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Corruption, Business Environment, and Small Business Fixed Investment in India

Maddalena Honorati
Taye Mengistae

The World Bank
Development Research Group
Macroeconomics and Growth Team
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Abstract

This paper estimates a structural dynamic business investment equation and an error correction model of fixed assets growth on a sample of predominantly small and mid-size manufacturers in India. The results suggest that excessive labor regulation, power shortages, and problems of access to finance are all significant factors in industrial growth in the country. The estimated effects of labor regulation, power shortages and access to finance on the rate of business investment all vary by states' levels of industrial development and. Perhaps more importantly, they also depend on a fourth institutional factor, namely, corruption. The rate of fixed investment is significantly lower where power shortages are more severe and labor regulation is stronger over the full sample, but each of these impacts is also greater for businesses self-reportedly affected by corruption. Although access to finance does not seem to influence the rate of investment for most firms, there is evidence that investment decisions are constrained by cash flow in enterprises that are unaffected by corruption or power shortages. There are nuances to this story as we take into account regional specificity, but the key result always holds that labor regulation, power shortages and access to finance influence the rate of fixed investment in ways that depend on the incidence of corruption. In interpreting this finding, we would like to think of corruption as a proxy for the quality of property rights institutions in the sense of Acemoglu and Johnson (2005). On the other hand, we regard labor regulation and the financial environment of small businesses in India as instances of what Acemoglu and Johnson (2005) call 'contracting institutions'. The analysis finds that the interaction between corruption and other aspects of the institutional environment of fixed investment decisions could be seen consistent with the Acemoglu-Johnson view that the quality of property rights institutions exerts more abiding influence on economic outcomes than the quality of contracting institutions.

This paper—a product of the Macroeconomics and Growth Division, Development Research Group—is part of a larger effort in the department to understand the role of institutional factors in sub-national regional inequality in developing economies. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at mhonorati@worldbank.org and tmengistae@worldbank.org.

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Maddalena Honorati

and

Taye Mengistae

Development Research Group

The World Bank

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1. Introduction

Two themes have recurred in recent discourse on the current growth performance of India's economy. One is if and when the pace of growth will eventually catch up with China's, or, rather, why that has not happened already. The second is the growing evidence that the rapid growth of the past decade and half has not spread evenly across all the regions of the country, being rather concentrated in about half a dozen 'advanced states'. Although lagging regions have also grown consistently over the period, this has been at a much lower pace than the advanced regions (World Bank 2006a; Purfield, 2006). Just as the contrast between India's growth performance with China's is most conspicuous in terms of the growth of manufacturing industry, concern with regional inequality within India has also largely related to disparity in industrial growth. It is not obvious that regional inequality in industrial development poses a policy problem for India, any more than does the fact that its growth rate has so far been smaller than China's. There is nonetheless remarkable consensus on some of the factors explaining both cases of disparity.

One point of consensus is that India's labor markets are less flexible than China's and probably have made Indian manufacturing industries less competitive in international markets. Some attribute labor market rigidity to intrusive employment codes, which, while common to all parts of the country, have also been enforced to a degree that varies substantially across states depending on the political orientation and tradition of state governments. Several studies report that this has generated significant regional differences in effective labor regulation, and is a major reason why industry has not done so well in some states as in others. Another point of consensus on the reasons why manufacturing is not growing as fast in India as it has in China, is that India's physical infrastructure is significantly poorer particularly in the area of power supply to industry. As a result of years of underinvestment associated with serious property rights and contract enforcement problems relating to power, India has been in a state of perennial power shortages that has proved to be a significant drag on manufacturing productivity and growth. Moreover, depending on how supportive local governance and politics have been of power sector reforms, the gravity of this problem has varied enormously across states.

There is less of a consensus as we move beyond excessive labor regulation and power shortages to other potential reasons why India's industry is not growing as fast as China's, or why industry is not doing as well in its lagging states as it is in more prosperous ones. However, two potential constraints happen to be rated highly by respondents to the business survey on which this paper draws. These are corruption and access to formal external finance. In fact both of these factors are reported to be constraints by a greater proportion of respondents to the survey than is labor regulation. At first sight the high rating of access to finance seems hard to square with the facts. As pointed out in a recent World Bank report, India has had excess savings and low interest rates for a number of years now and has consequently been a net exporter of capital

(World Bank, 2006a). Also, thanks to rapid reforms of the stock market since the early 1990s, large firms have not had difficulty in raising external finance while reducing leverage. However, the report also notes that, bank lending to the private sector has hardly increased meanwhile. This has partly to do with India's huge fiscal deficits. It is partly because the banking sector remains to be predominantly state-owned and heavily regulated. What this means is that small business access to finance may not have improved significantly over the years since, unlike large firms, SMEs in India are not yet attractive to equity markets or to FDI.

In this paper we analyze enterprise level data from the 2002 and 2005 waves of the Firm Analysis and Competitiveness Survey of India (FACS survey-henceforth) of the World Bank and the Confederation of Indian industry in order to help quantify the effect of all four factors, namely, labor regulation, power shortages, access to finance and corruption on manufacturing growth in India. As we have pointed out already, there is a degree of consensus, backed up by firm level and aggregate evidence, that labor regulation and power shortages are powerful influences on regional differences in industrial growth within India as well as on the growth of Indian industry relative to international benchmarks. However, we are not aware of similar investigations of the role of the other two factors. How important are corruption and access to finance as influences in manufacturing growth compared to labor regulation or power shortages? How much of the regional gap in industrial growth within India does each of the four factors account for? And how does each of the four factors influence the growth impact of the others?

We seek to address these questions by estimating a dynamic structural fixed business investment equation at the enterprise level on the FACS survey dataset for industrially advanced and lagging regions separately as well as on the all-India sample, with institutional variables among the right hand side variables. In a companion paper we relate the same set of variables to enterprise sales growth in order to address the same question (Honorati and Mengistae, 2007a). The value we expect to add here is to dig deeper into the same question by investigating how institutional variables impact on what we expect to be the more volatile of the two proximate determinants of output growth, namely investment in productive assets.[1] The specifications we estimate are influence by the hierarchy that Acemoglu and Johnson (2005) establish between what they call 'property rights institutions' and 'contracting institutions' as determinants of long-run economic growth. Property rights institutions provide private agents protection from predation by the state or powerful elites, while contacting institution regulate contracts between private parties. Acemoglu and Johnson argue and offer evidence that property rights institutions exert stronger influence on long-term economic outcomes than contracting institutions. The reason that they give for this is that private agents usually get around the problem of poor contracting institutions by developing informal substitutes for them albeit at a possible cost. On the other hand, there is little they could do to counter predatory exercise of political power and therefore withdraw entirely from

[1] We investigate the role of institutional variables in the other co-determinant, namely, productivity growth in a separate paper.

activities or transactions that they would have undertaken under secure property rights. In other words, the economic outcomes of the failure of contracting institutions tend to be less extreme than those of the failure of property rights institutions.

Following the contribution of Fernandes and Kraay to World Bank (2006b), we will think of corruption as a proxy for the quality of property rights institution. As Fernandes and Kraay (2006) argue, corruption is ultimately the use of political authority in order to make private economic gain (in the form bribes). Its incidence should therefore be higher where property rights institutions are weaker. On the other hand we treat labor regulation, and the financial system as they would be categorized in Acemoglu and Johnson (2005), that is, as contracting institutions. If the Acemoglu-Johnson hypothesis of the primacy of property rights institution over contracting institutions is correct, and we are right in using corruption as a proxy for the first type of institutions, then one would expect the investment effects of labor regulation, access to finance and power shortages all to depend on the incidence of corruption. Specifically, we would expect weak contracting institutions to be a binding constraint on rate of fixed investment only where property rights institutions are not. One way of testing this is to estimate the effects of the first three conditional on the incidence of corruption and compare the results with those of unconditional (on corruption) estimates of effects, which is what we have done in this paper. We have also estimated all specifications of our investment equation on the all-India sample as well as for 'lagging regions' and for 'advanced states' separately.

It turns out that the effects of labor regulation, power shortages and access to finance on the rate business investment all differ significantly between the two groups of states. More significantly, they also depend crucially on the incidence of corruption. Over the full sample, the rate of fixed investment is significantly lower where power shortages are more severe or labor regulation is stronger. Moreover, each of these impacts is greater for businesses self-reportedly affected by corruption. While access to finance does not seem to influence the rate of investment for most firms, there is evidence that investment decisions are constrained by cash flow in enterprises that are unaffected by corruption or by power shortages. There are nuances to this story as we look deeper to take into account regional specificity, but the key result always holds that labor regulation, power shortages and access to finance influence the rate of fixed investment in ways that crucially depend on the incidence of corruption.

The rest of the paper is organized as follows. We describe our data in section 2. We discuss specification, identification, and estimation issues in section 3. Details of estimation results are presented in section 4. Section 5 concludes.

2. Data: regional gaps in performance and institutional environment

The data on which we have estimated business growth equations come from the 2002 and 2005 waves of the FACS survey. The 2002 wave covered some 1856 predominantly small and medium sized enterprises sampled from 11 two-digit industries and 40 cities in 11 states. The states were Andra Pradesh, Delhi, Gujarat, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Punjab, Tamil Nadu, West Bengal and Uttar Pradesh. The industries were garments, textiles, leather goods, pharmaceuticals, consumer electronics, white goods, machinery, auto parts, metal products, chemicals and plastics, food processing. The 2005 wave successfully revisited 975 of the enterprises surveyed in the 2002 wave and expanded the full sample to 2287 by including more than a dozen new cities from four additional states. The newly added states were Bihar, Jharkhand, Orissa, and Rajasthan. Although the survey instrument diverges significantly between the two waves, there was large enough overlap to generate a panel dataset on a wide range of economic indicators and institutional variables. Also, each wave collected production statistics and financial data on the preceding three years. The length of the panel for production statistics is therefore six years rather than two. It is this aspect of the data that we have exploited in estimating a dynamic specification of the rate of investment.

In order to bring regional differences in industrial performance and institutional environment into sharp relief, we have classified the 16 states covered by the FACS survey into a smaller set of categories based industrial development and growth. The idea is to estimate the relationship between the rate of investment and business environment variables for each category separately. This allows us take into account the possibility of the heterogeneity or effects of institutions across regions. It is also an essential element of our strategy for the identification of the effects of access to finance on growth. The strategy relies on our interpretation of the coefficient of financial variables in the estimated investment equation. While, there are no unambiguous rules for identifying such effects in the context of a single equation, identification is possible through cross equation comparison of coefficients of financial variables.

In view of the small size of the over all sample, we would like to keep the number of categories to the minimum so as to maximize the degrees of freedom available for inference on the sub sample within each category. We also would like to make our categories match as much as possible those already established in the policy literature- that is, with what are already grouped as ‘lagging states’ and those called ‘advanced states’. Following Purfield (2006) we make the classification in two dimensions: level of development and recent growth performance. We measure level of development by per capita income in 1994 and recent growth performance by average annual growth rate in real GDP in the first decade since then. We divide states first by level of development into high-income states and low-income states with the average state level per capita GDP of 1994 as the dividing line. Each of these two groups is then further classified into high-growth states and low-growth states as the average annual state level GDP growth rate for 1994-2003 as the cutoff point. The combined result is the four-quadrant grouping of states shown in Figure 1, with Gujarat, Haryana, Kerala, Maharashtra and Tamil Nadu as the high-income high-growth group of the first quadrant; Andra Pradesh, Karnataka, Rajasthan, and West Bengal as the low-income high-growth states of the second quadrant; Bihar, Madhya Pradesh, Orissa and Uttar Pradesh as the low-income low-growth states of the third quadrant; and Punjab as the sole high-income low-growth state of quadrant four. We take Delhi as a quadrant-one state but group Jharkhand along with the low-income low-growth states.[2] Quadrant-three states are what are sometimes referred to as 'lagging regions' in the policy literature in contrast to the 'advanced states' of quadrant one, with the 'up-and-coming' states of quadrant II in the middle. Our analysis will mainly focus on two- way comparisons of quadrant-three or low-income and low-growth states as base group with quadrant I and quadrant II states.

The enterprise performance indicators that we compute from the FACS survey data by state groups are consistent with the macroeconomic performance contrast implied by Figure 1. Thus average sales per worker is highest for enterprises from quadrant one states but lowest in quadrant- three states (Figure 2) which is consistent with quadrant-one states being richer. Also, consistent with the income disparity between state groups, the gap in output per worker reflects the higher TFP levels of the average enterprise in quadrant-one states. Notice, however, that, although output per worker and productivity are higher in enterprises in higher income states, production is more capital intensive in lower income states. Moreover, wage rates are significantly higher in quadrant-two states than in quadrant-one states. Both suggest that the labor market might be most flexible in quadrant one states than in quadrant-two states- a suggestion that is born out by matching differences between the two states in terms of the ratings of labor regulation as a constraint to business growth by respondents to the FACS survey.

The patterns in business growth that we see in Figure 3a are also consistent with what we should expect given our state grouping criteria. Average business sales growth rates in low-income low-growth states were less than half of those of enterprises in high growth states. This pattern holds up when we measure growth in terms of fixed assets (Figure 3b) rather than sales. One major reason for the pattern is that gross fixed investment rates were consistently lowest in low-income low-growth states than in the higher growth states of both quadrant I and quadrant II (Figure 3c). A second reason into the details of which we will not go here is that enterprise productivity growth rates were also consistently and significantly lower in low-income low-growth states than in high-growth states (Honorati and Mengistae, 2007b).

These patterns seem to suggest that, over all, the policy and institutional environment of quadrant I and quadrant II states might be more conducive to business growth than that in quadrant III states, or 'lagging regions'. We see from Table 1 that this is indeed the case in terms of the incidence of corruption as our proxy for the quality of property rights institutions, and our indicators of the state of power supply and indicators of two

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[2] The difference between the classification in Puriefied (2006) and ours here is that we are using more recent data, and consequently arrive at a slightly different grouping compared to hers.

contracting institutions that the literature identifies to be of particular importance to the performance of Indian industry, namely, labor regulation, the financial system.

The table is based on an item in the instruments of the 2002 and 2005 waves of the FACS survey that asked enterprise managers to rate problems in some 20 different elements of their business environment as constraints to their growth and operations on the following scale: 0=no obstacle, 1= minor obstacle, 2=moderate obstacle, 3=major obstacle, and 4=very sever obstacle. We show in Figure 4 the percentage of respondents that reported problems with each aspect to be a significant obstacle, that is, rated the aspect at scale 2 or higher as a constraint, over the full sample pooled across states, but for each survey wave separately. Although there are sizeable differences between states in terms of the relative importance of any particular element, it is safe to say that corruption, power shortages, access to finance, and labor regulation are rated in both waves among the top 5 or 6 constraints in all states without exception.

Ideally one would seek to identify the effects of all potential growth bottlenecks rated by a significant proportion of respondents in the context of the growth equation we have estimated. Unfortunately the effects of some of the constraints rated by survey respondents could not by identified with the data at hand for lack of instruments. In particular we cannot identify the effects of problems of tax administration, tax rates, crime and crime and violence.[3]

As Figure 4 and table 1 indicate, labor regulation is regarded as a significant growth constraint by a sizeable proportion of businesses in both waves. Although this proportion decreased between the two waves of the survey for the full sample, the decline is confined to high growth states (table 1). More significantly, labor regulation is rated as an obstacle by a large proportion of businesses in all state groups, the proportion being twice as large in high-growth states as it is in low growth states. Turning to power shortages, twice as many businesses rate it as an obstacle to growth as those who rate labor regulation in the same way. Unlike labor regulation, power shortages do not seem to have weakened as an obstacle to growth between the two waves if we measure the strength of an obstacle by the proportion of those who report it as such. But, again this conceals the diversity of the situation across states. In fact a smaller proportion of businesses in high-growth states complained about power shortages in the 2005 than did in the same states in the 2002 wave. On the other hand, things seem to have worsened in low growth states in the sense of more businesses complaining about shortages there in 2005 than did in 2002.

About a quarter of enterprises surveyed in 2002 rated problems of access to finance as a moderate to very severe obstacle over the all India sample. This dropped steeply in the 2005 wave, but mainly on account of sharp falls in the proportion reporting the problem

[3] Another potentially strong bottleneck to industrial growth that did not turn out to be statistically significant in our investment regression is access to land, which comes out as major factor in McKinsey (2001).

in high income states. In contrast, the proportion of who complained about poor access to finance nearly doubled between the two waves in low-income states, including high growth ones as well as low-growth states.

The proportion of those who complained against corruption was comparable to those who complained against power shortages. At the same time it was far higher than those who complained against labor regulation or access to finance. This is very much in line with our designation of corruption as proxy for the quality of property rights institutions and our interpretation of the link between the latter and the power shortage problem in India. Nearly 40 percent of enterprises in the 2002 wave reported corruption as a moderate to severe obstacle to their growth over the full sample. This too dropped sharply in the 2005 wave, mainly on account of fall in the proportion in quadrant I states. The reduction in quadrant III states was also substantial. The proportion did increase, however, in quadrant II states, and quite drastically.

When managers rate corruption as an obstacle to the growth of their businesses, they usually have in mind payment of bribes as speed money or for access to services and markets. Complaints about access to finance refer to inability to borrow at the going interest rate due to non-price barriers such as high collateral requirements and too much hassle and unpredictability in loan processing. When they complain about labor regulation they often have in mind restrictions on hiring and firing practices including restrictions on the hiring of casual or temporary labor. Indeed, the proportion of businesses that cited restrictions on hiring and firing decisions in the 2005 wave was almost as large as the proportion rating labor regulation as an obstacle to growth (table 2). When rating power shortage as a constraint people would seem to consider, not only the frequency and unpredictability of power outages and the loss in revenue these entail, but also the cost of generators that businesses have to run as a way of coping with outages. Thus more than 60 percent of businesses in the 2002 wave run their own generators which accounted for nearly a fifth of the electricity they needed (table 3). Although the proportion of business running generators decreased substantially by 2005, the share of own generated electricity actually went up both over the full sample and across state groups, which is consistent with the fact that the proportion of businesses rating power shortages as a growth constraint did not fall between the two waves.

Table 4 provides selected objective indicators of the problems behind managers' ratings of labor regulation, power shortages, access to finance and corruption as constraints to growth as summarized in table 1. The indicators are the frequency of inspection visits that labor officials make to factory floors for labor regulation, the percentage of reported revenue loss due to power outages for power shortages, availability of bank overdraft facility for access to finance, and whether or not a business pays bribes to get things done for corruption. The picture that this table draws of variation in each constraint across state groups is strikingly similar to that we get from table 1. In particular, labor regulation appears to be more widespread or stronger in quadrant I states than in quadrant III states, but the relative position of the two groups of states reverses when it comes to power shortages. Corruption seems to be a more severe or more widespread problem in quadrant III states than in quadrant I states, as seems to be poorer access to finance.

In the business investment equations we will estimate in section 3, we chiefly rely on subjective ratings as regressors, the main exception being that we use hard financial data as indicators of problems of access finance. Part of the reason for this is that they are faithful to the picture provided by objective indicators such as those given in table 4. Part is that survey response rates happen to be much higher for questions inquiring about subjective ratings compared to those asking for objective indicators. We therefore obtain more reliable impact estimates and make more reliable inferences than could be possible if we worked exclusively with data on objective indicators. We offer more formal evidence of the faithfulness of subjective ratings to objective indicators in table 5, which shows marginal effects obtained from the estimation of a probit models of a firm identifying labor regulation, power shortages, poor access to finance or corruption as constraints to its growth. In relating a rating to an objective indicator we control in each case for line of business, state of location, year of observation, and the size and age of the business. Given all of these, the probability that a business rates labor regulation as a constraint increases significantly with the number of labor inspection visits it gets per year. Reported sales loss due to power outages is a significant predictor of the rating of power shortages in the same sense, as is the payment of bribes of the rating of corruption as an obstacle to growth.

Before turning to a formal assessment of the effect of our institutional variables on business growth, we note again that, on average, businesses grow faster in quadrant one states than in quadrant II states, and in the latter than in quadrant III states. Although our hypothesis is that better institutional quality or better business environment would mean higher average business growth, our institutional indicators do not map into our development categories of states as neatly as this might suggest. Specifically we cannot say that high-income states score better on the average than low-income states on all four of our indicators, just as we cannot say that high-growth states have a better business environment in all respects than low-growth states. We can nonetheless say that, on the whole, the institutional environment of quadrant I states (or advanced regions) is significantly better than that of quadrant III states (or lagging regions). The only qualification to this statement is that labor regulation is less of a problem in quadrant III states than it is in quadrant I states on the subjective as well as objective indicators of it that we report in tables 3 and 4 respectively. On the other hand, both the subjective indicators of table 3 and the objective indicators of table 4 indicate that the business environment of quadrant I states is better in all the other three areas. In particular both indicators suggest that corruption is a more serious problem in quadrant III states than it is in quadrant I states. This has to be seen in the light of greater importance we attach to corruption than we do to labor regulation or the other two indicators in the light of our interpretation of the incidence of corruption as a proxy for the quality of property rights institutions, and the latter's primacy over contract institutions as determinants of long run economic outcomes. Both power shortages and problems of access to finance are also more severe in quadrant III states than in quadrant I states (table 3), again on subjective as well as subjective indicators (table 4).

3. Empirical framework

We use as our basic testing framework the structural dynamic investment equation of Bond and Meghir (1994), which extends the Euler equation of a neoclassical model of investment under symmetric (quadratic) adjustment costs to the possibility of liquidity constraints arising from differences in cost between internal finance and external finance in general and debt finance in particular. Such differences could arise from, for example, bankruptcy costs or the differential taxation of income from equity and interest income. It could also arise from credit rationing by relatively uninformed lenders. Bond and Meghir (1994) show that the Euler equation for firm investing under no financial constraints leads to an estimable investment equation of the form

$$\left(\frac{I}{K}\right)_{i,t} = \beta_1\left(\frac{I}{K}\right)_{it-1} - \beta_2\left(\frac{I}{K}\right)^2_{it-1} - \beta_3\left(\frac{\Pi}{K}\right)_{it-1} + \beta_4\left(\frac{Y}{K}\right)_{it-1} - \beta_5\left(\frac{D}{K}\right)^2_{it-1} + d_t + \eta_i + \upsilon_{i,t} \quad \text{-------(1)}$$

where K_{it} is capital stock of business i at the end of fiscal year t ; I_{it} is i 's fixed investment in year t ; Π is annual gross profits, Y is annual sales,; D is long term liabilities; d_t and η_i are unobserved time effects and firm effects, which, between them, capture the user cost of capital; υ_{it} a forecast error uncorrelated with any of the other right-hand side variables; and β_j 's are parameters assumed to be constant across firms and over time. The Euler equation underlying this investment function fully incorporates the firm's expectations of future profitability, these being captured by one-step-ahead investment forecast. There is therefore no reason why more profitable firms should invest more as long as the marginal cost of internally financing the investment is the same as the marginal cost of external finance. Indeed, in the absence of financial constraints to investment, the model implies that $\beta_3 > 0$ so that the coefficient of the profitability term, $(\Pi / K)_{it-1}$, is negative. The sign configuration of the rest of the parameter set in the absence of financial constraints is $\beta_1, \beta_2, \beta_4, \beta_5 \geq 0$. The term $(Y / K)_{it-1}$ arises from the assumption of product market imperfection so that the price elasticity of product demand is finite. The coefficient of this term, β_4 , decreases in the price elasticity of demand and is consequently smaller in more competitive industries, as do the absolute values of the coefficients of $(\Pi / K)_{it-1}$ and $(D / K)^2_{it-1}$. The absolute value of each of the three financial variables $(\Pi / K)_{it-1}$, $(D / K)^2_{it-1}$, $(Y / K)_{it-1}$ also decease in decease in adjustment costs (that is in the output foregone in the process of installing the additional productive capacity) but increases in cost of long term borrowing. The absolute value of the coefficient of each of the rate of investment terms $(I / K)_{it-1}$ and $(I / K)^2_{tt-1}$ also increases in the cost of long term borrowing (while decreasing in the rate of depreciation).

Equation (1) subsumes a key variable of the neoclassical model of investment in the error component $d_t + \eta_i$. This is the user cost of capital, which in turn is an increasing function of the relative price of capital goods, the cost of long term borrowing and the rate of depreciation of capital stock. The coefficient of the user cost of capital in the fully spelt out specification being negative, an increase in any of these would reduce the current rate of investment $\left(I / K\right)_{it}$.

Assuming that (1) is the correct specification of the investment decision of firms in our sample, the role of any one of our four business environment variables on the rate of investment can be assessed by looking at the sign and magnitudes of our estimates of the coefficient of $\left(\Pi / K\right)_{it-1}$. Under the assumptions of the model, a statistically significant but negative value of this coefficient or a zero value for the same would suggest that access to finance is not an important factor in investment decisions. If in fact the coefficient is positive (and statistically significant), a higher magnitude of the coefficient would suggest greater importance of access to finance as a determinant of the rate of investment. There are at least three possible ways in which the role of the other three business environment variables, namely, corruption, labor regulation, and power shortages, could be assessed in the framework of equation (1). One is through their potential association with product market structure. It is possible that corruption or labor regulation raise entry barriers to industry which in turn could reduce investment through it effect on the coefficient of the accelerator term $\left(Y / K\right)_{it-1}$. A second is through the use-cost of capital embedded in $d_t + \eta_i$. For example, power shortages could raise user cost by leading to higher relative prices of capital goods, while corruption could have a similar effect by increasing the cost of borrowing. Thirdly, to the extent that corruption could tax interest income from income from equity or raise the cost of bankruptcy, it could reinforce the very force that generates a credit constraint to the investment process. In other words, the sensitivity of investment to profitability and indebtedness could depend on the magnitude of corruption in the economy. Finally, corruption, labor regulation, or power shortages could also influence investment through a second mechanism that again has been consigned to the error term in equation (1) but is a core topic in the investment literature, namely, uncertainty. Rate of return or demand uncertainty reduces investment if the latter is irreversible or is made under risk aversion.

An error correction specification

The suppression of the irreversibility of investment is a major simplification of the Bond-Meghir model underlying equation (1) and the symmetric quadratic adjustment costs that it assumes. While this has to be seen against the model's advantage of providing a structure for identifying the effect of financial factors on firm's investment decisions, it also means that the robustness of the results thereof to the removal of the simplification has to be assessed. Bond et al. (2003) propose as vehicle for such a robustness check on the estimation of a reduced form error correction model of investment the functional form of which can be chosen on empirical grounds rather than from an underlying optimization structure. Also on empirical grounds one can include in the specification the very variables the effects of which on investment we seek to identify based on equation (1). A relationship between investment and a financial or institutional variable that one detects based on the estimation of equation (1) would seem to be robust to departures from the assumptions underlying that equation if the relationship also holds under the estimated error correction specification.

The particular specification used in Bond et al. (2003) assumes profit maximizing production under a constant returns CES technology of elasticity of substitution parameter σ. Let y_{it}, be the log of annual output, and k_{it} the log of the capital stock that the firm would like to maintain in the long run, that is, the firm's desired capital stock. Then $k_{it} = \delta_i + y_{it} - \sigma J_{it}$, where J_{it} is the user cost of capital and δ_i is a firm specific parameter of production technology or product demand. The desired capital stock increases in current output but decreases in the user cost of capital and the elasticity of substitution of labor for capital, σ, and in the user cost of capital and, through it, in the cost of borrowing, the relative price of capital goods and the rate of depreciation. Because of the presence of adjustment costs the firm rarely attains the desired capital stock. The observed capital stock sometimes overshoots and sometime falls below the desired level. An estimable error correction specification of the investment function is arrived at by assuming that the observed capital stock is a fixed proportion of the desired stock. To arrive at their specification, Bond et al. (2003) further assume that observed capital stock follows a second order autoregressive distributed lag model so that

$k_{it} = \alpha_1 k_{it-1} + \alpha_2 k_{it-2} + b_0 y_{it} + b_1 y_{it-1} + b_2 y_{it-2} + \omega_{it}$, where ω_{it} is an error term incorporating the user cost term σJ_{it} and in δ_i. Taking the first difference and imposing the restriction that long run elasticity of capital with respect of output is unity leads to the error correction capital stock growth equation

$$\Delta k_{it} = \lambda_1 \Delta k_{it-1} + \lambda_2 \Delta y_{it} + \lambda_3 \Delta y_{it-1} - \lambda_4 (k_{it-2} - y_{it-2}) + c_t + u_i + \varepsilon_{it} \ldots \qquad (2)$$

where $\lambda_1 = \alpha_1 - 1$, $\lambda_2 = b_0$, $\lambda_3 = b_0 + b_1$, $\lambda_4 = 1 - \alpha_1 - \alpha_2$, and $c_t + u_i$ sums terms in δ_i and σJ_{it} and lags there of, and ε_{it} is a zero mean error term orthogonal to all other right hand side variables.[4] The restriction of the unitary elasticity of capital stock with respect of output implies that $\lambda_4 > 0$ so that the coefficient of the error correction term $(k_{it-2} - y_{it-2})$ is negative, meaning that there would be positive investment whenever capital stock falls short of the desired level while excess capital stock would prompt the firm to sell off assets.

We have incorporated institutional variables into equation (2) in the same way as we inserted them in equation (1). The best way of using equation (2) to assess the effect of the access to finance on the rate of investment seems to append the very financial variables of equation (1). While it is not at all obvious as to what signs the coefficients assume in the framework of equation (2) we would nonetheless interpret a positive and statistically significant coefficient of lagged profitability as evidence that investment is being made under a financial constraint. Likewise positive association between the growth of capital stock and past indebtedness should indicate that investment would be higher with easier access to external finance. Keeping in line with the ADL (2,2)

[4] The unitary elasticity restriction used in obtaining (2) is $(b_0 + b_1 + b_2)/(1 - \alpha_1 - \alpha_2) = 1$.

structure of equation (1) we have included one-step and two-step lags of $(\Pi / K)_{it}$ and $(D / K)_{it}$ in the version of the equation that we actually estimate.

To assess the effects of the other three components of business environment, namely, corruption, labor regulation and power shortages, we have include indicators of each of these among the regressors of the augmented error correction model.

Neither equation (1) nor equation (2) can be estimated consistently by OLS since the lagged dependent variables in each must be correlated with unobserved firm effects of the error term of the specification being estimated. In the empirical literature on firm level investment this problem is usually addressed by using the first difference GMM estimator of Arellano and Bond (1991), which eliminates the unobserved firm effects by first differencing and using appropriately lagged values of all endogenous variables as instruments. This would provide consistent estimates as long as the error term of the levels specification is serially uncorrelated once the firm effects are removed. However, the difference GMM estimator sometime performs poorly with data exhibiting a high degree of persistence. Blundell and Bond (1998) show that when such persistence is high enough, the first difference GMM estimator could be biased in small samples since lagged values provide weak instruments in that case and propose a system GMM estimator as a solution to this problem. Essentially, the solution amounts to the use of lagged differences of endogenous variables as additional instruments over and above those of the difference estimator. It happens that our fixed assets series is characterized by a high degree of persistence. We have therefore opted for reporting the system GMM estimator to for both specifications (1) and (2) in the interest of maintaining comparability, even though our difference GMM estimates (not reported here) of the Euler equation model of gross fixed investment are not much different from the system GMM estimates.

A particular problem in our data that potentially reduces the advantages of the ADL-GMM estimation framework is that we have only two observations on each business environment variable made in two three-year intervals over the six year period covered by our production and investment series. We have sought to surmount this problem by assuming that the value of a business environment variable for a firm during a survey year is the best predictor of the true value of the same indicator for the preceding two year for which production data were collected as part of the same survey. This obviously introduces measurement error into the specifications we have estimated. It also means that the effective number of natural instruments that we have for the business environment variables in the systems GMM framework is quite limited. We have sought to address this problem by using city or location averages of institutional variables and as additional excluded instruments. The validity of location means as instruments obviously assumes that location decisions are strictly exogenous or predetermined. While this would be a questionable assumption for large businesses other studies (Dollar et al. 2005, and Lall and Mengistae, 2005) suggest that it is a reasonable vis-à-vis manufacturing SMEs in developing economies.[5]

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[5] For example, Lall and Mengistae (2005) model location decisions and enterprise productivity jointly, assuming that both depend on a common a set of institutional

4. Results

Results of the estimation of equation (1) by GMM-sys are reported in tables 7 and 8. As a check on the robustness of the results of those tables to the assumptions of the Euler equation model about adjustment costs we have also estimated equation (2) again by GMM-sys, of which the full set of results we report in tables 9, 10 and 11. The basic instruments in the estimation of the Euler equation model in tables 7 and 8 include three step and longer lags of the gross investment rate, the profit rate, the sales to capital stock ratio and the debt to fixed assets ratio as well as two step or longer lags of first differences in each of these. Corresponding lags of levels and first differences of the variables of the error correction specification constitute the basic instrument set used in tables 9, 10 and 11. In all cases city and state dummies and year dummies have been used as additional instruments. All the variables that appear in tables 7 to 11 are as defined already in this and in previous sections. The variable "constrained by power shortages'' is dummy for whether enterprise management considered problems of electricity supply as a "moderate" to "very severe' obstacles to the business' growth, where the rating phrases are as described in Section II. The variable "constrained by corruption" in tables 9 is likewise a dummy for whether management considered corruption as a "moderate" to "very severe" obstacle to business growth.

Turning to specific estimation results, we focus first on table 7, where we seek to identify the investment effects of our three 'contracting institutions' by conditioning the investment regression on the incidence of corruption, as our proxy for the quality of property rights institutions. We read three striking results from this table. One of these is that, over the full sample, the investment rate is significantly lower where labor regulation is more stringent and where power shortages are more severe. This can be seen from columns 1 and 2. Looking deeper, we see that this actually reflects what is happening in high-growth states, that is both quadrant I states and quadrant II states. The gross investment rate actually increases with the stricter labor regulation and more with the gravity of power shortages in lagging regions or quadrant III states.[6]

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variables that vary across locations, by using the identifying assumption that the location of birth of the founding entrepreneur should influence the location decisions but not the performance of businesses past a certain age. They find that the selectivity term of the productivity equation that they estimate based on the joint model is not generally statistically significant in for the 2002 wave of the FACS dataset.

[6] One possible explanation for the positive association between labor regulation and the rate of investment in lagging states is that the former encourages more capital intensive production in those states. Likewise it may be that the positive association between the rate of investment and more severe power shortages reflects that own-generation of power accounts for a significant share of fixed investment lagging regions while that is not the case in more advanced regions. In a related paper (Honorati and Mengistae, 2007a), we report that greater power shortages and stricter labor regulation both lead reduce the rate of growth of enterprise in lagging as well as advanced states. It must be, then, that both factors reduce productivity in lagging states. Honorati and Mengistae (2007b) report positive evidence that labor regulation does indeed produce decline in productivity over time.

The second striking pattern in table 7 is that the effects both of labor regulation and of power shortages increase with the incidence of corruption. Labor regulation reduces the rate of investment by a greater amount in enterprises constrained by corruption than it does for those unaffected by corruption. Likewise, corruption seems to reinforce the effect of power shortages. A hypothetical increase in power shortages would reduce the rate of investment among businesses self-reportedly constrained by corruption than it does among those unconcerned by corruption.

The third striking pattern in table 7 is the importance of access to finance to investment decisions also. It is clear from the coefficients of the profitability term that investment is constrained by cash-flow only in low-income but high-growth states. Within this group of states, investment is sensitive to cash-flow regardless of the incidence of corruption. However, the sensitivity is smaller for businesses reportedly constrained by corruption.

These patterns hold up in table 8 as well where we get back to the all-states sample to estimate the impact of three contracting institutions in pairs by conditioning the investment rate regression on the incidence of corruption and one of the contracting institution variables at once. In the first four-column panel of the table we condition the regression on various configuration of the firm being constrained by some combination of labor regulation and corruption. In the second four-column panel, we condition the regression on values of the indicators of power outages and corruption. Here also we see that greater labor regulation reduces investment by more in businesses constrained by corruption (column 6). Likewise, more severe power shortages reduce investment by more by those constrained by corruption. Also investment is constrained by cash flow only in businesses that are unconstrained by corruption or labor regulation

It turns out that the conclusions that we draw from tables 7 and 8 about the effects of corruption, labor regulation and power shortages are broadly confirmed by estimation results of the error correction model. Indeed, the only significant difference between the two sets of results seems to be that the error correction model provides what looks to be stronger evidence of investment being subject to financial constraints to the extent that lagged profitability terms are more generally positive and statistically significant. This is certainly the case in all three columns of tables 9, where the first lag of the profitability term is still negative and statistically significant as in the Euler equations specification, but the second lag is positive and statistically significant. On the other hand, the story that tables 9 tells about the role of labor regulation and power shortages is the same as that read from the previous tables. Thus it is clear from the first column of the same table that both labor regulation and power shortages represent a significant drag on investment rates. We also see from the second and third columns of the table that the same table that these effects are magnified by corruption to the extent that they are significantly larger for firms that are self reportedly constrained by corruption. Power shortages do not seem to have perceptible impact on businesses unconstrained by corruption, for which firms labor regulation is in fact associated with higher investment rates. The positive association that seems to exist in this sense between the effects of corruption on the one hand, and labor regulation and power shortages on the other, is again in line with what we read from table 7.

We do not have enough observations to replicate the estimates of tables 9 for each of the four state groups. The patterns of tables 9 hold nonetheless in the estimates that we report for high-growth high-income state group of states separately in tables 10, except for the fact that the evidence for financial constraints here is weaker. While all firms seem to be financially constrained in tables 9, investment here is subject to financial constraints only in businesses unconstrained by corruption. However, as in tables 9, both labor regulation and power shortages are stronger drags on investment for firms constrained by corruption than firms that are unconcerned about corruption.

The correlation between corruption and financial constraints to investment comes out even more strongly in tables 11, where we run the regression of the error correction model by conditioning on two of the institutional variables at once. It is clear that from this table that investment is more likely to be subject to financial constraints in firms that are unconstrained by corruption (cols. 3, 4, 7, 8). As in the previous tables, the reductions in investment due to labor regulation or power shortages are stronger for firms constrained by corruption (cols. 1, 2, 5 and 6).

Given our interpretation of corruption as a proxy for the quality of property institutions in general, and of labor regulation and (external) business finance as instances of contracting institutions, the correlation between the investment effects of the latter two factors with the incidence of corruption that we just described is consistent with the Acemolu-Johnson hypothesis that property rights institutions are of stronger influence on long term growth than contracting institutions. Also consistent with the same thesis is the result that the investment effect of power shortages also depends on the incidence of corruption. Only the relationship here is even more direct. This is because, while the persistence of power shortages reflects a failure of contracting institutions, the problem also has a property rights dimension in that shortages arise from a) excessive transmission and distribution losses-largely because of theft; and b) that too many households are not paying their electricity bills to the power companies. Ultimately these two circumstances signify insecurity property rights in power industry, as does, the government's long standing policy of cross subsiding household consumption through high tariffs on industry. The shortages can be traced to the underinvestment in generation and distribution and transmission capacity resulting from the financial losses of power companies caused by these instances of failure of property rights institutions.

5. Summary and conclusion

Based on the analysis of data from the FACS survey of the World Bank and the Confederation of Indian Industry, this paper has offered a quantitative assessment of the effects of corruption, labor regulation, access to finance and the quality of power supply on investment decisions of manufacturing SMEs in India. All four factors are highly rated by business managers as obstacles to business operations and business growth almost in every state covered by the survey. The ratings are backed up by data on objective indicators of the incidence of corruption, the intrusiveness of labor regulation, the costliness of power shortages and the quality of access to formal external finance. India's states vary enormously on all these indicators just as they do in per capita incomes and in terms of growth performance.

Businesses are most productive on average in what we have classified as high-income and high-growth states (or"quadrant-1 states"), but least productive in low-income low-growth states ("quadrant-3 states'). Businesses in low-income high-growth states (or 'quadrant-2 states') capture the middle ground in terms of productivity. Business growth rates are also much higher in high-growth states than in low-growth rates. This is because business investment rates and TFP growth rates are higher in high-growth rates. The paper has shown that, although these patterns in business performance rates do not map neatly into a pattern whereby the better performing states are also better in every important aspect of the institutional environment. It remains to be the case, though, that low-income low-growth states have the worst indicators of all four institutional variables except one, namely, labor regulation. Corruption appears to be most prevalent in those states while the cost of power outage and poorer access to finance are also highest for the same group of states.

In order to assess the role of the four institutional variables in the performance gaps between the four groups of states, we have estimated on the FACS survey sample a dynamic structural business investment equation for each group. Our estimates show that, over the full sample, excessive labor regulation and power shortages significantly reduce the average enterprise fixed investment rate. There is also evidence that fixed investment is constrained by access to finance in low-income but high-growth states. Although there are some nuances to it is also always the case that labor regulation, power shortages and access to finance influence the rate of fixed investment in ways that crucially depend on the incidence of corruption.

We interpret the result that excessive regulation, power shortages and problems of access to finance are significant influences on business investment rates as an instance of the importance of 'contracting institutions' in the current performance of India's manufacturing industries. We have also argued that corruption is a good enough proxy for the quality of property rights institutions in general. Our result that those effects depend on the incidence of corruption would then be consistent with the Acemoglu-Johnson thesis of the primacy of property rights institutions over contracting institutions in investment outcomes.

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Table 1. Percent of reporting factor as significant constraint to business growth

Proportion of those constrained by	Panel firms			All firms		
	2001	2004	Δ(04-01)	2001	2004	Δ(04-01)
Labor regulation						
Low income states:						
Low growth	0.09	0.10	0.01	0.07	0.09	0.02
High growth	0.23	0.21	-0.02	0.28	0.21	-0.07
High income states:						
Low growth	0.12	0.22	0.10	0.15	0.24	0.09
High growth	0.19	0.13	-0.07	0.19	0.13	-0.06
Total	0.17	0.14	-0.03	0.17	0.14	-0.03
obs.	1042	1173		1972	2274	
Power shortages						
Low income states:						
Low growth	0.54	0.55	0.02	0.47	0.61	0.14
High growth	0.18	0.15	-0.03	0.16	0.28	0.12
High income states:						
Low growth	0.24	0.41	0.17	0.24	0.36	0.12
High growth	0.27	0.20	-0.07	0.27	0.24	-0.03
Total	0.30	0.30	0.00	0.29	0.36	0.07
obs.	1050	1174		1981	2279	
Access to finance						
Low income states:						
Low growth	0.11	0.29	0.18	0.07	0.25	0.18
High growth	0.15	0.29	0.14	0.11	0.23	0.12
High income states:						
Low growth	0.27	0.20	-0.06	0.18	0.12	-0.06
High growth	0.31	0.13	-0.17	0.23	0.11	-0.13
Total	0.25	0.19	-0.06	0.17	0.16	-0.01
obs.	1177	1177		1981	2279	
Corruption						
Low income states:						
Low growth	0.43	0.36	-0.08	0.39	0.30	-0.08
High growth	0.21	0.33	0.12	0.33	0.34	0.01
High income states:						
Low growth	0.35	0.32	-0.03	0.37	0.35	-0.01
High growth	0.41	0.21	-0.20	0.39	0.23	-0.16
Total	0.39	0.27	-0.13	0.38	0.28	-0.10
obs.	1050	1174		1978	2279	

Table 2 . Aspects of labor regulation, 2005

	Proportion facing cost/restriction of dismissal	Proportion of facing restrictions on casual labor	Proportion facing restrictions on hiring temporary workers
Low income states:			
Low growth	0.10	0.11	0.06
High growth	0.26	0.20	0.13
High income states:			
Low growth	0.07	0.06	0.05
High growth	0.11	0.10	0.10
Total	0.13	0.11	0.09
obs.	2267	2271	2270

Table 3. Coping with power shortage

	Panel firms			All firms		
	2001	**2004**	**Δ(04-01)**	**2001**	**2004**	**Δ(04-01)**
Proportion owning generator:						
Low income states:						
Low growth	0.56	0.58	0.02	0.56	0.56	-0.01
High growth	0.56	0.51	-0.05	0.56	0.39	-0.17
High income states:						
Low growth	0.44	0.33	-0.11	0.42	0.30	-0.13
High growth	0.68	0.59	-0.08	0.70	0.59	-0.11
Total	0.61	0.55	-0.07	0.62	0.52	-0.10
obs.	1011	1141		1759	2219	
Electricty from own generator (%)						
Low income states:						
Low growth	16.68	21.09	4.41	16.56	26.89	10.32
High growth	21.57	24.10	2.53	22.50	19.60	-2.90
High income states:						
Low growth	12.64	19.29	6.64	11.72	22.47	10.75
High growth	19.81	18.08	-1.73	21.40	19.57	-1.83
Total	18.23	19.25	1.01	18.97	21.90	2.93
obs.	1011	608		1759	1126	

Table 4. Selected business environment indicators

	Panel firms			All firms		
	2001	2004	Δ(04-01)	2001	2004	Δ(04-01)
Labor inspection visits per year						
Low income states:						
Low growth	1.20	1.65	0.45	1.09	1.41	0.32
High growth	1.11	1.61	0.50	1.02	1.55	0.53
High income states:						
Low growth	0.95	1.06	0.10	1.28	1.04	-0.24
High growth	2.22	2.15	-0.07	2.08	1.91	-0.17
Total	1.69	1.85	0.16	1.61	1.62	0.01
obs.	583	1101		1073	2157	
Sales lost to outages (%)						
Low income states:						
Low growth	15.91	8.04	-7.87	13.77	11.47	-2.29
High growth	5.66	3.39	-2.27	6.30	4.83	-1.47
High income states:						
Low growth	7.21	5.41	-1.79	7.49	5.78	-1.70
High growth	7.65	6.21	-1.44	8.29	6.47	-1.82
Total	8.97	6.39	-2.58	8.89	7.78	-1.11
obs.	926	822		1780	1674	
Proportion with overdraft facility						
Low income states:						
Low growth	0.45	0.48	0.03	0.43	0.41	-0.02
High growth	0.63	0.58	-0.06	0.57	0.55	-0.02
High income states:						
Low growth	0.55	0.53	-0.02	0.55	0.48	-0.07
High growth	0.65	0.66	0.00	0.62	0.60	-0.01
Total	0.60	0.60	-0.01	0.57	0.53	-0.04
obs.	1041	1174		1976	2282	
Proportion reporting payment of bribes						
Low income states:						
Low growth	0.58	0.72	0.14	0.56	0.51	-0.06
High growth	0.46	0.46	-0.01	0.45	0.44	-0.01
High income states:						
Low growth	0.78	0.47	-0.31	0.75	0.40	-0.35
High growth	0.67	0.55	-0.12	0.62	0.51	-0.11
Total	0.66	0.57	-0.09	0.62	0.49	-0.14
obs.	906	1169		1740	2269	

Table 5. Objective vs. Subjective Indicators

	Probit Estimates - Marginal effects			
	Labor regulation is an obstacle	Power shortage is an obstacle	Poor access to finance is as an obstacle	Corruption is an obstacle
Number of labor inspections	0.052*			
	(0.012)			
Business age	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Log employment	0.002	0.022*	0.007	-0.006
	(0.007)	(0.008)	(0.007)	(0.007)
Located in a big city	0.009	-0.081**	-0.006	0.043
	(0.031)	(0.034)	(0.033)	(0.029)
% sales lost because of power outages		0.009*		
		(0.001)		
Share of external finance			-0.001*	
			(0.000)	
Pays bribes				0.156*
				(0.017)
Dummies for Industry	yes	yes	yes	yes
Dummies for States	yes	yes	yes	yes
Dummies for Year	yes	yes	yes	yes
Observations	2,061	3,100	2,469	3,603
R-squared	0.084	0.139	0.065	0.050
note: .01 - *; .05 - **; .1 - *;**				

(Standard Errors in parentheses)

Table 6. Additional descriptve statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
All states:					
$(I/K)_t$	4976	0.04	0.11	0.00	1.00
$(Y/K)_t$	4976	2.08	1.47	0.00	9.96
$(\Pi/K)_t$	4976	0.43	0.32	-1.00	1.00
$(D/K)_t$	4976	0.64	0.59	0.00	4.93
Δk_{it}	3227	0.06	0.46	-0.98	4.92
Δy_{it}	3163	0.09	0.38	-0.99	4.83
$(k-y)_t$	3227	-0.58	0.82	-3.90	7.13
High-income high growth states:					
$(I/K)_t$	2283	0.04	0.12	0.00	1.00
$(Y/K)_t$	2283	2.14	1.41	0.00	9.96
$(\Pi/K)_t$	2283	0.46	0.31	-0.98	1.00
$(D/K)_t$	2283	0.60	0.59	0.00	4.84
Δk_{it}	1576	0.10	0.54	-0.98	4.92
Δy_{it}	1535	0.09	0.45	-0.99	4.58
$(k-y)_t$	1576	-0.64	0.79	-3.90	7.13
Low-income high growth states:					
$(I/K)_t$	1253	0.05	0.12	0.00	0.97
$(Y/K)_t$	1253	2.07	1.67	0.00	9.60
$(\Pi/K)_t$	1253	0.36	0.36	-0.96	1.00
$(D/K)_t$	1253	0.77	0.69	0.00	4.93
Δk_{it}	685	0.04	0.37	-0.78	4.40
Δy_{it}	675	0.10	0.36	-0.89	4.83
$(k-y)_t$	685	-0.54	0.98	-3.10	5.87
Low-income low-growth states:					
$(I/K)_t$	960	0.03	0.10	0.00	0.88
$(Y/K)_t$	960	1.72	1.30	0.00	9.48
$(\Pi/K)_t$	960	0.39	0.31	-1.00	1.00
$(D/K)_t$	960	0.58	0.54	0.00	4.39
Δk_{it}	619	0.05	0.38	-0.93	3.40
Δy_{it}	606	0.09	0.31	-0.91	2.46
$(k-y)_t$	619	-0.34	0.77	-3.69	3.43
High-income low-growth states:					
$(I/K)_t$	480	0.02	0.06	0.00	1.00
$(Y/K)_t$	480	2.53	1.39	0.25	8.44
$(\Pi/K)_t$	480	0.55	0.20	-0.29	1.00
$(D/K)_t$	480	0.59	0.25	0.00	4.05
Δk_{it}	347	-0.09	0.21	-0.95	1.28
Δy_{it}	347	0.05	0.18	-0.52	1.64
$(k-y)_t$	347	-0.87	0.53	-2.12	1.17

Table 7.-Dynamic business investment functions: Euler equation specification, GMM-sys estimates

Dependent variable: the investment rate, $(I/K)_{it}$ Absolute value of z-statistics in parentheses * significant at 5% level; ** significant at 1% level

	All States		Constrained by corruption				Unconstrained by corruption		
	Constrained by corruption	unconstrained by corruption	High-income high- growth states	Low-income high-growth states	Low-income low-growth states	High-income low-growth states	High-income high- growth states	Low-income high-growth states	Low-income low-growth states
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$(I/K)_{it-1}$	0.946	1.136	0.829	0.768	-0.026	0.186	0.428	1.372	-0.366
	(6.95)**	(11.05)**	(7.76)**	(8.94)**	(0.30)	(5.86)**	(3.83)**	(22.14)**	(1.81)
$(I/K)^2_{it-1}$	-0.409	-1.505	-0.360	-0.103	0.628	-2.364	-0.420	-1.765	1.941
	(1.70)	(7.75)**	(2.08)*	(0.54)	(5.18)**	(10.03)**	(2.05)*	(15.40)**	(3.70)**
$(\Pi/K)_{it-1}$	-0.003	0.008	-0.014	0.028	-0.048	-0.035	0.014	0.033	0.027
	(0.28)	(0.87)	(1.35)	(1.87)	(2.72)**	(7.50)**	(1.50)	(7.55)**	(1.11)
$(Y/K)_{it-1}$	0.001	-0.000	0.001	0.010	0.045	0.006	0.000	-0.004	0.003
	(0.57)	(0.15)	(0.62)	(3.04)**	(36.97)**	(4.30)**	(0.02)	(2.18)*	(0.69)
$(D/K)^2_{it-1}$	0.002	0.000	-0.000	0.007	-0.003	-0.003	0.002	-0.002	-0.016
	(1.23)	(0.05)	(0.31)	(2.26)*	(7.57)**	(2.26)*	(0.99)	(3.40)**	(2.10)*
Constrained by power shortages	-0.026	-0.009	-0.022	-0.061	0.019	0.010	-0.018	-0.009	0.007
	(3.10)**	(1.77)	(2.39)*	(6.45)**	(1.85)	(3.42)**	(3.26)**	(0.98)	(0.32)
Constrained by labor regulation	-0.023	-0.006	-0.021	-0.007	0.019	0.007	-0.011	-0.037	0.074
	(2.87)**	(1.23)	(2.22)*	(0.71)	(2.19)*	(2.14)*	(1.98)*	(2.88)**	(4.66)**
Constant	0.045	-0.011	0.038	0.041	-0.074	-0.023	-0.005	0.008	-0.023
	(3.36)**	(1.35)	(2.77)**	(1.96)	(5.81)**	(3.23)**	(0.68)	(0.44)	(1.35)
Observations	2432	1098	1166	577	403	286	491	274	247
Businesses	1211	589	554	340	220	97	261	158	129
Overidentification test									
Chi-square	81.1	76.4	42.5	40.5	30.9	37.4	47.5	40.5	29.7
P-value	0.44	0.60	0.94	0.77	1.00	0.54	0.81	0.74	1.00
Tests for AR in first differences (z-stat):									
m1	-3.64	-2.97	-2.54	-1.77	-0.90	-2.64	-2.20	-1.46	-0.95
m2	1.81	-0.40	1.56	-1.59	0.57	-1.33	1.08	-0.48	1.03

Instruments: t-2 onward lags of the investment rate (and its square), of the profit rate, and of the ratios of sales and debt to fixed assets; one-step lags of first differences thereof;
also business age, state of location, and year of observation, lagged business envirnoment variables and city means of business envionment variables
All columns include state, year, industry dummies.

Table 8.-Labor regulation and power shortages in dynamic investment functions: Euler equation specification, GMM-sys estimates

Dependent variable: the investment rate= $(I/K)_{it}$ * significant at 5% level; ** significant at 1% level

	Labor regulation				Power shortages			
	Constrained by corruption		Unconstrained by corruption		Constrained by corruption		Unconstrained by corruption	
	Constrained by labor regulation	Unconstrained by labor regulation	Constrained by labor regulation	Unconstrained by labor regulation	Constrained by power shortages	Unconstrained by power shortages	Constrained by power shortages	Unconstrained by power shortages
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(I/K)_{it-1}$	0.795	0.877	0.304	1.363	1.261	0.756	1.064	0.899
	(8.69)**	(12.71)**	(12.44)**	(14.93)**	(14.27)**	(10.68)**	(26.82)**	(10.02)**
$(I/K)^2_{it-1}$	-0.220	-0.712	-0.192	-1.998	-0.974	-0.516	-1.502	-1.113
	(1.34)	(5.12)**	(3.72)**	(11.97)**	(7.07)**	(2.77)**	(18.22)**	(6.43)**
$(\Pi/K)_{it-1}$	-0.002	0.029	0.027	-0.007	0.009	-0.043	-0.004	0.027
	(0.19)	(3.79)**	(9.68)**	(2.48)*	(1.04)	(3.55)**	(0.87)	(3.55)**
$(Y/K)_{it-1}$	0.005	-0.001	-0.004	0.004	-0.000	0.016	0.007	-0.003
	(2.09)*	(0.29)	(6.04)**	(1.96)*	(0.12)	(5.18)**	(8.16)**	(1.06)
$(D/K)^2_{it-1}$	-0.001	0.004	-0.002	-0.001	0.003	-0.001	-0.001	-0.001
	(1.06)	(3.90)**	(2.72)**	(1.30)	(2.23)*	(0.39)	(1.28)	(0.59)
Constrained by power shortages	-0.002	-0.027	0.005	-0.008				
	(0.23)	(3.92)**	(1.64)	(1.23)				
Constrained by labor regulation					-0.002	-0.023	0.004	-0.012
					(0.42)	(2.25)*	(0.95)	(1.91)
Constant	-0.000	0.008	0.011	0.007	-0.016	-0.007	-0.015	-0.018
	(0.03)	(0.85)	(1.44)	(0.80)	(1.80)	(0.59)	(3.43)**	(1.85)
Observations	1607	825	427	671	1851	581	677	421
Businesses	864	442	226	381	965	323	360	247
Overidentification test								
Chi-square	78.2	79.7	67.6	61.0	82.0	78.8	100.0	55.8
P-value	0.54	0.40	0.71	0.92	0.50	0.25	0.05	0.87
Tests for AR in first differences (z-stat):								
m1	-2.32	-3.21	-1.35	-2.40	-3.26	-2.62	-2.66	-1.54
m2	1.12	1.55	0.39	0.10	1.62	0.65	-0.62	0.73

Instruments: t-2 on ward lags of the investment rate (and its square), of the profit rate, and of the ratios of sales and debt to fixed assets; one-step lags of first differences thereof; also busines age, state of locttion and year of observation, lagged business envionment variables, and city means of business environment variables
All columns include state, year and industry dummies.

Table 9.-Dynamic business investment functions: error correction specification

GMM-sys estimates; all states, by assesment of corruption as a constraint to growth

Dependent variable: annual growth in fixed capital stock= Δk_{it}

	All businesses (1)	Businesses constrained by corruption (2)	Businesses unconstrained by corruption (3)
Δk_{it-1}	-0.015	-0.051	0.013
	(1.11)	(3.74)**	(0.85)
Δy_{it}	0.573	0.692	0.416
	(7.34)**	(9.34)**	(10.79)**
Δy_{it-1}	0.069	-0.030	0.084
	(1.96)	(0.73)	(3.09)**
$(k - y)_{t-2}$	-0.092	-0.152	-0.044
	(3.01)**	(4.92)**	(1.93)
$(\Pi / K)_{it-1}$	-0.276	-0.429	-0.397
	(2.88)**	(4.14)**	(6.39)**
$(\Pi / K)_{it-2}$	0.167	0.163	0.380
	(1.82)	(1.77)	(5.95)**
$(D / K)_{it-1}$	-0.085	0.046	-0.149
	(2.00)*	(0.81)	(7.75)**
$(D / K)_{it-2}$	0.137	0.006	0.197
	(3.72)**	(0.11)	(8.45)**
Constrained by power shortages	-0.174	-0.273	0.005
	(3.45)**	(5.17)**	(0.22)
Consrained by labor regulation	-0.105	-0.085	0.074
	(2.29)*	(1.55)	(3.20)**
Constrained by corruption	0.067		
	(1.09)		
Observations	1509	1021	488
Number of businesses	1018	719	373
Overidentification test:			
Chi-square	89.6	95.2	79.0
P-value	0.10	0.41	0.22
AR in first dif. error (z-stat):			
m1	-5.51	-4.76	-3.06
m2	0.09	-0.16	0.87

Absolute value of z-statistics in parentheses * significant at 5% level; ** significant at 1% level

All columns include state, industry and year dummies

Instruments: t-2 onward lags of growth rate of capital stock, growth rate of sales sales, and profitiability and indebtedness; one-step lags of first differecnes thereof; also lagged business envorinment indicators, state of location, year of observation, lagged business environment variables, and city means of business enviroment variables.

Table 10.-Dynamic business investment functions: error correction specification,
GMM-sys estimates; all state groups and assesment of corruption as a constraint to growth

Dependent variable: annual growth in fixed capital stock= Δk_{it}

	Businesses constrained by corruption		Businesses unconstrained by corruption
	High-income high- growth states	Low-income high-growth states	High-income high- growth states
	(1)	(2)	(3)
Δk_{it-1}	-0.210	0.080	-0.025
	(1.57)	(6.88)**	(3.76)**
Δy_{it}	0.480	0.496	0.639
	(6.16)**	(16.43)**	(43.78)**
Δy_{it-1}	-0.043	-0.087	0.049
	(1.11)	(7.23)**	(6.91)**
$(k-y)_{t-2}$	-0.022	-0.191	-0.258
	(4.50)**	(7.80)**	(15.82)**
$(\Pi / K)_{it-1}$	-0.104	-0.187	-0.569
	(1.63)	(6.67)**	(14.17)**
$(\Pi / K)_{it-2}$	-0.007	-0.177	0.318
	(0.10)	(6.81)**	(7.46)**
$(D / K)_{it-1}$	-0.035	0.294	-0.150
	(0.42)	(8.44)**	(24.15)**
$(D / K)_{it-2}$	0.014	-0.194	0.092
	(0.20)	(5.66)**	(12.78)**
Constrained by power shortages	-0.196	-0.006	-0.089
	(3.36)**	(0.26)	(4.82)**
Consrained by labor regulation	-0.312	0.083	0.019
	(4.10)**	(4.00)**	(1.17)
Observations	503	175	241
Number of businesses	339	91	173
Overidentification test:			
Chi-square	73.7	51.0	66.2
P-value	0.09	0.14	0.2
AR in first dif. error (z-stat):			
m1	-3.52	-1.65	-2.41
m2	-0.32	-1.08	-0.61

Absolute value of z-statistics in parentheses All regressions include state, and industry dummies
* significant at 5% level; ** significant at 1% level
Instruments: t-2 onward lags of growth rate of capital stock, growth rate of sales sales,
and profitability and indebtedness variables, year of observation, state, business age, lagged business environment
variable and city means of business evironment variables

Table 11.-Labor regulation and power shortages in dynamic investment functions: error correction model of captial stock, all state, GMM-sys estimates

Dependent variable: annual growth in fixed capital stock= Δk_{it} Absolute value of z-statistics in parentheses * significant at 5%; ** at 1%

	Labor regulation				Power shortages			
	Constrained by corruption		Unconstrained by corruption		Constrained by corruption		Unconstrained by corruption	
	Constrained by labor regulation (1)	Unconstrained by labor regulation (2)	Constrained by labor regulation (3)	Unconstrained by labor regulation (4)	Constrained by power shortages (5)	Unconstrained by power shortages (6)	Constrained by power shortages (7)	Unconstrained by power shortages (8)
Δk_{it-1}	-0.040	-0.014	-0.012	-0.109	-0.057	0.005	-0.122	-0.044
	(3.12)**	(1.67)	(1.27)	(7.14)**	(3.68)**	(0.68)	(7.71)**	(10.03)**
Δy_{it}	0.672	0.420	0.551	0.771	0.567	0.236	0.715	0.502
	(13.15)**	(5.13)**	(18.82)**	(32.11)**	(10.45)**	(5.71)**	(35.66)**	(17.63)**
Δy_{it-1}	-0.085	0.045	0.040	0.080	-0.093	-0.046	0.164	-0.012
	(2.48)*	(2.64)**	(5.90)**	(3.40)**	(3.16)**	(3.55)**	(10.14)**	(2.60)**
$(k - y)_{t-2}$	-0.171	-0.091	-0.338	-0.062	-0.041	-0.153	-0.060	-0.257
	(4.74)**	(5.77)**	(9.90)**	(4.21)**	(2.87)**	(5.03)**	(3.48)**	(10.69)**
$(\Pi / K)_{it-1}$	-0.305	-0.011	-0.655	-0.434	-0.168	-0.270	-0.469	-0.453
	(3.64)**	(0.28)	(17.66)**	(16.81)**	(2.06)*	(3.30)**	(11.66)**	(9.46)**
$(\Pi / K)_{it-2}$	0.194	-0.154	0.163	0.465	0.219	-0.013	0.499	0.165
	(2.51)*	(4.63)**	(4.66)**	(14.63)**	(4.15)**	(0.25)	(13.60)**	(4.22)**
$(D / K)_{it-1}$	0.031	0.017	0.077	-0.086	-0.119	-0.139	-0.164	-0.105
	(0.42)	(0.60)	(1.54)	(7.15)**	(2.78)**	(2.27)*	(16.58)**	(4.04)**
$(D / K)_{it-2}$	-0.077	0.037	-0.186	0.132	0.173	0.102	0.164	0.115
	(1.06)	(1.82)	(3.06)**	(14.35)**	(2.12)*	(1.84)	(16.25)**	(5.60)**
Constrained by power shortages	-0.212	-0.162	-0.152	-0.017				
	(4.06)**	(5.05)**	(5.65)**	(0.78)				
Consrained by labor regulation					-0.025	-0.128	0.132	0.050
					(0.70)	(2.62)**	(8.00)**	(2.46)*
Observations	674	347	207	281	779	242	308	180
Number of businesses	504	255	159	219	560	190	242	135
Overidentification test Chi2:	76.9	79.4	53.3	78.8	98.3	49.3	78.1	54.9
P-value	0.30	0.11	0.80	0.10	0.02	0.79	0.13	0.76
AR in first dif. error (z-stat):m1	-3.55	-3.55	-2.04	-2.12	-3.55	-2.68	-2.66	-0.65
m2	-0.15	0.84	-1.39	-0.68	0.12	0.45	-0.89	-1.71

Instruments: t-2 onward lags of growth rate of capital stock, growth rate of sales sales, and profitability and indebtedness ratios also lagged business envorinment indicators; also state of location, year of observation, lagged business environment variables, city means of business environment variables.

All columns include industry, state and year dummies.

Figure 1:

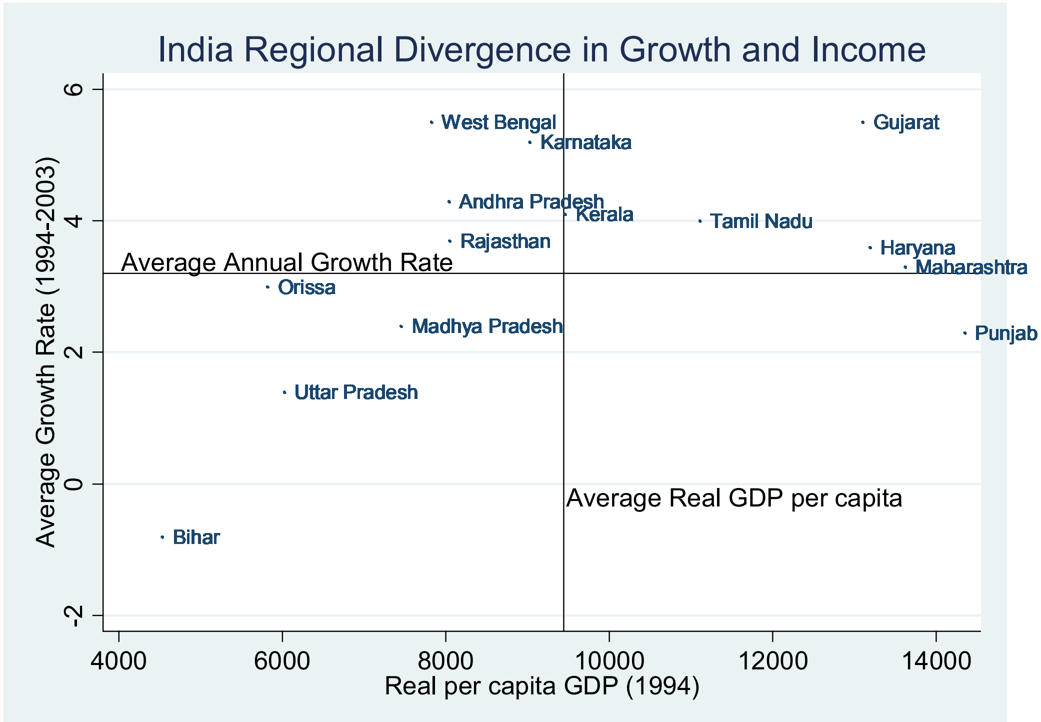

Figure 2: Manufacturing productivity by state groups

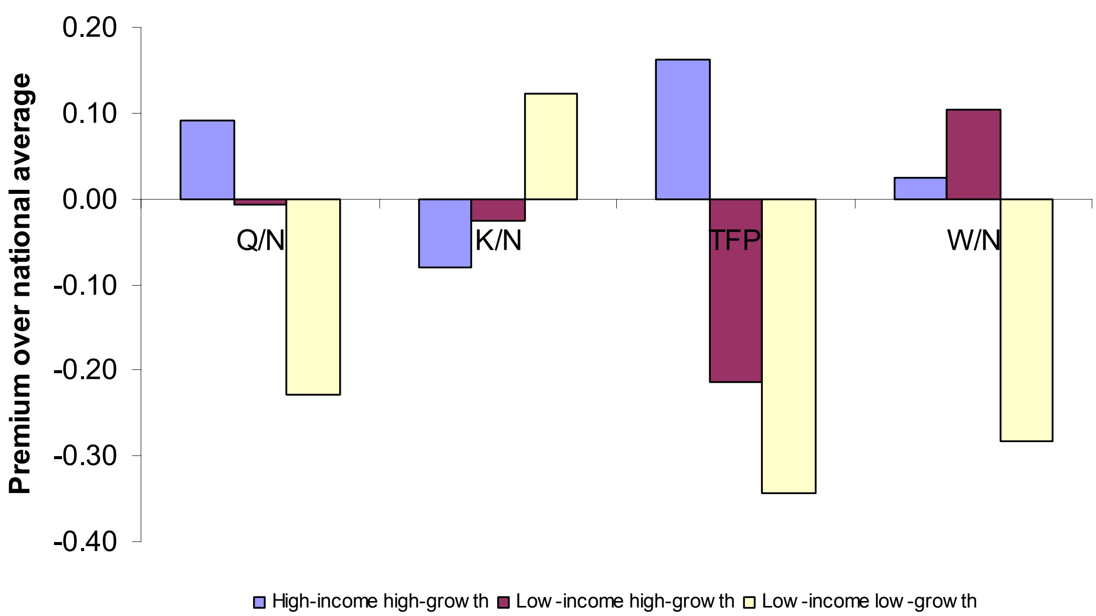

Figure 3a: Annual sales growth rate

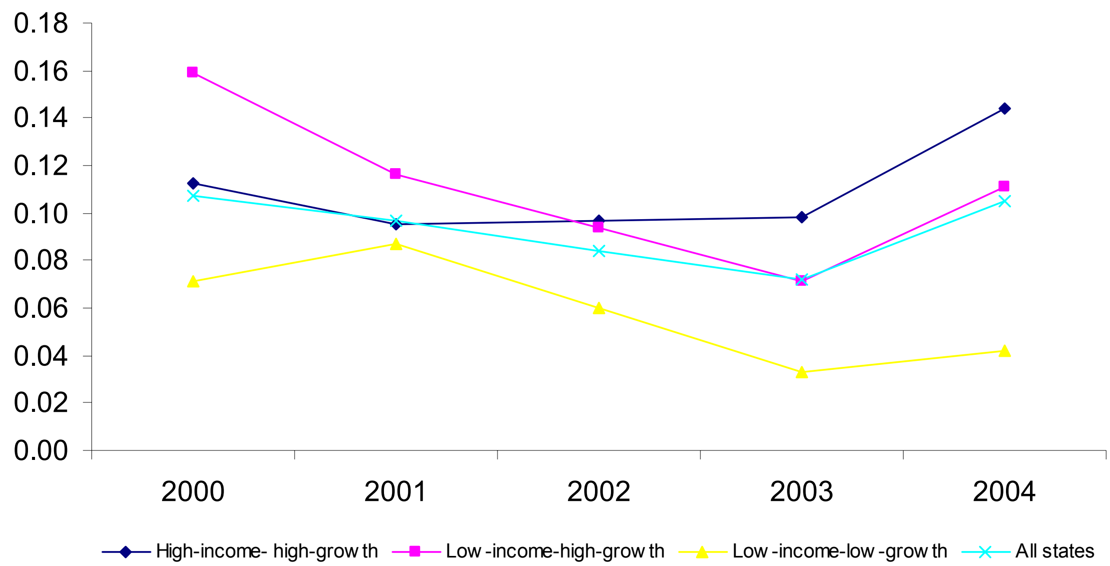

Figure 3b. Annual fixed assests' growth rate

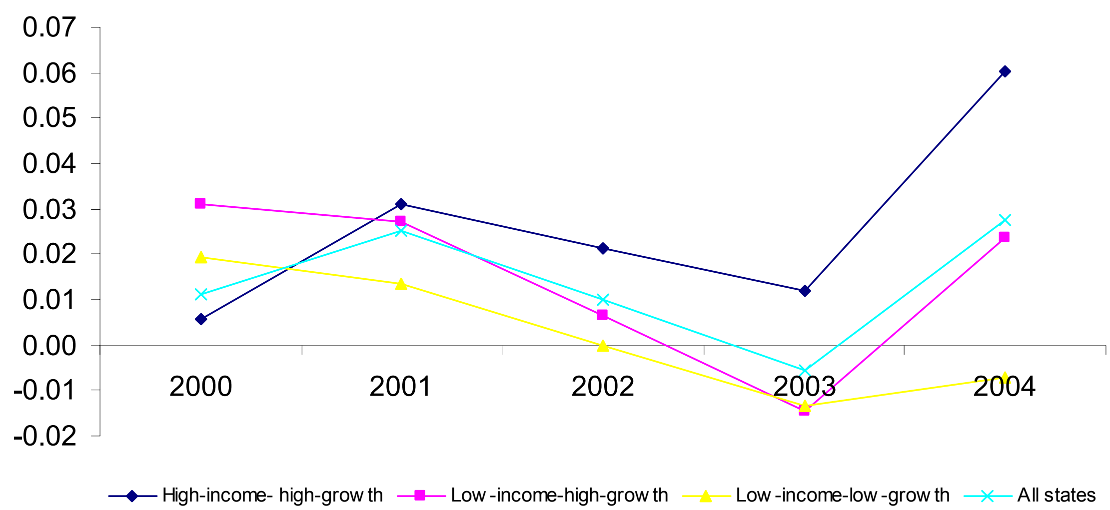

Figure 3c. Annual gross fixed investment rate

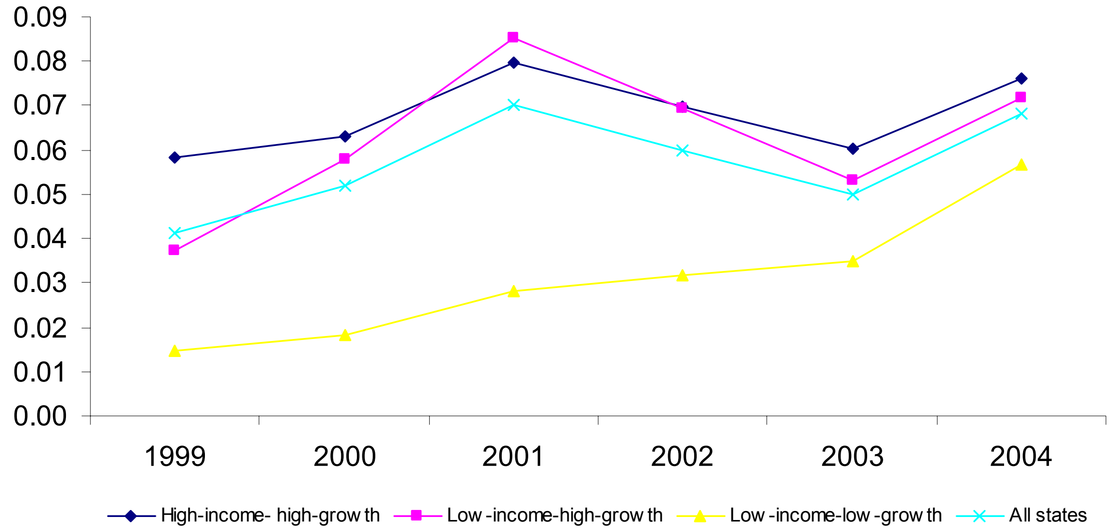

Figure 4. Percentage of firms that reported the following issues as obstacles to their activity India