only 5% of the firms in the sample had more than 1000 employees in 1999. These firms are eliminated from the sample used in this paper because the sample of these very large firms is not big enough to examine separately and their experience may be different from the smaller firms on which we focus. The results are not materially different if these firms are included.

business interactions. The obstacles on which firms are queried cover a broad range including the adoption and implementation of laws and regulation, and access to finance. Each obstacle is rated on a scale from 0-7, with representing the factor is "not an obstacle" and 7 representing a "very serious" obstacle. Firms are also asked both about bureaucratic corruption and political/regulatory influence.

We are interested here primarily in the business climate faced by firms and in credit constraints. We broadly define the business environment as being impacted by the efficiency with which laws and regulations are developed and implemented (which we refer to as the "regulatory environment") on the one hand, and the prevalence of bureaucratic corruption on the other. We measure the regulatory environment in two ways. First, firms are asked about the severity of the following obstacles to growth: inadequate laws, policies and regulation; frequent unexpected changes in laws and regulations; a lack of transparency in the design of laws and regulations; and unjust implementation of laws and regulations. Our first measure of the impact of regulation is the average of these four responses. Second, respondents were asked what percentage of their firm's revenues were expended on "costs related to regulations." We use the response to this question as an alternative measure of the efficiency of the regulatory environment.[5]

On the bureaucratic corruption side, we also use two primary measures. The first comes from a question which asks respondents what percentage of sales firms "like theirs" expend on "extra official" payments to bureaucrats. Responses are given in categories "0", "less than 1%," "1-2.5%," and so on. The second approach to measuring corruption is based on a question asking each respondent to name the three "cleanest" states in Mexico, those characterized with the "least corruption in government-business

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[5] The question from which the regulation cost data comes asks for a division of sales into 8 categories. "Costs related to corruption" is one of the other categories, and hence regulation costs are measured distinctly from bureaucratic corruption.

relations." We use this question to create another measure of (the lack of) bureaucratic corruption. This question has the advantage of asking respondents for a relative ranking. About 38% of firms named their own state as one of those which is least corrupt. We create a variable indicating this response. We also calculate the percentage of respondents in the entire survey naming a given state in this list. For example, just under 28% of the respondents in all states said that the state of Aguascalientes was one of the three states with the lowest level of corruption. At the other extreme, only 1.5% of respondents named Guerrero as one of the "cleanest" states.[6]

The survey contains somewhat less information on access to finance. Firms were asked about the degree to which access to finance was an obstacle to growth. Firms were also asked whether they had applied for credit in the two years prior to the survey. Those who had not applied for credit were asked why they had not. We use the data from these questions to measure the impact of financial constraints. We also use the level of bank credit as a percentage of GDP at the state level as a measure of local financial market development.

Section 4: The Data

Table 1 summarizes several of the most important independent variables in the analysis at the national and state level. For each of the variables, there is significant variation in the mean responses across states. For example, regulation costs as a percent of sales are as low as 1.5% in Querétero and as high as 5.8% in the Federal District (Column 1). The lowest cost of corruption as a percent of sales is again reported by firms in Querétero (0.15%), while the highest is in Tabasco (4.3%, Column 2). The data based on respondent's lists of the three cleanest states are represented in Columns 3 and 4.

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[6] A given respondent's own response to the question is not used in calculating the percentage of surveys naming the respondent's state. Given the modest sample sizes at the state level, this eliminates any bias from the respondent's own attitudes.

Column 3 shows the percentage of time firms in a given state name their own state as one of the cleanest. Less than 5% of firms in the states of Tabasco, Guerrero, and Mexico do so, while more than 85% of firms in Aguascalientes, Colima and Querétero do so. Column 4 shows the percentage of times firms located in other states name the given state as one of the three cleanest. Here Guerrero is named least often (1.5%) and Aguascalientes most often (26.2%). The correlation between the state level averages reported in Columns 3 and 4 is very high, about .69. Thus, there is broad consistency between what firms within a state say and the reputation of the state in other parts of the country. Finally, Column 6 shows the average response to the severity of the obstacle created by lack of access to finance. Firms in Guanajuato and Durango report that the financing constraint is most severe, while firms in Querétero and Zacatecas report it is least severe.

Figure 1A shows a map of Mexico depicting the data on regulation costs in Column 1 of Table 1. The states shaded darkest are the 10 in which firms report the highest average cost of regulation. The unshaded states are the 11 with the lowest average cost of regulation. Figure 1B shows a similar map depicting the data from Column 4, the percentage of times a given state is listed as one of the three cleanest. The states shaded darkest are the 11 which are least often listed as one of the cleanest. Those without shading are the 9 most often listed. States reported to have high regulation costs tend to be those found in the southern part of the country. The north/south divide is less evident in Figure 1B. Most of the states which are named most frequently as one of the three cleanest are located north of the center of the country but south of the US border. There are clearly similarities in the patterns depicted on Figures 1A and 1B, though differences as well. The correlation between the rankings at the state level is 0.42.

Tables 2 and 3 show the raw correlations among and between the independent variables of interest and the measures of firm performance. The latter are the growth in

employment between the end of 1999 and the time of the survey, roughly a two year period, and the percentage of profits which the firm reinvested in 2001.

Several things are worth highlighting on Table 2. First, the correlations between the three questions related to "obstacles to enterprise development" are very high. Firms saying that the adoption/implementation of laws is a severe obstacle are more likely to say access to finance is an obstacle. The correlation between these responses is 0.48. The correlation between the severity of adoption/implementation of laws and bureaucratic corruption is even higher, 0.66. The correlations among the other measures of the business environment, and between these measures and the "obstacles" responses, is also positive but much smaller. For example, firms saying that bureaucratic corruption is a more severe obstacle also say that firms like theirs pay a higher proportion of their sales as bribes, though the correlation is only 0.17.

The correlations at the state level averages (Table 3) follow the same pattern, though the correlations themselves are generally higher. For example, the correlation between the average state-level response on the severity of bureaucratic corruption as a constraint and the average proportion of their sales firms pay as bribes is 0.38 (compared to 0.17 in the individual firm responses).

One question on which Tables 2 and 3 shed some light is: When are firms more likely to list their own state as one of the three cleanest? Here the correlations suggest that firms reporting higher costs of regulation and higher costs of corruption (either for themselves or for firms like theirs) are less likely to name their own state as one of the three cleanest. Moreover, firms in a state are more likely to list their own state as one of the 3 cleanest when other firms in the state say that the costs of regulation and corruption as a percent of sales are low. Indeed, 40% of the variance in the percentage of firms listing their own state as one of the cleanest is explained by state level differences in the cost of regulation as a percent of sales and the cost of corruption as a percent of sales.

This provide some reassurance that at least the responses related to the business environment are consistent across questions, and across firms within a state.

Section 5: Employment Growth Regressions

We begin by examining the relationship between the business environment faced by the firm and the firm's rate of employment growth. The EGDE survey asks firms the level of employment at the end of 1999 and at the time of the survey. The survey was administered between December 2001 and March 2002, implying that the time period over which the employment change is calculated varies slightly across the sample. To control for this, we include in the regressions variables indicating the month in which the firm answered the survey, with December as the base group.

A handful of firms grew to many times their 1999 size, and a handful shrank to a small fraction of their 1999 size. So that the results are not unduly influenced by these outliers, the sample is limited to firms which grew by no more than 100% or shrank by no more than 50%. This turns out to be roughly equivalent to truncating at the 5th and 95th percentile of firm growth. Additionally, we eliminate firms that employed fewer than 5 workers in 1999. Survivor bias is likely to have the largest impact on the firms which were smallest at the beginning. We eliminate the firms with more than 1000 employees in 1999 as well, because the sample includes very few of them and they may face constraints which are different from those of smaller firms. The results reported below are not sensitive to the exclusions based on initial firm size, but some of the results are sensitive to the exclusion of firms which grew by more than 100% or shrunk be more than 50%.

Following the reduced form employment growth equation (4), the initial set of regressions takes the form:

Employment growth = β_0 + β_1 Regulation/Corruption costs (θ) + β_2 Financial constraints + β_3 Profit rate + $\beta_4 \Delta$ Wage rates + β_5 Firm characteristics + β_6 Respondent characteristics + β_7 Sector + β_8 state GDP growth + β_9 month of survey + ε_i

where β_1 is a vector of variables measuring constraints to growth, such as the regulatory climate or lack of finance, which are the variables of central interest here, and β_2 are measures of financing constraints. The period over which growth is measured in the survey is one of severely limited bank finance in Mexico (Gonzalez 2002), so we would expect financial constraints to be especially important in this period. β_3 and β_4 measure the other variables in equation (4), the average profit rate in the state and industry and the change in wage rates in the state in the 2 years leading up to the start of the growth period. β_5 is a vector of other firm characteristics. For all of the regressions reported here, these characteristics include the beginning (1999) level of employment and its square, and the age of the firm (in years) and its square. We also include a variable to indicate that a portion of the firm's output is exported and a variable to indicate that a portion of the output is sold to government entities. Ownership of some part of the firm by a government entity or by a foreign firm is indicated by dummy variables.

The vector β_6 includes an indicator of the responding manager's gender, variables measuring his/her age and its square, and variables indicating the completion of lower secondary, upper secondary, and university education (less than lower secondary is the base group). Because many of the key right hand side variables ask for the manager's impressions, we also include the manager's response (on a scale of 1-7) to the statement: "The majority of people can be trusted" to control for the general attitude of the respondent.

Finally, β_7 controls for differences across the five sectors of activity with 4 indicator variables and β_8 measures the impact of the rate of growth in per capita GDP in the respondent's state between 1998 and 2000. The last variable serves two purposes.

First, there may be some concern that respondents take into account the recent economic performance of a state when answering questions about the business environment in their own state or listing the three states with the most favorable business environment. Growth caused by factors other than government-business relations may result in an upward bias in the quality of the business environment. Including a measure of the recent economic growth in the regressions provides some degree of control for this. The inclusion of recent growth rates also provides some control for factors which might affect the overall climate for firms in the state. Firms in states which are growing more rapidly should themselves be expected to grow more rapidly.

The first set of regressions, reported on Table 4, uses the firm's own individual response to the questions regarding the impact of capital constraints, the regulatory environment, and degree of bureaucratic corruption. Arguably, these responses provide the most firm-specific information we have on the environment faced by the individual enterprise. For reasons we discuss below, they may not be the most accurate measure available from the survey. Because the various measures of the business environment are correlated, sometimes highly so, we include them the one at a time in the regressions. The regressions are random effects regressions, allowing for correlation of errors with states.[7]

All three of the responses to the "obstacles to enterprise development" questions have significant associations with the firm's rate of growth. Firms that say the adoption and implementation of laws and regulations is an obstacle to growth do grow more slowly themselves (β=-0.61, t=2.37, Column 1). Recall that the response to this and other "obstacle" questions range from 0-7. The coefficient indicates that a one category increase in the severity of the obstacle (from 4 to 5, for example) is associated with a .61% decrease in the firm's growth rate. Obstacles associated with bureaucratic corruption (β=-0.49, t=2.19, Column 3) and access to finance (β=-0.39, t=1.72, Column

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[7] OLS regressions allowing for clustering of errors at the state level produce nearly identical results.

7) are also associated with slower growth in employment, though the measured effect is slightly smaller. The quantitative measure of bureaucratic corruption has a significant effect with the expected sign when measured either as the percent of sales paid in bribes by "firms like yours" (β=-0.24, t=1.78, Column 4) or by the variable indicating that the firm listed its own state as one of the three cleanest (β=-2.66, t=2.23, Column 6). However, a firm's own reported cost of corruption as a percentage of sales is positively associated with the employment growth rate (β=0.36, t=2.23, Column 5). The firm's reported cost of regulation as a percentage of sales has no significant association with the rate of employment growth (β=0.08, t=0.72, Column 2). These last two results are consistent with growing firms having more interaction with the state, and hence more need to pay costs of regulation and bribes.[8]

The framework sketched in Section 2 suggests that recent changes in the business environment should also have an effect on employment growth, as should changes in wage rates. Table 2 reports the coefficients of variables measuring these two factors, along with the coefficient for the manager's response to the statement: "The majority of people can be trusted." There are no questions in the survey asking managers about recent changes in the business environment, but there is a question asking about the prospects for change in the coming two years. We use this as a proxy for recent changes, since forecasts are likely to be based at least partly on recent experience. In each of the specifications, all three of these variables have the expected sign (positive in the case of changes in the business environment and general trust of people, negative in the case of wage rate changes), but none are statistically significant.

The results in Table 4 provide support for idea that firm growth is impacted by both regulation/corruption costs and financing constraints. Though individual responses of firm managers have been used in similar exercises (Johnson, McMillan and Woodruff

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[8] The regressions on Table 2 do not include state fixed effects. However, the reported results are not qualitatively different when state fixed effects are included.

2000; Beck, Demirgüç-Kunt, and Maksimovic 2002; Gaviria 2002), there are reasons to be concerned with biases in the estimated effects of the factors represented by these responses. The biases may run in either direction. On the one hand, if managers of firms which are doing poorly for reasons not measured by the variables in the regression tend to blame their poor performance on the business environment. This will result in correlation between the variables measured in β_1 and the error term, ε_i, in such a way that the negative effects of constraints on growth are exaggerated (biased upward in absolute value). On the other hand, the results suggest that the potential bias in the other direction which was discussed above may dominate. Managers of firms which are growing faster may be those that say, by our measures, that the business environment is most hostile, because they interact most often with the state.

One way to reduce the potential impact of these biases is to use measures of the business environment and financial constraints based on responses of other firms operating in the area rather than the respondent firm itself. We do this by taking averages of the key independent variables at the state level. We exclude each firm's own response when calculating the state level average for that firm. Note that all of the potential bias is not eliminated by taking state level averages, since states or regions in which firms generally are doing poorly will have a larger portion of firms which blame their poor results on the business environment. Regions or states in which firms are doing well will have a larger portion of rapidly growing firms which interact with the state more intensely. In the actual sample, however, most of the variance in growth rates across firms occurs within states rather than across states. Note that the state level averages will perform best when the relevant environmental factors do not depend on the specific characteristics of firms. That is, if firms within a given state face significantly different costs of bureaucratic corruption, then the state level measure will do a bad job of reflecting each individual firm's constraints.

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Table 5 reports regressions using the state level averages for the various measures of the business environment, discussed above. The regression reported in Column 1 includes a variable measuring the percentage of firms in the sample which list a firm's state of operation as one of the three states with the lowest level of bureaucratic corruption. A one percentage point increase in the number of firms saying a state is "clean" is associated with an increase of 0.33% in the average growth rate of firms in that state. For the regression sample, the standard deviation of this measure of the business environment is about 6.4%, implying that a one standard deviation increase in the percentage of firms naming a given state is associate with a growth rate of firms which is 2.1 percentage points higher.

The second Column of Table 5 adds measures of financial market access. Firms located in states where other firms say financial constraints are severe grow more slowly, though the effect is significant only at the .10 level. The alternative measure of financial market development, the ratio of the log of bank credit and the log of GDP in the state in which the firm operates, has an insignificant association with the growth rate of employment. The third column uses the cost of regulation in place of the percentage of firms naming a state as one of the three cleanest. The regulation cost has an effect of similar magnitude to the fist measure. A one standard deviation increase in regulation costs (1.05%) is associated with a decrease in the firm's growth rate of about 2.6 percentage points. The fourth column includes measures of all three of the constraints. In spite of the collinearity between the state level data, all three constraints are significantly associated with slower growth of firms, at the .10 level or better.

The theoretical discussion suggested that regulatory/corruption costs should matter the most when financing constraints are not binding, and financial constraints should matter the most when regulatory/corruption costs are low. We test for this in Column 5 by adding a variable interacting the measure of financial constraints and regulatory costs to the regression in Column 3. We expect this variable to have a positive

sign, indicating, in effect, that financial constraints and regulatory costs are substitutes in slowing firm growth. Indeed, the result in Column 4 indicates that this is the case. The interaction term is positive and significant at the .05 level. The coefficients indicate that in the states in which financial constraints are least important (with a measure of financial constraints equal to 2), a one percentage point increase in the cost of regulation is associated with a 5 percentage point decrease in the rate of growth of firms. In the states in which financial constraints bind most tightly, on the other hand (with a measure of almost 5 on the 7 point scale), regulatory costs have no effect on the rate of firm growth.[9]

Finally, the last three columns (Columns 6-8) of Table 4 replace these initial measures of constraints with the percentage of firms who name their own state as one of the three cleanest (Column 6), the state average cost of corruption reported for "firms like yours" (Column 7), and the state average cost of corruption reported as a percentage of the firms' own sales (Column 8). Each of these is significantly associated with slower growth of employment at least at the .05 level.

Section 6: The Willingness to Invest

The results of the firm growth regressions suggest that for most firms in the sample, growth is impacted by bureaucratic corruption and the costs of regulation more than a lack of finance. A poor climate for business reduces the demand for credit. We now explore the relationship between firms' investment behavior and the business environment more directly. The survey asked firms their rate of profit as a percentage of their sales in the year 2000. Responses were provided in categories, negative, 0-5%, 6-10% and so on. The question was asked about profits in the year 2000 because the 2001 data would likely have reflected the recession suffered by Mexico that year. A separate question asked firms what percentage of profits they reinvested in their business. Here,

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[9] Similar results are found when financial constraints are interacted with the percentage of firms ranking the state as one of the three cleanest.

the question referred to 2001 rather than 2000. Again, categories were provided for responses: 0%, 1-10%, 11-25%, 25-50%, and so on. We use data from the question on reinvestment to examine the relationship between the willingness to make investments and the business environment faced by the firms. For these purposes, we exclude the firms which were not profitable in the year 2000. The data are less than perfect, because the recession made 2001 a hostile year for investment throughout Mexico. Moreover, some of the firms responding to the reinvestment question may not have been profitable in 2001, and the survey does not allow us to identify those firms. With these important caveats in mind, the data do show a significant link between the willingness to make investments and the climate faced by the firms.

Table 6 reports the results of ordered logits and random effects regressions using the percentage of profits reinvested as the dependent variable. The categorical nature of the responses means that firms invested either 0%, 5% (the midpoint of the 1-10% range), 17.5%, 37.5%, 62.5%, or 87.5% of their profits. The results reported in Columns 1 and 2 indicate that firms located in a state which is more often named as being among the three cleanest states invest a significantly higher percentage of their profits. While statistically significant, the impact is not very large. A one standard deviation movement in the independent variable (6.4%) is associated with a 2.3 percentage point increase in the reinvestment of profits. Even moving a firm from the state named least often (Guerrero, 1.5%) to the state named most often (Aguascalientes, 30%) results in only an additional 10% of profits being reinvested. The magnitude of the coefficient may reflect the measurement errors associated with the reinvestment variable.

Despite the data problems associated with the reinvestment data, the statistical significance of the link between reinvestment and the business environment suggests that the impact of the business environment on the growth of firms goes at least in part through the willingness of firms to make investments, that is, through the demand for capital rather than the supply of capital.

Section 7: Concluding Discussion

Using data from a new firm-level survey in Mexico, we find that the growth of private sector firms in Mexico is constrained both by difficulty in accessing external finance and by the costs of regulation/corruption incurred by the firms. High regulatory costs damps the demand for external finance. Most interestingly, we find that the financing constraints matter most in states with low costs of regulation and corruption. Firms operating in states with a poor business environment are less impacted by financial constraints.

The data from the EGDE survey of firm managers indicate that the environment for business varies widely across states and regions in Mexico. The differences in the business environment are associated with differences in firm growth rates which are significant not only statistically, but economically as well. A one standard deviation improvement in the business climate is associated with an increase in the growth rate of employment in firms of 2.3 percentage points. Given that growth is measured over a two to two and a quarter year period, this translates to annual difference in growth rates of about 1 percentage point. The impact of the business climate in state where financial constraints bind the least is roughly twice as big, an annual growth rate of about 2 percentage points.

These results suggest that stimulating growth among small and medium sized firms in Mexico involves more than resolving current issues related to access to external credit. Robust demand for investment capital from the firms must be stimulated as well, particularly in those states which currently have a poor business environment. Reduction in the costs of regulation and corruption faced by the firms is also necessary.

The strongest correlation between firm growth and business environment is measured not by a firm's own response to questions about the environment for business, but the average response of other firms located in the same state. This is reassuring, given

the possibility that own responses reflect unmeasured influences which may be correlated with the firm's growth. However, the use of aggregate measures does not eliminate all concerns about what is being measured by the business environment questions. The aggregate responses are themselves subject to criticism of reflection effects (Manski, 1993). That is, the responses of the entire group of respondents in a given state may be endogenous to conditions in the state correlated with potential firm growth, but not reflecting corruption per se. Greater confidence in the exogeneity of the findings discussed in this paper awaits a better understanding of the exogenous factors determining differences in the business environment across Mexico's states.[10]

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[10] Recent work by Acemoglu, Johnson and Robinson (2001, 2002) addresses this issues by using historical instruments to identify the exogenous portion of the variation in current business environment. Acemoglu, Johnson and Robinson use a data set comprised of countries which were formerly colonies of European nations. They use the mortality rate of Europeans at the time of settlement, and argue that where mortality rates were low, Europeans went to settle and established governmental institutions favorable to economic investment growth. Where mortality rates were high, Europeans went only to extract resources, not to settle. In these countries, the institutions were more hostile to long term investment and growth.

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Mexico

Mexico
Average cost of regulation, % of sales

- 0.0421 to 0.0569 (10)
- 0.0299 to 0.0421 (11)
- 0.0138 to 0.0299 (11)

FIGURE 1A

Mexico

Mexico
% of times state is not one of the 3 cleanest

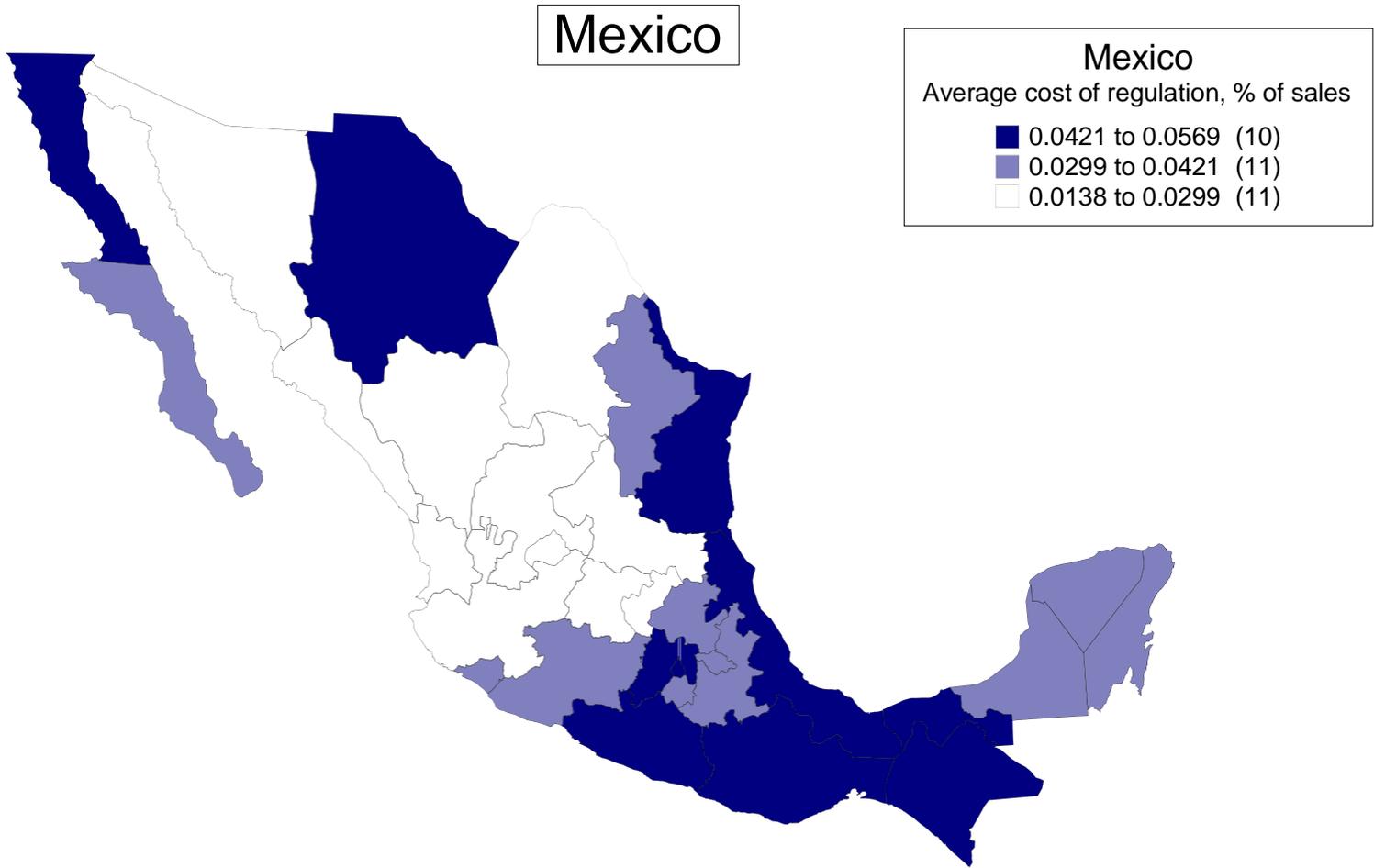- 0.959 to 0.985 (9)
- 0.927 to 0.959 (12)
- 0.738 to 0.927 (11)

FIGURE 1B

Table 1
State level averages
Corruption, finance data

State	% of sales which firms pay in costs of regulation	% of sales which firms like yours pay in bribes	% of firms saying their own state is one of three least corrupt states	% of firms in other states saying state is one of three least corrupt states	Index of bureaucratic-administrative corruption in state	Index of capital constraints indicated by firms in state
Average in all states	3.46%	2.18%	38.3%	7.5%	4.18	3.71
Aguascalientes	2.88%	1.10%	89.0%	26.2%	4.01	4.18
BC Norte	4.45%	1.83%	16.8%	6.0%	4.82	3.98
BC Sur	3.28%	2.93%	49.0%	5.2%	3.75	3.33
Campeche	3.69%	2.34%	42.9%	5.3%	3.76	3.28
Coahuila	2.11%	1.38%	64.3%	3.9%	4.13	3.84
Colima	3.88%	2.14%	93.8%	12.6%	3.91	3.39
Chiapas	4.75%	2.76%	22.9%	3.7%	3.86	3.61
Chihuahua	4.32%	2.67%	33.0%	6.0%	4.27	3.52
Districto Federal	5.69%	3.20%	6.1%	2.6%	4.35	3.54
Durango	2.49%	2.04%	20.8%	5.3%	5.25	4.74
Guanaguato	1.77%	2.46%	60.7%	19.7%	4.93	4.76
Guerrero	5.38%	2.51%	4.7%	1.5%	4.01	3.27
Hidalgo	3.76%	3.25%	18.9%	6.0%	3.24	3.31
Jalisco	2.66%	2.15%	17.8%	7.6%	4.56	3.78
Mexico	4.68%	3.11%	4.1%	2.1%	4.69	3.67
Michoacan	3.40%	1.64%	32.8%	4.4%	3.75	3.48
Morelos	3.07%	1.16%	45.2%	3.6%	4.10	3.84
Nayarit	2.34%	1.57%	35.5%	6.7%	3.57	3.35
Nuevo Le	3.30%	1.85%	54.8%	18.8%	4.53	4.19
Oaxaca	4.63%	1.88%	16.3%	7.0%	4.41	3.78
Puebla	3.47%	3.07%	24.5%	9.0%	5.19	4.53
Queretero	1.38%	0.15%	87.5%	13.9%	2.52	2.24
Quintana Roo	3.85%	1.70%	30.4%	3.6%	3.64	3.34
San Luis Potosi	2.94%	2.04%	39.3%	7.9%	4.41	3.90
Sinaloa	2.17%	2.10%	12.5%	2.0%	4.71	4.00
Sonora	2.58%	1.72%	34.0%	4.1%	5.08	4.50
Tabasco	4.28%	4.34%	3.6%	4.4%	4.29	3.86
Tamaulipus	4.35%	1.72%	26.6%	2.0%	3.83	3.36
Tlaxcala	3.49%	1.11%	68.0%	7.3%	3.50	3.43
Veracruz	4.21%	4.30%	35.2%	7.7%	4.85	4.20
Yucatan	2.99%	1.95%	72.6%	10.0%	4.03	3.75
Zacatecas	2.26%	2.11%	60.0%	10.7%	3.58	2.85

Table 2
Firm Level Correlation Matrix

	Adoption/implementation of laws is obstacle (1-7)	Firm's own cost of regulation as a % of sales	Bureaucratic corruption is obstacle (1-7)	Cost of corruption as a % of sales, like firms	Firm's own cost of corruption as a % of sales	Firm lists own state as one of 3 least corrupt	Access to finance is obstacle (1-7)	Bank credit as a % of GDP in state and sector	Growth rate of employment, 1999-2001	% of profits reinvested by firm	Firm has applied for loan in past 2 years
Adoption/implementation of laws is obstacle (1-7)											
Firm's own cost of regulation as a % of sales	0.00										
Bureaucratic corruption is obstacle (1-7)	0.66***	0.03*									
Cost of corruption as a % of sales, like firms	0.14***	0.08***	0.17***								
Firm's own cost of corruption as a % of sales	0.03	0.31***	0.06***	0.12***							
Firm lists own state as one of 3 least corrupt	-0.08***	-0.07***	-0.13***	-0.10***	-0.07***						
Access to finance is obstacle (1-7)	0.48***	0.01	0.44***	0.13***	0.07***	-0.09***					
Ratio of log of bank credit and GDP in state	0.11***	0.01	0.11***	0.02	0.01	-0.06***	0.06***				
Growth rate of employment, 1999-2001	-0.03	0.01	-0.02	0.01	0.03	0.01	-0.02	0.01			
% of profits reinvested by firm	0.03*	-0.06***	0.03*	0.01	-0.02	0.04**	0.03*	0.02	0.12***		
Firm has applied for loan in past 2 years	0.11***	0.01	0.06***	0.05**	0.04*	-0.02	0.11***	0.04**	0.08***	0.11***	
Manager says "most people" can be trusted (1-7)	0.01	-0.10***	-0.04**	-0.09***	-0.06***	0.06***	-0.002	0.05***	-0.01	0.04**	0.03

Notes: *** -- significant at .01 level; **--significant at .05 level; *--significant at .10 level

Table 3
State Level Correlation Matrix

	Adoption/implementation of laws is obstacle (1-7)	Firm's own cost of regulation as a % of sales	Bureaucratic corruption is obstacle (1-7)	Cost of corruption as a % of sales, like firms	Firm's own cost of corruption as a % of sales	Firm lists own state as one of 3 least corrupt	Firms in other states list state as 1 of 3 least corrupt	Firms in all states list state as 1 of 3 least corrupt	Access to finance is obstacle (1-7)	Bank credit as a % of GDP in state and sector	Growth rate of employment, 1999-2001	% of profits reinvested by firm	Firm has applied for loan in past 2 years
Adoption/implementation of laws is obstacle (1-7)													
Firm's own cost of regulation as a % of sales	-0.07***												
Bureaucratic corruption is obstacle (1-7)	0.92***	0.09***											
Cost of corruption as a % of sales, like firms	0.24***	0.54***	0.38***										
Firm's own cost of corruption as a % of sales	0.04**	0.68**	0.15***	0.51***									
Firm lists own state as one of 3 least corrupt	-0.15***	-0.55***	-0.40***	-0.57***	-0.47***								
Firms in other states list state as 1 of 3 least corrupt	0.22***	-0.43***	-0.03***	-0.29***	-0.18***	-0.70***							
Firms in all states list state as 1 of 3 least corrupt	0.18***	-0.46***	-0.07***	-0.33***	-0.22***	0.76***	0.996***						
Access to finance is obstacle (1-7)	0.89***	-0.10***	0.89***	0.24***	0.04**	-0.17***	0.21***	0.16***					
Ratio of log of bank credit and GDP in state	0.40***	0.04**	0.40***	0.09***	0.04**	-0.11***	0.11***	0.09***	0.32***				
Growth rate of employment, 1999-2001	-0.02	-0.04**	-0.02	-0.05***	-0.03	0.003	0.01	0.01	-0.02	0.01			
% of profits reinvested by firm	-0.02	-0.08***	-0.03*	-0.01	-0.05***	0.06***	0.07***	0.07***	-0.01	0.03	0.12***		
Firm has applied for loan in past 2 years	0.06***	-0.02	0.05***	-0.01	-0.01	0.01	0.02	0.02	0.04**	0.04**	-0.08***	0.11***	
Manager says "most people" can be trusted (1-7)	0.25***	-0.55***	0.07***	-0.34***	-0.57***	0.42***	0.30***	0.33***	0.14***	0.33***	0.02	0.05**	0.04**

Notes: *** -- significant at .01 level; **--significant at .05 level; *--significant at .10 level

Table 4 Regression Results

Dependent Variable: Employment level 2001 / employment level 1999
Individual response variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adoption/implementation of laws is obstacle (1-7)	-0.61 (2.37)						
Firm's own cost of regulation as a % of sales		0.08 (0.72)					
Bureaucratic corruption is obstacle (1-7)			-0.49 (2.19)				
Cost of corruption as a % of sales, like firms				-0.24 (1.78)			
Firm's own cost of corruption as a % of sales					0.36 (2.23)		
Firm lists own state as one of 3 least corrupt						2.66 (2.23)	
Access to finance is obstacle (1-7)							-0.39 (1.72)
Ratio of log of bank credit and GDP in state							0.017 (0.20)
Manager believes corruption will diminish in next 2 years	0.42 (1.40)	0.42 (1.21)	0.41 (1.35)	0.27 (0.78)	0.46 (1.31)	0.37 (1.18)	0.44 (1.47)
Change in wage rates in state, 1996-1998	-0.08 (1.04)	-0.04 (0.29)	-0.07 (0.96)	-0.07 (0.55)	-0.05 (0.32)	-0.05 (0.60)	-0.07 (0.91)
Manager says "most people" can be trusted (1-7)	0.38 (1.18)	0.44 (1.20)	0.36 (1.11)	0.43 (1.18)	0.47 (1.27)	0.37 (1.10)	0.41 (1.26)
Number of observations	2681	2124	2677	2158	2124	2527	2671
Chi-square	70.6	57.3	69.7	58.0	61.9	67.7	67.8
(prob)	<.001	<.001	<.001	<.001	<.001	<.001	<.001

Notes: t values in parentheses. Random effects regressions allowing for correlation at the state level. In addition to the variables shown, all of the regressions include variables measuring the age of the firm and it square, the number of employees in 1999 and its square, variables indicating the firm has non-Mexican owners, exports part of its production, sells part of its output to government entities, and is part-owned by government entities, 4 variables indicating the sector in which the firm operates, 3 variables indicating the month in which the interview took place, a variable measuring the profit rate in the sector and industry in which the firm operates, and a variable measuring the rate of growth of GDP per capita in the state in which the firm operates. Regressions also include variables indicating the age, education level (2) and gender of the respondent.

Table 5
Regression Results
Dependent Variable: Employment level 2001 / employment level 1999
Average responses of firms in same state

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Business environment								
% of firms in all states list state as 1 of 3 least corrupt	0.33 (3.12)	0.35 (3.81)		0.19 (1.83)				
Firm's own cost of regulation as a % of sales, state average			-2.58 (4.70)	-2.05 (3.31)	-0.11 (2.50)			
Finance								
Access to finance is obstacle (1-7), state average		-0.02 (1.95)	-0.02 (1.91)	-0.02 (2.07)	-0.08 (2.48)			
Ratio of log of bank credit and GDP in state		0.054 (0.62)	0.065 (0.75)	0.066 (0.76)	0.039 (0.44)			
Financial constraints * cost of regulation					0.025 (1.94)			
Alternative measures of the business environment								
% of firms in state which list own state as one of 3 least corrupt						0.07 (2.53)		
Cost of corruption as a % of sales, like firms, state average							-2.69 (3.36)	
Firm's own cost of corruption as a % of sales, state average								-2.67 (2.68)
Additional Controls								
Manager believes corruption will diminish in next 2 years	0.27 (0.90)	0.25 (0.84)	0.22 (0.74)	0.17 (0.55)	0.22 (0.73)	0.29 (0.97)	0.29 (0.97)	0.30 (0.99)
Change in wage rates in state, 1996-1998	-0.04 (0.45)	-0.06 (0.76)	-0.11 (1.44)	-0.09 (1.19)	-0.13 (1.68)	-0.06 (0.64)	-0.01 (0.07)	-0.06 (0.65)
Manager says "most people" can be trusted (1-7)	0.32 (0.97)	0.33 (1.03)	0.29 (0.89)	0.28 (0.87)	0.28 (0.85)	0.31 (0.97)	0.31 (0.95)	0.31 (0.94)
Number of observations	2682	2682	2682	2682	2682	2682	2682	2682
Chi-square	74.0	81.9	80.8	93.1	83.8	70.6	75.5	71.3
(prob)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001

Notes: t values in parentheses. Random effects regressions allowing for correlation at the state level. In addition to the variables shown, all of the regressions include variables measuring the age of the firm and it square, the number of employees in 1999 and its square, variables indicating the firm has non-Mexican owners, exports part of its production, sells part of its output to government entities, and is part-owned by government entities, 4 variables indicating the sector in which the firm operates, 3 variables indicating the month in which the interview took place, a variable measuring the profit rate in the sector and industry in which the firm operates, and a variable measuring the rate of growth of GDP per capita in the state in which the firm operates. Regressions also include variables indicating the age, education level (2) and gender of the respondent.

Table 6
Regression Results
Dependent Variable: % of profits reinvested, 2001
Average responses of firms in same state

	(1) Ordered logit, clustered errors	(2) random effects GLS	(3) Ordered logit, clustered errors	(4) random effects GLS
% of firms in all states list state as 1 of 3 least corrupt	1.79 (2.96)	35.7 (2.48)		
Firm's own cost of regulation as a % of sales, state average			-12.01 (2.23)	-2.68 (1.89)
Profit as a percent of sales, 2000	0.18 (3.89)	1.98 (2.98)	0.18 (3.90)	1.98 (2.98)
Manager believes corruption will diminish in next 2 years	0.023 (0.94)	0.178 (0.46)	0.022 (0.91)	0.089 (0.23)
Manager says "most people" can be trusted (1-7)	3.47 (1.24)	0.82 (1.97)	3.34 (1.22)	0.80 (1.94)
Number of observations	2174	2174	2174	2174
Chi-square	114.8	106.1	109.4	98.5
(prob)	<.001	<.001	<.001	<.001

Notes: t values in parentheses. The regressions in Columns 1 and 3 are ordered logits, with atndard errors adjsuted for clustering at the state level. The regressions in Columns 2 and 4 are random effects regressions allowing for correlation at the state level. In addition to the variables shown, all of the regressions include variables measuring the age of the firm and it square, the number of employees in 1999 and its square, variables indicating the firm has non-Mexican owners, exports part of its production, sells part of its output to government entities, and is part-owned by government entities, 4 variables indicating the sector in which the firm operates, 3 variables indicating the month in which the interview took place, a variable measuring the profit rate in the sector and industry in which the firm operates, and a variable measuring the rate of growth of GDP per capita in the state in which the firm operates. Regressions also include variables indicating the age, education level (2) and gender of the respondent.