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# IMF Working Paper

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## Does the Business Environment Affect Corporate Investment in India?

*Kiichi Tokuoka*

**IMF Working Paper**

Asia and Pacific Department

**Does the Business Environment Affect Corporate Investment in India?**

**Prepared by Kiichi Tokuoka**

Authorized for distribution by Laura Papi

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**Abstract**

Since the global financial crisis, corporate investment has been weak in India. Sluggish corporate investment would not only moderate growth from the demand side but also constrain growth from the supply side over time. Against this background, this paper analyzes the reasons for the slowdown and discusses how India can boost corporate investment, using both macro and firm-level micro data. Analysis of macro data indicates that macroeconomic factors can largely explain corporate investment but that they do not appear to account fully for recent weak performance, suggesting a key role of the business environment in reviving corporate investment. Analysis of micro panel data suggests that improving the business environment by reducing costs of doing business, improving financial access, and developing infrastructure, could stimulate corporate investment.

JEL Classification Numbers: D22, D24, E22

Keywords: Corporate investment, Business environment, Costs of doing business, Infrastructure

Author's E-Mail Address: [ktokuoka@imf.org](mailto:ktokuoka@imf.org)

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## I. INTRODUCTION

**While investment in India was the main growth driver before the global financial crisis, it has been lackluster since then.** Before the global financial crisis, strong corporate investment was behind the increase in investment (Figure 1), which was well above levels in most emerging economies (in percent of GDP). Since 2009, however, corporate investment has slowed sharply to 10 percent of GDP from 14 percent before the crisis. More recently, the growth of investment (gross fixed capital formation) has slowed to about  $-0.6$  (quarter on quarter) on average in the first three quarters in 2011, compared with an average of nearly 3 percent between 2000–2007, and high frequency data on capital goods production suggest that corporate investment may be weakening further.

**This weak corporate investment performance has demand and supply implications.** If corporate investment remains as weak as it is now, lower demand would reduce growth substantially over the medium term. For example, if the quarterly growth rate of corporate investment stays at  $-1/4$  percent (the average growth in investment in 2011), lower demand would reduce medium-term GDP growth to around 7 percent.<sup>1</sup> Sluggish corporate investment would also constrain growth from the supply side over time. This is a particularly relevant issue for India, as it is a supply-constrained economy.

**Views vary on whether macroeconomic or structural factors are responsible for the recent weak corporate investment.** On the one hand, increased macroeconomic uncertainty including from high inflation and the weaker global economic outlook may be weighing on investor sentiment. At the same time, monetary tightening since early 2010 may have affected corporate investment at the margin. On the other hand, structural factors, such as the still unfavorable business environment, weakening governance, and slower government project approvals, may be depressing investment. Costs of doing business in India remain among the highest in the world, and according to the World Economic Forum, in recent years an increasing number of people are concerned about weakening governance in India.

**The main message of this paper is that not only macroeconomic factors but also structural factors, in particular, the business environment, affect corporate investment in India.** As we will see in detail below, macroeconomic factors can largely explain corporate investment, but they do not appear to account fully for recent weak performance. While it is not entirely clear how important structural factors are in explaining the recent weakening of investment, analysis of micro panel data suggests that improving the business environment by reducing the costs of doing business, upgrading the financial system, and developing infrastructure, could stimulate corporate investment.

This paper is structured as follows. Using macro data, the next section examines to what extent macroeconomic factors can explain the recent weak corporate investment performance. Using firm-level micro panel data, Section III discusses what other factors not captured by

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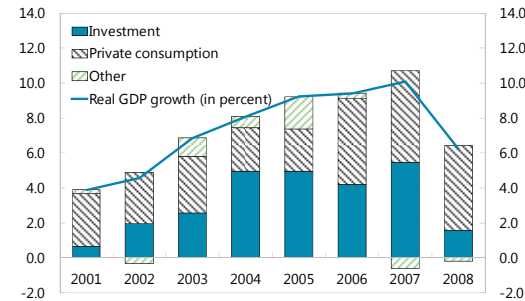
<sup>1</sup> The analysis in Oura and Topalova (2009) suggests that an increase in corporate sector stress in India (e.g., from global deleveraging) could also weaken corporate investment substantially.

the analysis of macroeconomic data, in particular the business environment, affect corporate profitability and investment. Section IV discusses policy issues and concludes.

**Figure 1. Investment in India**

*Before the global financial crisis, investment was the main driver of growth in India...*

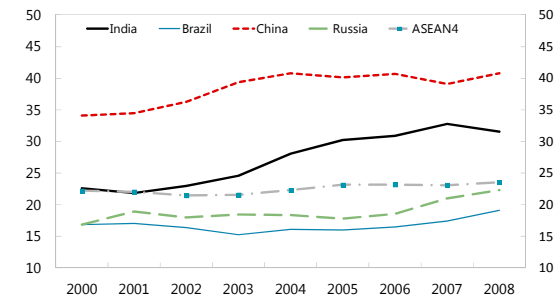
**India: Breakdown of GDP Growth**  
(Contributions, in percent)



Source: IMF WEO database

*...with its share rising substantially compared with other emerging economies.*

**Selected Economies: Investment**  
(In percent of GDP)

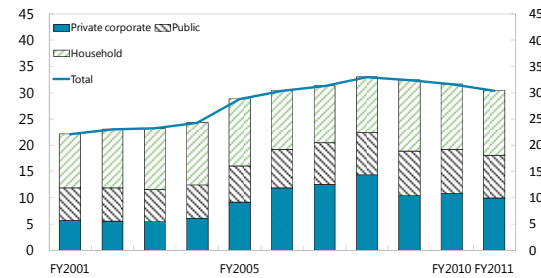


Source: IMF WEO database

1/ Investment refers to gross fixed capital formation.

*Since the crisis, the share of corporate investment has fallen...*

**India: Annual Investment 1/**  
(In percent of GDP)

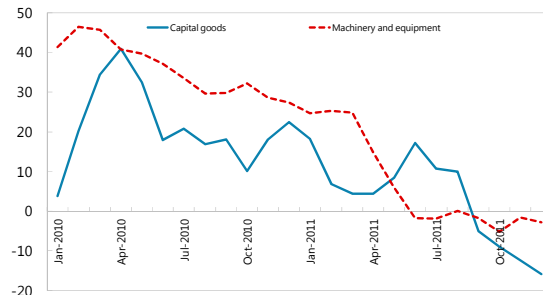


Source: Haver

1/ Investment refers to gross fixed capital formation. FY20xx refers to a fiscal year ending in March 20xx.

*...and high frequency production data point to a continued slowdown in corporate investment as machinery and equipment production has been declining.*

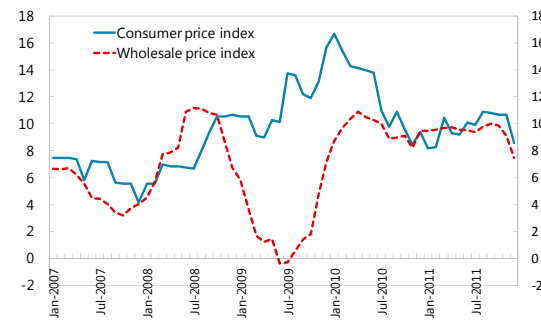
**India: Production Growth**  
(3 month average of y/y growth, percent)



Source: Haver

*High inflation may be weighing on investor sentiment.*

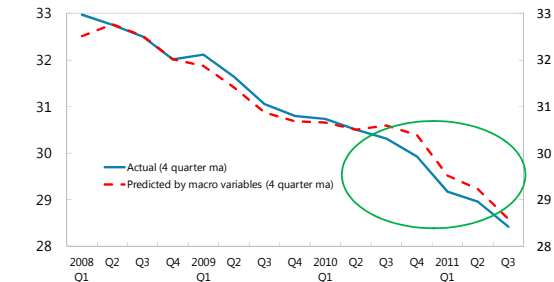
**India: Inflation Rate**  
(In percent, year on year)



Source: Haver.

*In recent quarters, actual investment has been consistently below levels predicted by macroeconomic variables.*

**India: Quarterly Investment 1/**  
(In percent of GDP)



Sources: Haver; IMF WEO database; and staff estimates.

1/ Investment refers to gross fixed capital formation.

## II. ANALYSIS OF MACROECONOMIC DATA

**A variety of macroeconomic factors affects corporate investment.** Domestic and global economic cycles are likely to affect corporates' investment decisions, as marginal returns from corporate investment are likely to be cyclical. High and volatile inflation increases uncertainty about returns from corporate investment, which may also make corporates hesitant to undertake investment. Finally, real interest rates have a direct impact on corporate investment as they determine financing costs.

**To quantify the impact of macroeconomic variables on corporate investment, this paper estimates the following equation:**

$$CI_t = a_1 X_{t-1} + a_2 VIX_t + a_3 CI_{t-1} + \varepsilon_t,$$

where  $CI$  is corporate investment (in percent of GDP), and  $X$  is a vector of macroeconomic variables including the volatility of the inflation rate (CPI),<sup>2</sup> the inflation rate (CPI), real GDP growth, the real interest rate,<sup>3</sup> and the world's real GDP growth. The  $VIX$  global stock volatility is used to control for global uncertainty, which may affect the level and volatility of profit. This paper uses *annual* data (FY1992–2011) because quarterly data on corporate investment do not exist.

**Using *annual* data, the estimation results suggest that the volatility and level of inflation and global uncertainty may depress corporate investment.** The coefficient on the volatility of inflation is consistently negative, and statistically significant in most specifications (Table 1).<sup>4</sup> The coefficients on the real interest rate and global stock volatility are negative and statistically significant. Other explanatory variables have the expected signs but are statistically insignificant in most cases.

**In terms of contribution to corporate investment, the high and volatile inflation, and higher global uncertainty are estimated to have contributed negatively between end-FY2007 and end-FY2011.** This is partly offset by the monetary easing after the global financial crisis, and the total net contribution from these macroeconomic factors during this period is estimated at around –1.3 percent of GDP (Table 1). The negative coefficient on (the lag of) the real interest rate also suggests that monetary tightening since early 2010 may have hit corporate investment during FY2012 (April 2011–March 2012), but the analysis of annual data does not say much about factors behind the weak corporate investment in recent quarters.

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<sup>2</sup> The volatility of the inflation rate is calculated by the standard deviation of monthly inflation rates (month on month, seasonally adjusted) in the year.

<sup>3</sup> For the real interest rate, this paper uses the average of nominal prime lending rates of ICICI Bank and IDBI Bank (whose data on prime lending rates are available for over 20 years) deflated by CPI inflation.

<sup>4</sup> Using WPI (wholesale price index) instead of CPI gives a negative coefficient on the volatility of the inflation rate, but the coefficient is not significant.

**Table 1. Impact of Macroeconomic Variables on Corporate Investment 1/**

Dependent variable: corporate investment (% of GDP)	(1)	(2)	(3)	Contribution to corp investment (% of GDP) using coeffs in (3) between end-FY07 and end-FY11
lag of volatility of inflation rate	-2.79* (1.32)	-2.62* (1.31)	-1.59 (1.08)	-0.71
lag of inflation rate	-0.11 (0.16)	-0.051 (0.17)	-0.21* (0.11)	-1.74
lag of real GDP growth	0.10 (0.22)		0.14 (0.17)	-0.03
lag of real GDP growth ex agriculture		0.28 (0.32)		
lag of real interest rate	-0.51** (0.22)	-0.45* (0.23)	-0.34* (0.17)	1.66
lag of world's real GDP growth	0.36 (0.31)	0.37 (0.31)		
global stock volatility			-0.11*** (0.035)	-0.49
lag of corporate investment (in % of GDP)	0.65*** (0.19)	0.55** (0.23)	0.85*** (0.14)	
				Total -1.3

1/ \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Standard errors in parentheses.

**To see if macroeconomic factors can explain weak corporate investment in recent quarters, it is necessary to analyze *quarterly* data as the latest annual data point is FY2011** (ending in March 2011). However, there is a limitation with using quarterly data: only data on gross fixed capital formation are available, but not on corporate investment, which is a primary interest of this paper.<sup>5</sup> While this is a limitation, given the high correlation between gross fixed capital formation and corporate investment (over 0.8), this paper estimates the following equation and produces predicted values for overall investment, using quarterly data:

$$I_t = a_1 X_{t-1} + a_2 X_{t-2} + a_3 VIX_t + a_4 I_{t-1} + a_5 I_{t-2} + \varepsilon_t,$$

where  $I$  is gross fixed capital formation (in percent of GDP), and  $X$  is a vector of standard macroeconomic variables including the volatility of inflation (CPI),<sup>6</sup> the inflation rate (CPI), real GDP growth, the real interest rate, and world real GDP growth.  $VIX$  is global stock volatility.

<sup>5</sup> Gross fixed capital formation is the sum of private corporate investment, public investment, and household (residential) investment.

<sup>6</sup> The volatility of the inflation rate is calculated by the standard deviation of monthly inflation rates (month on month, seasonally adjusted) in the quarter. Using WPI (wholesale price index) instead of CPI gives similar results.

**The analysis of *quarterly* data indicates that while investment can be largely explained by standard macro variables, since late 2010 it has been falling short of levels predicted by these variables somewhat** (bottom right chart of Figure 1). These results hint that recent weak investment may also be reflecting factors that are not fully captured by standard macroeconomic variables, such as factors that affect the business environment.

### III. ANALYSIS OF FIRM-LEVEL MICRO PANEL DATA

**The analysis of micro panel data helps identify determinants of corporate investment, which are difficult to detect using macro data.** For example, the impact of aggregate costs of doing business on corporate investment may be difficult to identify, given their limited time variation. Following Nabar and Syed's (2011), this paper begins by estimating the standard investment function using Indian firm-level panel data:

$$i_{j,t}/k_{j,t} = a_1 \textit{profitability}_{j,t-1} + a_2 \textit{liquidity}_{j,t-1} + a_3 \textit{leverage}_{j,t-1} + a_4 i_{j,t-1}/k_{j,t-1} + \textit{control vars} + \varepsilon_{j,t},$$

where  $j$  denotes firms,  $t$  denotes years,  $i$  is corporate capital investment,  $k$  is the stock of capital, *profitability* is Tobin's  $q$ , *liquidity* is the ratio of liquid assets to capital  $k$ ,<sup>7</sup> *leverage* is the ratio of debt to total assets, and the stock price volatility of each firm and time dummies are included as control variables. The main estimation method is the Arellano–Bond Dynamic Panel GMM Estimator (Dynamic GMM), which implements GMM after taking first differences. The data are from Prowess provided by the Centre for Monitoring Indian Economy (CMIE). Prowess is a data set that reports both listed and unlisted companies' data and has a panel structure.<sup>8</sup> After standard sample selection and restricting the sample to nonfinancial companies, the sample includes 12,306 observations (2,291 companies) over 1990–2011.

**The results confirm that profitability, liquidity, and leverage are key determinants of corporate investment in India.** Table 2 shows that the coefficients on profitability and liquidity are positive and generally significant, while the coefficient on leverage is negative and significant. One might think that the impact of liquidity may differ by sector or firm size,<sup>9</sup> but the results in Table 3 do not support this hypothesis. The coefficient on liquidity, interacted with the manufacturing dummy, the firm size dummy, or the exporter dummy is statistically insignificant (3<sup>rd</sup>, 6<sup>th</sup>, and 9<sup>th</sup> columns of the table). The positive coefficients on liquidity in Tables 2 and 3 suggest that there remains room for improving financial access, as in a world of perfect financial markets, liquidity should not affect corporate investment. This is consistent with the conclusion in Oura (2008) that upgrading the financial system would contribute to higher corporate investment. Most importantly, the results in the tables imply that to stimulate investment in India, it would be critical to raise profitability. Thus, the next question is, what would affect profitability?

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<sup>7</sup> Using an alternative measure of liquidity (e.g., current ratio (liquidity assets to short-term liability ratio)) does not change the results.

<sup>8</sup> Appendix A conducts a robustness check, using an alternative data set (Thomson Reuters Worldscope).

<sup>9</sup> For example, for capital-intensive manufacturing firms or smaller firms, liquidity might be more important in investment decision making.



**Table 2. Estimation of Investment Function 1/**

	OLS	FE (fixed effect estimator)	FD (first diff method)	FD+IV 2/	Dynamic GMM 2/	
profitability						
q	0.024*** (0.0025)	0.040*** (0.0033)	0.028*** (0.0040)	0.060*** (0.015)	0.040*** (0.0068)	
alternative q 3/					0.0013 (0.0012)	
liquidity	0.016*** (0.0020)	0.035*** (0.0023)	0.050*** (0.0042)	0.087*** (0.028)	0.055*** (0.014)	0.062*** (0.014)
leverage	-0.035*** (0.0087)	-0.21*** (0.014)	-0.30*** (0.027)	-0.28*** (0.095)	-0.16** (0.073)	-0.26*** (0.068)
stock price volatility	-0.00090*** (0.00032)	-0.00074** (0.00035)	-0.000029 (0.00033)	0.00071 (0.00050)	-0.0053 (0.0035)	-0.0052* (0.0031)
lag of i/k	0.42*** (0.011)	0.22*** (0.0091)	-0.23*** (0.012)	0.38*** (0.029)	0.35*** (0.023)	0.36*** (0.022)
Num of observations	12306	12306	8909	6686	8909	8909

Source: CMIE Prowess

1/ \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1. Robust standard errors in parentheses.

2/ Instruments are 2 and 3 period lags of profitability, liquidity, leverage, and the dependent variable.

3/ Alternative q is defined as (market value of equities + total debt - current assets)/replacement costs of capital (from Nabar and Syed, 2011).

**Table 3. Estimation of Investment Function Using Subsamples**

	Sector			Firm Size			Foreign Exposure		
	Manufacturing	Services	Full sample + dummy manufacturing * liquidity	Large	Small	Full sample + dummy small * liquidity	Exporters	Nonexporters	Full sample + dummy exporters * liquidity
profitability									
q	0.048*** (0.0091)	0.019* (0.011)	0.039*** (0.0066)	0.031*** (0.0084)	0.039*** (0.012)	0.038*** (0.0065)	0.031*** (0.0070)	0.079*** (0.023)	0.040*** (0.0067)
liquidity	0.031 (0.020)	0.064*** (0.017)	0.056** (0.026)	0.057*** (0.019)	0.037** (0.016)	0.050*** (0.016)	0.065*** (0.017)	0.087*** (0.021)	0.059*** (0.022)
dummy manufacturing * liquidity			-0.014 (0.037)						
dummy small * liquidity						-0.00067 (0.016)			
dummy exporters * liquidity									0.012 (0.023)
leverage	-0.19** (0.089)	-0.080 (0.14)	-0.16** (0.078)	-0.19** (0.078)	-0.32** (0.13)	-0.20** (0.081)	-0.061 (0.077)	-0.70*** (0.19)	-0.19** (0.074)
stock price volatility	-0.0045 (0.0035)	-0.0036 (0.0045)	-0.0057 (0.0040)	-0.0014 (0.0045)	-0.0030 (0.0031)	-0.0041 (0.0036)	-0.0019 (0.0044)	-0.00028 (0.0039)	-0.0012 (0.0034)
lag of i/k	0.41*** (0.027)	0.18*** (0.048)	0.36*** (0.024)	0.39*** (0.030)	0.23*** (0.037)	0.35*** (0.023)	0.37*** (0.025)	0.25*** (0.042)	0.35*** (0.023)
Num of observations	7001	1469	8470	5603	3306	8909	7434	1475	8909

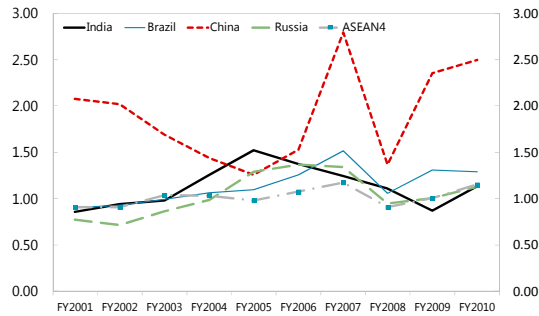
Source: CMIE Prowess

Notes: \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1; Robust standard errors in parentheses; Instruments are 2 and 3 period lags of profitability, liquidity, leverage, and the dependent variable (for the services regression (second column), only 2 period lags are used to reduce the number of instruments relative to the number of companies).

**Figure 2. Determinants of Corporate Investment**

*In India, profitability measured by Tobin's q...*

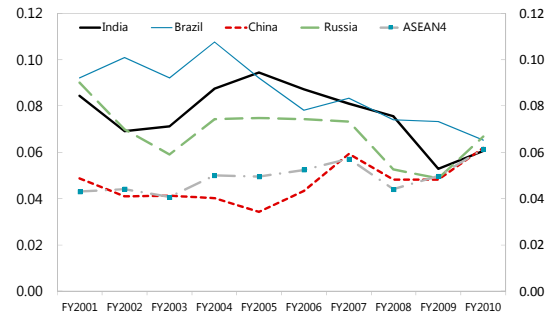
**Median Tobin's q of Nonfinancial Sector**



Source: IMF Corporate Vulnerability database

*...and ROA have not returned to pre-crisis levels.*

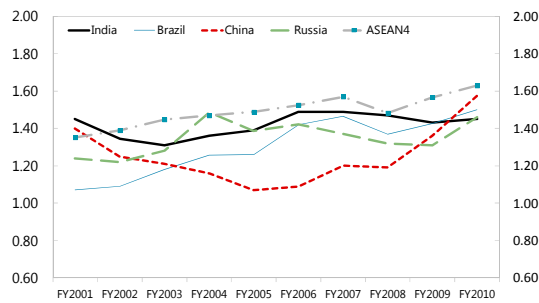
**Median Return on Assets of Nonfinancial Sector**



Source: IMF Corporate Vulnerability database

*Corporate liquidity in India measured either by the current ratio...*

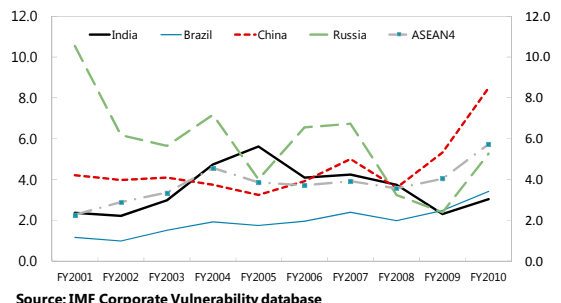
**Median Current Ratio of Nonfinancial Sector <sup>1/</sup>**



Source: IMF Corporate Vulnerability database  
<sup>1/</sup> Current ratio is defined as liquid assets divided by short-term liabilities.

*...or the interest coverage ratio is somewhat low.*

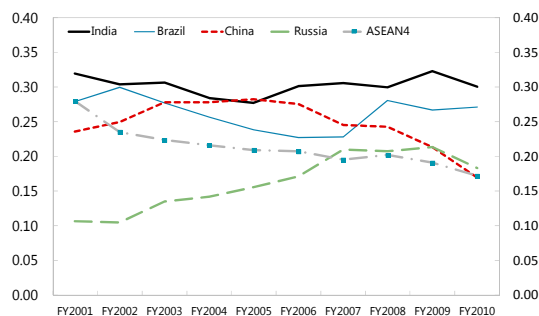
**Interest Coverage Ratio of Nonfinancial Sector <sup>1/</sup>**



Source: IMF Corporate Vulnerability database  
<sup>1/</sup> Interest coverage ratio is defined as interest payments divided by earnings before interest and taxes.

*Leverage is on the high side...*

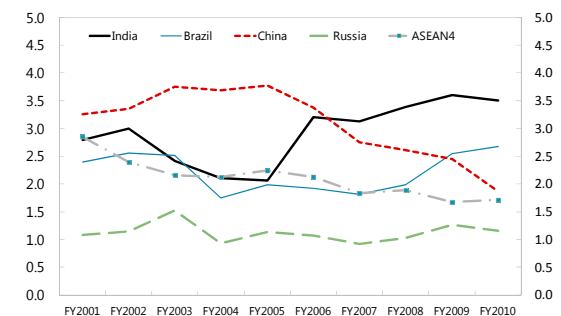
**Median Debt to Assets Ratio of Nonfinancial Sector**



Source: IMF Corporate Vulnerability database

*...and its increase is more pronounced in relation to cash inflows.*

**Median Debt to Cash Flow Ratio of Nonfinancial Sector**



Source: IMF Corporate Vulnerability database

**India has substantial room for improving its business environment to enhance corporate profitability.**

- In 2011, the World Bank ranked India 132<sup>nd</sup> of 183 countries in the world (up from 139<sup>th</sup> in 2010) in terms of ease of doing business (top left chart of Figure 3). India's ranking reflects relatively high costs of doing business. For example, in starting a business, India is ranked at 166<sup>th</sup>, while in registering property it is rated at 97<sup>th</sup>. In enforcing contracts, India is ranked at the second lowest (182<sup>nd</sup>), with its costs amounting to nearly 40 percent of claims.
- The OECD's product market regulation (PMR) indicators show that PMR, in particular barriers to entrepreneurship, is restrictive in India, not only by advanced economy standards, but also by emerging economy standards (middle left chart of Figure 3).<sup>10</sup> There is considerable room for relaxing employment protection. Indeed, Indian corporates cite labor regulation as one of the key constraints on their business (World Bank, 2012).
- According to the World Economic Forum, India's headline global competitiveness fell to 56<sup>th</sup> place in 2011 from 49<sup>th</sup> in 2009, reflecting weakening institutions (e.g., transparency of government decision making) and relatively slow pace of infrastructure improvement (bottom left chart of Figure 3). Among sub-indexes, the ranking in institutions has shown a noticeable decline from 34<sup>th</sup> in 2006 to 69<sup>th</sup> in 2011. Note that India's headline global competitiveness ranking (56<sup>th</sup> in 2009) is higher than the ranking measured by the World Bank's doing business indicators. This is because in measuring headline global competitiveness, the World Economic Forum also incorporates indicators such as market size and financial development, where India performs well.

These rankings and indicators underscore the point that India could enhance corporate sector profitability by reducing doing business costs, reforming regulation, improving institutions, and developing infrastructure. The impact of regulation reform on corporate profitability may be ambiguous as regulation could also give rents to existing firms. However, there is empirical evidence that relaxing regulation has a positive impact on productivity (e.g., Conway, Herd, and Chalaux, 2008), which presumably benefits profitability.

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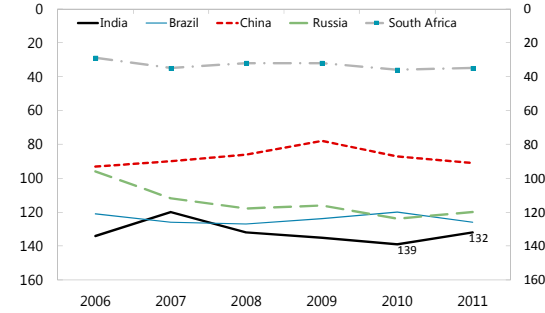
<sup>10</sup> PMR is calculated based on objective indicators related to product market regulations. For details about the methodology to calculate PMR, see Conway, Janod, and Nicoletti (2005).

**Figure 3. Business Environment Indices**

India's rankings in terms of ease of doing business have stayed around 120–140<sup>th</sup> in the world...

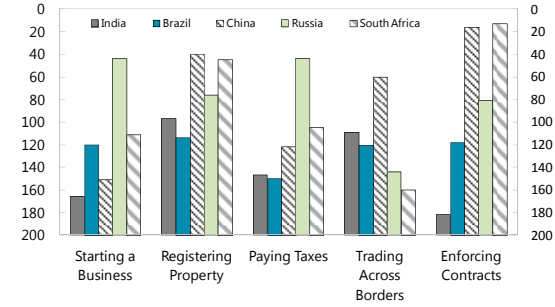
...and India lags particularly in starting a business and enforcing contracts.

**Headline Doing Business Rankings**



Source: World Bank

**Rankings of Doing Business Indicators, 2011**

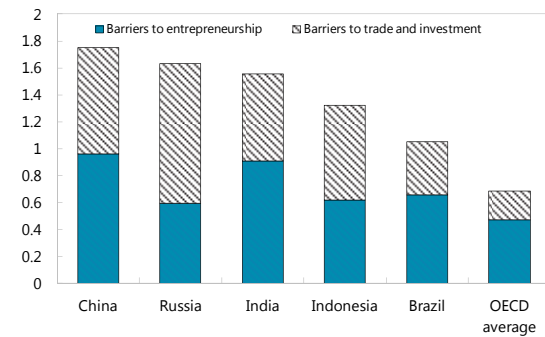


Source: World Bank

Product market regulation in India remains restrictive...

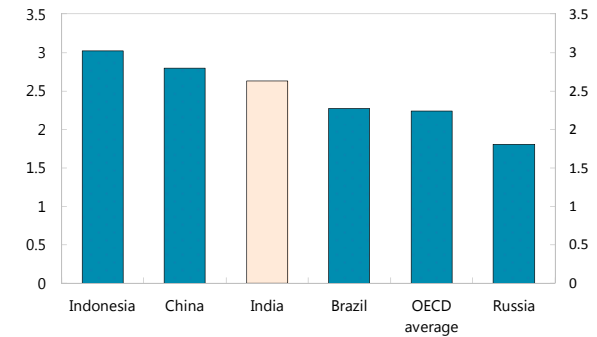
...and there is room for relaxing employment protection.

**OECD Product Market Regulation Indicators, 2008**



Source: OECD

**OECD Employment Protection Legislation Indicator, 2008**

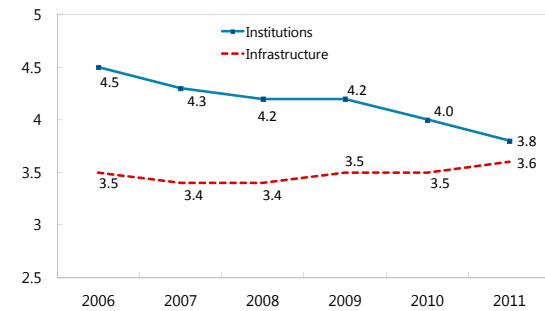


Source: OECD

In India, institutions have been weakening in recent years...

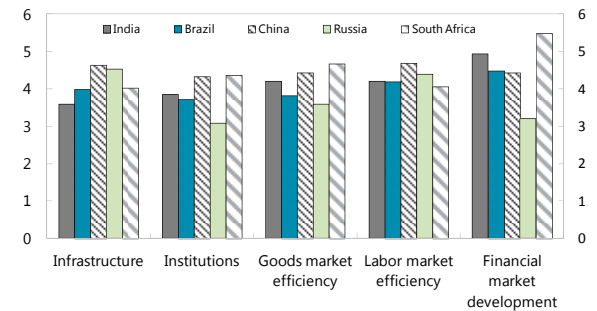
...while infrastructure has remained weak.

**India: Global Competitiveness Indexes**



Source: Global Competitiveness Report (World Economic Forum)  
1/ Rated between 1 and 7 (7 is the highest).

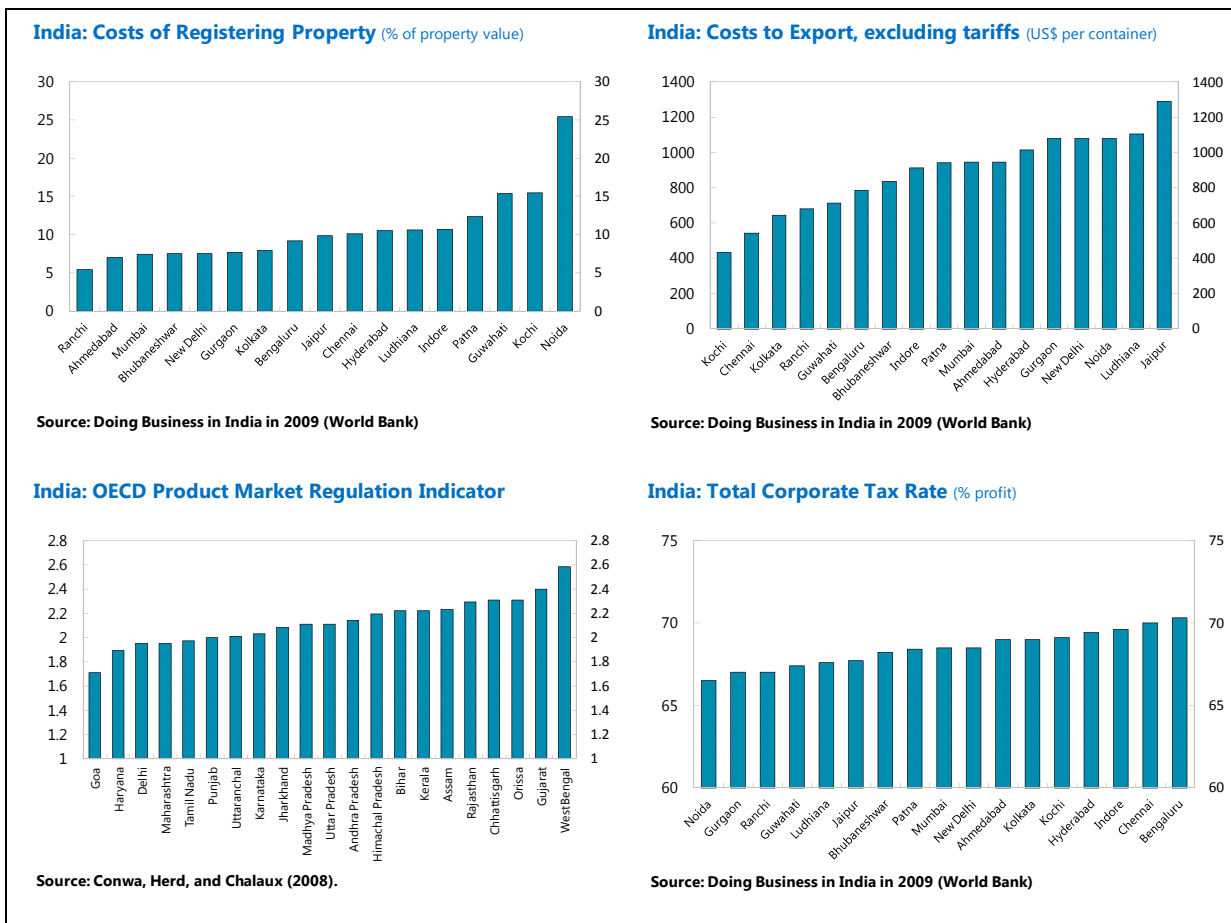
**Global Competitiveness Indexes, 2011 1/**



Source: Global Competitiveness Report (World Economic Forum)  
1/ Rated between 1 and 7 (7 is the highest).

**Large differences in the business environment exist within India.** The World Bank has reported doing business indicators across Indian cities three times in 2005, 2007, and 2009 (see the Appendix B for main indicators and cities covered). Some of the indicators, such as the costs of registering property and costs to export, vary significantly across cities (top two charts of Figure 4). Restrictiveness of certain regulations, which states have the power to control, is also very heterogeneous within India. For example, the OECD’s product market regulation indicator shows noticeable differences across states (bottom left chart of Figure 4). While there are some business-environment-related indicators that do not vary much within India (e.g., corporate tax rate, employment regulation), overall, the business environment is very heterogeneous, suggesting that many cities and states in India can learn from the best performers.

**Figure 4. Variability of Business Environment within India**



**The variability of the business environment within India allows us to explore the impact of the business environment on profitability, using firm-level micro panel data.**

Specifically, this paper estimates the following equation, exploiting the variability of the World Bank’s doing business indicators across Indian cities:

$$profitability_{j,t} = a_1 \text{ doing business indicators}_{j,t} + a_2 \text{ infrastructure proxy}_{j,t} + \text{control vars} + \varepsilon_{j,t},$$

where  $j$  denotes firms,  $t$  denotes years, control variables include time dummies and other controls (leverage and liquidity).<sup>11</sup> Only *doing business indicators* that vary enough across cities and that are reported in all three surveys (2005, 2007 and 2009) are included in the regressions.<sup>12</sup> As *infrastructure proxy*, I use phone density (percentage of telephone connections, including cell phone connections). The phone density may also capture the direct positive impact of phone access on profitability, which Jensen (2007) found among fishermen. One may also want to include in the panel regression the OECD's product market regulation indicator, which varies enough within India (bottom left chart of Figure 4), but this is not feasible as the indicator is available across states only once. The error term  $\varepsilon_{j,t}$  contains unobservable firm-specific factors, which may be correlated with independent variables. To avoid a bias due to this correlation, this paper estimates the equation by either taking first differences or using the fixed effects estimator. The regression uses the same micro panel data set as used for estimating the investment function above (Prowess).

**The results generally support the hypothesis that higher business costs reduce profitability.** Table 4 shows that costs of starting business, registering property, and enforcing contracts have the expected negative signs (except for a few cases) and are significant in many cases.

**Table 4. Regression of Profitability 1/**

	Dependent Variable							
	q				alternative q 2/			
	FD (first dif)	FE (fixed effect estimator)	FD (first dif)	FE (fixed effect estimator)	FD (first dif)	FE (fixed effect estimator)	FD (first dif)	FE (fixed effect estimator)
			Exporters only	Exporters only			Exporters only	Exporters only
costs of starting business	-0.0030 (0.0028)	-0.0035 (0.0024)	-0.029** (0.013)	-0.034*** (0.011)	-0.022 (0.020)	-0.023 (0.021)	-0.33*** (0.094)	-0.30*** (0.096)
costs of registering property	-0.0099 (0.013)	-0.023** (0.011)	-0.0042 (0.034)	0.0019 (0.030)	-0.094 (0.094)	-0.21** (0.10)	0.22 (0.25)	0.24 (0.25)
costs of enforcing contracts	-0.0087* (0.0051)	-0.0053 (0.0041)	-0.028 (0.018)	-0.015 (0.017)	-0.12*** (0.040)	-0.080** (0.037)	-0.18 (0.14)	-0.21 (0.15)
time to export			-0.0090 (0.0072)	-0.0047 (0.0069)			-0.053 (0.052)	-0.060 (0.060)
costs to export			-0.00097 (0.00063)	-0.00051 (0.00068)			-0.0084* (0.0046)	-0.0079 (0.0060)
phone density	-0.0022 (0.0017)	-0.00063 (0.0016)	-0.0083* (0.0048)	-0.0028 (0.0053)	-0.033** (0.014)	-0.027* (0.015)	-0.077* (0.040)	-0.088* (0.046)
Num of observations	2173	3552	970	1888	2049	3147	932	1688

Source: CMIE Prowess

1/ \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parentheses.

2/ Alternative q is defined as (market value of equities + total debt - current assets)/replacement costs of capital (from Nabar and Syed, 2011).

<sup>11</sup> For liquidity, the ratio of liquid asset to the stock of capital  $k$  is used. Using an alternative liquidity measure (e.g., current ratio (liquidity assets to short-term liability ratio)) gives similar results. For leverage, the ratio of debt to total assets is used.

<sup>12</sup> In addition, indicators in 2006 and 2008 are estimated by interpolation to increase the number of observations. The results are similar with and without this procedure.

### Box 1. Studies Utilizing Variability within India

**The idea of exploiting the variability within a country is not new but is built on several studies on India.** Examples of such studies are as follows.

- *Using state level data*, Besley and Burgess (2004) found that states that amended labor laws in favor of workers experienced lower growth in manufacturing productivity. Purfield (2006) reported that transmission and distribution losses of electricity had a negative impact on real per capita growth at the state level. Kochhar et al. (2006) identified a negative correlation between the concentration within the manufacturing industry and state economic growth. Finally, Topalova (2008) found that higher financial development and more flexible labor markets lead to more inclusive growth at the state level.<sup>13</sup> The difference between these studies and this paper is that while these studies used semi-aggregate state-level data (or state-level industry data), this paper uses firm-level micro data.
- *Using firm-level cross-sectional data*, Conway, Herd, and Chalaux (2008) found that firms' productivity growth is lower in states where product market regulation is tighter. Their work is closely related to this paper in the sense that they also intended to see the impact of the business environment (product market regulation) on firm-level corporate performance. The advantage of this working paper is that while Conway, Herd, and Chalaux (2008)'s data are cross-sectional, this paper's data set has a panel structure, which allows us to remove the potential bias coming from unobservable firm-specific factors (as discussed above).
- *Using firm-level panel data*, Topalova and Khandelwal (2011) exploited the variability in the pace of tariff reductions across industries during the 1990s, and tested if tariff reductions increased firm-level productivity (their results support the hypothesis).<sup>14</sup> The difference with this paper is that while they used variability across industries, this paper uses variability across cities.

**There is some evidence that developing infrastructure could boost profitability.** The 3<sup>rd</sup>, 4<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> columns of Table 4 show that if the sample is restricted to exporters, the coefficient on costs to export is negative and significant at the 10 percent level in one of the specifications, suggesting that improvements in infrastructure, especially transport, may be beneficial. However, phone density has a negative sign, hinting that it is not a good proxy for infrastructure development. Using the number of bank offices per square kilometer or the ratio of electricity supply to demand (by state) as an alternative proxy for infrastructure development generally does not give the expected positive sign, either (details not reported here). While there is evidence that infrastructure development has a positive effect on

<sup>13</sup> In their paper, inclusiveness is defined as the difference between the consumption growth rate of the bottom and the top 30 percent of the population (within the state).

<sup>14</sup> The large time variation (decline) in tariffs during this period helped them to identify the impact of tariff reductions. Time variation is smaller in subsequent periods, making it difficult for researchers to estimate their impact.

manufacturing productivity (e.g., Mohommad, 2010), further work is required to reach a clearer conclusion about the relevance of infrastructure for corporate profitability.

**The results imply that improving the business environment could boost corporate investment substantially.** The estimated coefficients in Table 2 and in columns 1–4 of Table 4 mean that reducing the average of each cost of doing business to the lowest among Indian cities surveyed in 2009 could boost aggregate demand by  $\frac{1}{4}$  to  $1\frac{1}{2}$  percent of GDP, by raising corporate investment by 3 to  $13\frac{1}{2}$  percent (Table 5). Of the various business costs, lowering the average costs to export is estimated to be the most effective and could increase GDP by 0.1 to 0.6 percent. Reducing the average of each of the other costs to the lowest could raise GDP by 0.03 to 0.4 percent each. These results should be interpreted with caution, as just cutting the costs included in the staff analysis may not be enough to produce the growth effects reported in Table 5. This is because the costs of doing business are correlated with other business-environment-related factors (e.g., product market regulation, education, skills) and the staff's estimates may have picked up the effects of such omitted factors.

**Table 5. Estimated Aggregate Impact of Reducing Costs of Doing Business**

	Reducing the average of each cost to	
	Lowest	Third Lowest
Change in aggregate corporate investment (in percent)	3.1 — 13.5	2.2 — 9.0
costs of starting business	0.6 — 1.8	0.6 — 1.6
costs of registering property	0.3 — 1.9	0.1 — 0.5
costs of enforcing contracts	1.0 — 4.0	0.9 — 3.6
costs to export	1.2 — 5.8	0.7 — 3.2
Direct demand impact on GDP (in percent of GDP)	0.3 — 1.5	0.2 — 1.0
costs of starting business	0.1 — 0.2	0.1 — 0.2
costs of registering property	0.03 — 0.2	0.0 — 0.1
costs of enforcing contracts	0.1 — 0.4	0.1 — 0.4
costs to export	0.1 — 0.6	0.1 — 0.3

#### IV. POLICY ISSUES AND CONCLUSIONS

**This paper argues that both macroeconomic factors and the business environment affect corporate investment.**

- The analysis of macro data suggests that high and volatile inflation, and heightened global uncertainty may have dampened corporate investment. While monetary easing since the global financial crisis provided important support for corporate investment, the monetary tightening since early 2010 may have started hurting corporate investment at the margin. The main policy implication of these results is that lowering and stabilizing inflation is critical for sustained investment growth.



- The analysis of micro panel data implies that to stimulate corporate investment, improving the business environment is essential. India has considerable room to improve its business environment. Specifically, priority areas include cutting various costs of doing business and improving financial access. There is also some evidence that developing infrastructure, especially transport, could support corporate investment. Given the substantial variability in these areas within the country, India can learn from itself.

**Business-environment-related factors that are not tested in this paper can also be important in stimulating corporate investment in India.** The empirical analysis in this paper was able to examine only factors that vary enough within India and whose data are available for multiple years. However, there are many other factors that are likely to play an important role in supporting corporate profitability and investment. Such factors include stable provision of electricity, ease of land acquisition, less restrictive regulations in product and labor markets, simpler administrative procedures, and higher quality education and skills. In many of these areas, India falls behind other emerging economies.

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## APPENDIX A. REGRESSION RESULTS USING AN ALTERNATIVE DATA SET

As a robustness check, this appendix reports results of firm-level micro panel regression using an alternative data set: Thomson Reuters Worldscope. Tables A.1 and A.2 confirm that the results are very similar to those reported in Tables 2 and 4. Based on the coefficients in Tables A.1 and A.2, reducing the average of each cost of doing business to the lowest among Indian cities is estimated to raise aggregate demand by  $\frac{1}{2}$  to  $1\frac{1}{2}$  percent of GDP, which is a similar range to that estimated using Prowess (Table 5).

**Table A.1. Estimation of Investment Function 1/**

	OLS	FE (fixed effect estimator)	FD (first diff method)	FD+IV 2/	Dynamic GMM 2/	
profitability						
q	0.015*** (0.0027)	0.033*** (0.0035)	0.025*** (0.0050)	0.047*** (0.012)	0.032*** (0.0079)	
alternative q 3/						0.0041*** (0.0011)
liquidity	0.018*** (0.0044)	0.040*** (0.0043)	0.045*** (0.0096)	0.067** (0.028)	0.044** (0.022)	0.041* (0.021)
leverage	-0.082*** (0.0096)	-0.29*** (0.019)	-0.34*** (0.031)	-0.28* (0.14)	-0.25*** (0.080)	-0.26*** (0.078)
stock price volatility	0.00055** (0.00022)	0.00070 (0.00051)	0.00062 (0.00083)	0.0012 (0.0011)	0.0063** (0.0027)	0.0077** (0.0032)
lag of i/k	0.42*** (0.015)	0.12*** (0.014)	-0.27*** (0.019)	0.26*** (0.046)	0.30*** (0.035)	0.30*** (0.035)
Num of observations	5516	5516	4031	2878	4031	4031

Source: Thomson Reuters Worldscope

1/ \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parentheses.

2/ Instruments are 2 and 3 period lags of profitability, liquidity, leverage, and the dependent variable.

3/ Alternative q is defined as (market value of equities + total debt - current assets)/replacement costs of capital (from Nabar and Syed, 2011).

**Table A.2. Regression of Profitability 1/**

	Dependent Variable							
	q				alternative q 2/			
	FD (first dif)	FE (fixed effect estimator)	FD (first dif)	FE (fixed effect estimator)	FD (first dif)	FE (fixed effect estimator)	FD (first dif)	FE (fixed effect estimator)
			Exporters only	Exporters only			Exporters only	Exporters only
costs of starting business	-0.015** (0.0057)	-0.013*** (0.0044)	-0.012 (0.020)	-0.0021 (0.018)	-0.053 (0.037)	-0.043 (0.036)	-0.020 (0.093)	-0.060 (0.15)
costs of registering property	-0.049** (0.020)	-0.056*** (0.019)	-0.033 (0.045)	-0.036 (0.049)	-0.30** (0.15)	-0.37** (0.16)	-0.11 (0.28)	-0.051 (0.42)
costs of enforcing contracts	-0.0057 (0.011)	-0.0057 (0.0074)	-0.058* (0.032)	-0.059** (0.025)	-0.12** (0.061)	-0.14** (0.061)	-0.38** (0.16)	-0.28 (0.21)
costs to export			-0.0019* (0.0012)	-0.0018* (0.00095)			-0.014** (0.0067)	-0.0099 (0.0081)
phone density	-0.00070 (0.0033)	-0.00065 (0.0027)	-0.015 (0.0091)	-0.016** (0.0077)	-0.038* (0.021)	-0.029 (0.023)	-0.13** (0.059)	-0.099 (0.065)
Num of observations	1182	2048	388	755	1149	1944	375	720

Source: Thomson Reuters Worldscope

1/ \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parentheses.

2/ Alternative q is defined as (market value of equities + total debt - current assets)/replacement costs of capital (from Nabar and Syed, 2011).

## APPENDIX B. DESCRIPTION OF SEMI-AGGREGATE DATA

The analysis of micro panel data uses both firm-level data (from CMIE's Prowess) and semi-aggregate city- or state-level data. The semi-aggregate data are the doing business indicators, the phone density, the number of bank offices per square kilometer, the ratio of electricity supply to demand.

- **Doing business indicators.** The data are from the World Bank's Doing Business surveys. Broadly speaking, the survey reports three sets of variables in each business activity: i) number of administrative procedures; ii) time needed to finish all the procedures; and iii) costs.<sup>1</sup> The main indicators reported for Indian cities in 2005, 2007, and 2009 are summarized in Table B.1.

**Table B.1. Main Indicators Reported by the World Bank Doing Business Survey**

	2005	2007	2009
<b>Starting business</b>			
Procedures (number)		✓	✓
Time (days)	✓	✓	✓
Cost (% of income per capita)	✓	✓	✓
<b>Dealing with construction permits</b>			
Procedures (number)		✓	✓
Time (days)		✓	✓
Cost (% of income per capita)		✓	✓
<b>Employment regulation</b>			
Rigidity of employment index	✓	✓	
Cost of firing (weeks of wages)	✓	✓	
<b>Registering property</b>			
Procedures (number)		✓	✓
Time (days)	✓	✓	✓
Cost (% of property value)	✓	✓	✓
<b>Paying taxes</b>			
Payments (number)		✓	✓
Time (hours)		✓	✓
Total tax rate (% of profit)		✓	✓
<b>Trading across borders</b>			
Documents for export (number)		✓	✓
Time to export (days)		✓	✓
Cost to export (US\$ per container)		✓	✓
<b>Enforcing contract</b>			
Procedures (number)		✓	✓
Time (days)	✓	✓	✓
Cost (% of claim)	✓	✓	✓
<b>Closing business</b>			
Time (years)	✓	✓	✓
Cost (% of estate)	✓	✓	✓

<sup>1</sup> For more details, see <http://www.doingbusiness.org/data>.

The survey covered 9, 12, and 17 Indian cities in 2005, 2007, and 2009, respectively (Table B.2).

**Table B.2. Indian Cities Covered by the World Bank's Doing Business Survey**

	2005	2007	2009
Ahmedabad			✓
Bengaluru	✓	✓	✓
Bhubaneswar	✓	✓	✓
Chandigarh	✓	✓	
Chennai	✓	✓	✓
Gurgaon			✓
Guwahati			✓
Hyderabad	✓	✓	✓
Indore			✓
Jaipur	✓	✓	✓
Kochi			✓
Kolkata	✓	✓	✓
Lucknow	✓	✓	
Ludhiana			✓
Mumbai	✓	✓	✓
New Delhi		✓	✓
Noida			✓
Patna		✓	✓
Ranchi		✓	✓
Num of cities covered	9	12	17

- **Phone density.** The data are from CEIC. The phone density is defined as the percentage of telephone connections, including cell phone connections. This is a state-level variable, unlike city-level doing business indicators (above). In other words, firms in the same state take the same value.
- **Number of bank offices per square kilometer.** These data are calculated by dividing the number of bank offices by the area of each state. The data on bank offices are from the Reserve Bank of India, while those on state areas are from the Ministry of Statistics and Programme Implementation.
- **Ratio of electricity supply to demand.** The data are from CEIC. The variable is calculated at the state level.