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The Investment Climate in 16 Indian States

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Abstract

In this paper, the author attempts to identify the characteristics of the business climate in India that can help explain the different performance of individual states in terms of investment and growth. The paper develops a new Investment Climate Index aimed at summarizing the aspects of the business environment that entrepreneurs consider when deciding whether to invest. Using this index, the author explores the investment climate in several typologies of Indian states and identify the key features of a poor business environment in India. The analysis shows that infrastructure and institutions remain the main bottlenecks in the country's private sector development. More specifically, power, transportation, corruption, tax regulations, and theft are major factors explaining the poor business environment in some Indian states. Infrastructure appears to be the single most important constraint, as it is particularly binding in states that show low levels of domestic investment and GDP growth.

This paper—a product of the Finance and Private Sector Development Group, Africa Region—is part of a larger effort in the department to better understand the micro-determinants of growth. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at giarossi@worldbank.org.

THE INVESTMENT CLIMATE IN 16 INDIAN STATES

Giuseppe Iarossi

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When deciding on investing, entrepreneurs look at a host of factors from cost of inputs, to reliability of infrastructure, to quality of institutions. Given its broad nature, it is impossible to meaningfully portray the investment climate in any country by examining a handful of indicators. Consequently we study the investment climate in India by constructing a composite index. This approach will enable us to summarize and compare in one indicator the many different features of the investment climate in 16 Indian states. Furthermore this methodology will allow us to gauge what specific features of the investment climate best describe a more business friendly environment in India.

1. Methodology

In building such index we start from the assumption that entrepreneurs look at and compare a wide range of features of the business climate in each state when deciding on investing. More specifically we assume that investors take into account a host of factors closely related to the production process such as quality and reliability of infrastructure services, availability of finance, level of corruption, etc.

We use the Investment Climate Survey data collected by the World Bank in India in 2005. This micro data set is based on face-to-face interviews of a representative sample of over 4000 entrepreneurs in both manufacturing and retail establishments in 16 Indian states. The data therefore represent the views of 'in state' firms and existing investors. Nevertheless thanks to the standardized methodology used to collect such information comparison across states is possible and meaningful. [1]

We identified 46 variables descriptive of the business environment in the 16 states. For simplicity we grouped them in three categories: inputs, infrastructure and institutions (Table 1).[2] Within each of these three categories we then distinguish two dimensions:

[1] Before applying principal component the firm level data is converted in state level averages, after outliers have been dropped. Furthermore since not all variables of table 1 were available for all states, in a limited number of cases (and never to exceed 20% of the variables used) missing values were imputed with the sample average.

[2] As suggested by one reviewer, four variables classified in Table 1 as Input Perceptions (Share of short term, share of long term, trade finance, and loan duration) were reclassified as Inputs Cost

objective values (cost) and subjective indicators (perception). As a result of this classification the 46 variables are grouped in six sets which represent the backbone of the ICI and aim at measuring the cost and quality of infrastructure services, input markets, and institutions.

Table 1. Variables used in the construction of the composite Investment Climate Index (ICI)

INFRASTRUCTURE	
COST	**PERCEPTION**
1 Hours of power outages last year	1 Perception on electricity
2 Hours of telephone outages last year	2 Perception on telecom
3 Percentage of sales lost in transit	3 Perception on transport
4 Percentage of sales lost due to power outages	4 Perception on access to land
5 Days of inventories kept for main input (proxy for quality of transportation)	

and the ICI recalculated. The results were almost the same as in the original ICI. The correlation coefficient among the two indices was 90% with a significance level of 1%.

Table 1 (cont'd). Variables used in the construction of the composite Investment Climate Index (ICI)

INPUTS

	COST		PERCEPTION
1	Excess labor	1	Share of short term finance obtained by banks
2	Cost of finance: value of collateral required to obtain a loan	2	Share of long term finance obtained by banks
3	Proximity to raw materials (share of inputs bought by domestic sources)	3	Short term finance represented by trade finance
4	Proximity to domestic customers	4	Duration of loan
5	Share of firms using new technology	5	Perception on access to finance
6	Trade credit: share of sales sold on credit	6	Perception on labor regulations
7	Trade credit: share of inputs bought on credit	7	Perception on customs
		8	Perception on availability of skills

INSTITUTIONS

	COST		PERCEPTION
1	Law & order: security cost	1	Perception of law & order: crime
2	Law & order: losses due to theft	2	Perception of corruption
3	Manager time spent dealing with regulations	3	Perception on licensing & permits
4	Days spent with officials to deal with regulations	4	Quality of adm.: consistent interpretation of rules
5	Tax evasion (% of sales not declared)	5	Perception of tax administration: rates
6	Days to obtain a telephone connection	6	Perception of tax administration: administration
7	Days to obtain a electric connection	7	Perception of functioning of judicial system
8	Days to obtain a construction permit		
9	Bribes to "get things done"		
10	Share of firms reporting officials request gifts		
11	Share of firms reporting gifts requested to obtain a power connection		
12	Share of firms reporting gifts requested to obtain a telephone connection		
13	Share of firms reporting gifts requested to obtain a construction permit		
14	Share of firms reporting gifts requested to obtain a main operating license		
15	Average time to reach a court judgment (weeks)		

We assume that both costs and perceptions drive investors' decisions. However since we do not know the relative weight of each we assume they carry an equal weight in the construction of the index. Hence we keep them separated in the aggregation process by estimating sub-indices. Aggregating variables into sub-indices before building the composite indicator allows us to avoid the composite indicator to be driven by data availability. As a matter of fact, estimating sub-indices for each category and then aggregating them into the ICI ensures equal weighting among each of the clusters of data.

In fact if we were to estimate the composite index using all the variables, irrespective of their number within each category, we would inadvertently give more weight to the 'institutions' aspect of the business environment simply because the number of variables available within that category is higher. Similarly assembling all variables across dimensions might implicitly assign a different weight to 'cost' or 'perception' depending on the number of objective or subjective variables available. Furthermore since perception questions appear to have a higher variability than objective questions, pulling them together in an index will give more weight to perception questions than objective variables. Finally, even if we had the same number of variables in each dimension of each category, because it is often not possible to measure a characteristic of the business environment with both objective and perception questions (e.g. access to land) then pulling the variables in one index will unduly give more weight to those characteristics of the business environment that can be measured by both objective and subjective indicators over those that are measure only with one. [3]

From a methodological point of view, a critical decision in the construction of any index rests with the aggregation of individual components into the composite indicator. As a matter of fact different indices can be built with the same set of variables depending on which aggregation method is adopted.

In building the ICI we decided to follow a methodology that would not only allow us to combine together components as different as access to credit and internet usage, but that would also enable us to achieve two main objectives. First, *an index that is able to prioritize among indicators*. Albeit all indicators in Table 1 are important to an investor we postulate that not all of them are *equally* important in the characterization of the investment climate in a country. That is, for instance, while access to credit and to the internet are both important factors of the business environment, investors will value improving access to credit differently than improving access to the internet. Secondly, *an index that does not allow constant compensability among indicators,* that is progress on

[3] Furthermore from a methodological point of view subjective and objective indicators have different levels of reliability. Objective indicators are definitely more reliable, especially for international comparisons, than subjective (perception) data.

'access to finance' will not be have the same impact on the overall ranking to a equivalent improvement in 'access to the internet'.

These objectives are achieved through the use of weights and geometric aggregation. While deciding to build a weighted index is a straightforward conclusion, the actual choice of the weights is a much more difficult task since there is no theoretical model which postulates on the choice of weights. We cannot tell if in a good investment climate the provision of reliable electricity should count twice as much as the availability of a good transport system.

We solved this problem through the use of principle component analysis. This methodology has two advantages. First, it identifies which indicators vary most across states. Secondly it estimates how much they vary. Using this methodology will therefore allow us to pinpoint which indicators differ most across Indian states and by how much.

Principal component analysis estimates the total variance of all the variables analyzed. At the same time it arranges them in groups (called 'factors') depending on their degree of correlation. In other words, this methodology identifies the variables most correlated with each other, creates new indicators called 'factors' - which are a linear combination of all original variables - and calculates the share of the total variance explained by each factor. Therefore through factor analysis we can: (1) identify the group(s) of variables that vary most across countries (those that in effect will help discriminate between a good and bad the investment climate), and (2) obtain an estimate of their variability which we can use as weight. [4] The underlying assumption is that if two countries show almost the same value in one variable (that is very low variability, hence low weight) this variable will count less in the investor's decision to invest (and hence in the ICI) than other indicators which show a higher variability across states.

[4] Note that while we use the total variability of each factor as the exponential weights of the factor itself, each variable is at the same time weighted by its own regression coefficient in the construction of each factor. As a further benefit this methodology allows us also to account for the heterogeneous nature of each individual component.

Using the weights allows us to achieve the first objective, to establish an order of priority among constraints, but not to achieve the second goal: non compensability among components. To reach this second objective we adopted a geometric aggregation when combining individual factors into the ICI. Hence the formula used to build the ICI is:

$$ICI = (Factor1)^{w} * (Factor2)^{w} \qquad [1.1]$$

where w_i = share of variance explained by each factor, and:

$$Factor1 = \alpha_1 * INFRASTRUCTUREsubindex + \alpha_2 * INSTITUTIONSsubindex + \alpha_3 * INPUTS$$
$$Factor2 = \beta_1 * INFRASTRUCTUREsubindex + \beta_2 * INSTITUTIONSsubindex + \beta_3 * INPUTS$$ [5]

Geometric aggregation coupled with the presence of factor coefficients ensure that a change in one variable will not have the same impact on the index as the same change of a different variable.

The ICI index is constructed by means of a series of three separate aggregations. First, to ensure that each component has equal weight, the variables in each of the six sets (infrastructure cost, infrastructure perceptions, etc.) are combined into six corresponding sub-indices. Then these six sub-indices are aggregated into three sub-indices, one for each category: infrastructure, inputs and institutions. Lastly these three sub-indices are combined into the Investment Climate Index, as described in [1.1]. At each stage of the aggregation process principal components and geometric aggregation is employed.[6]

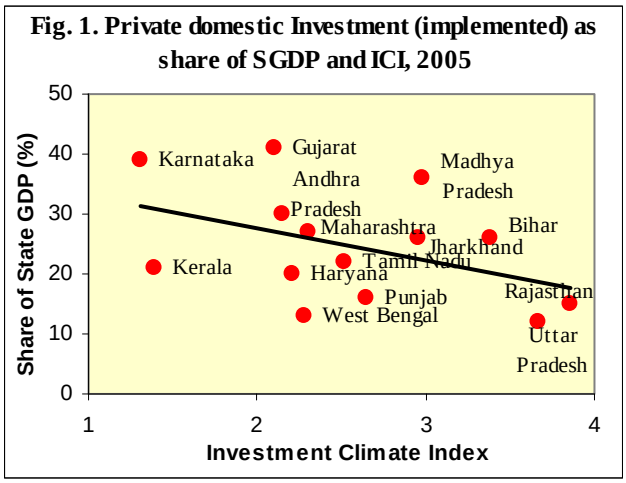
2. Index Reliability

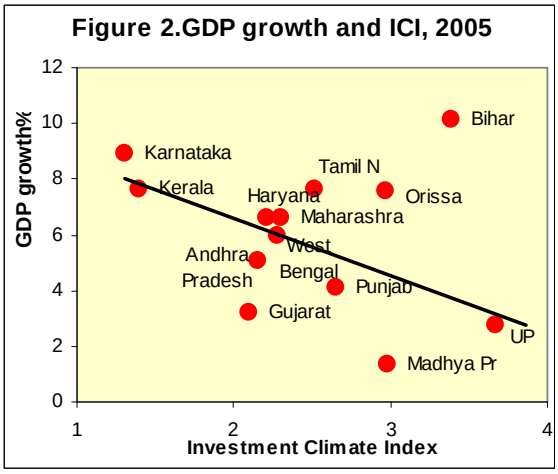
[5] Note that each factor is a liner combination of all variables, each with different coefficients. This implies that each variable has its own 'weight' - represented by the regression coefficient - in the construction of the factor. However, factors are constructed in such a way that only one or few coefficients 'load' heavily on each variable and thus some variables have a real impact on one factor while other variables have an impact on other factor(s).

[6] The appendix reports a graphic representation of the aggregation process.

Because there is no theoretical model on the estimation of the weights used in the construction of our index, before proceeding with the analysis we tested the reliability of the ICI as a predictor of a good investment climate in India by correlating it with a number of other performance indicators.

Being the composite ICI a summary statistics of the quality of the investment climate we expect states with a better investment climate to present a higher level of domestic private investments. Therefore we correlate our ICI with the share of domestic private investment in GDP for the 16 Indian states in our sample. Figures 1 presents this relationship and confirm our hypothesis by showing a clear and significant association between ICI and domestic private investments.[7]





A better investment climate should lead to higher growth and help reduce poverty. To establish this relationship, and the validity of our composite indicator, we also tested the relationship between ICI and GDP growth. Even in this case the data shows a significant association between ICI and state level growth (Figure 2).[8] These tests give us some degree of confidence that ICI is a reliable indicator of the investment climate in India.[9]

[7] The relation is significant at the 12% level. Delhi is omitted because not available and Orissa because it is an outlier. The relation is significant at 6% if Kerala is excluded.
[8] The relation is significant at the 10% level. Ideally we would like to test causality by correlating the ICI with subsequent growth. Unfortunately at the time this paper was finalized data on 2006

3. Analysis of Investment Climate in 16 Indian States

We start our analysis of India's investment climate by first looking at the ranking of our 16 Indian states. When reading this ranking it is important to remember that the ICI, as any index, is very useful at highlighting broad patterns, but should not be taken as indicator of the exact ordinal position of any individual state in the ranking. Since the ICI is a linear combination of factors estimated from a sample of the population, the value of each index has a margin of error. Consequently values that are very close to each other cannot be considered as representing the exact position of a state. So for instance the difference between Jharkhand, Orissa, and Madhya Pradesh in Figure 3 is so small that it would not be correct to assume that the exactly ranking among these 3 states is the one reported on the chart. Rather it is more appropriate to conclude that these 3 states have the same level of investment climate.

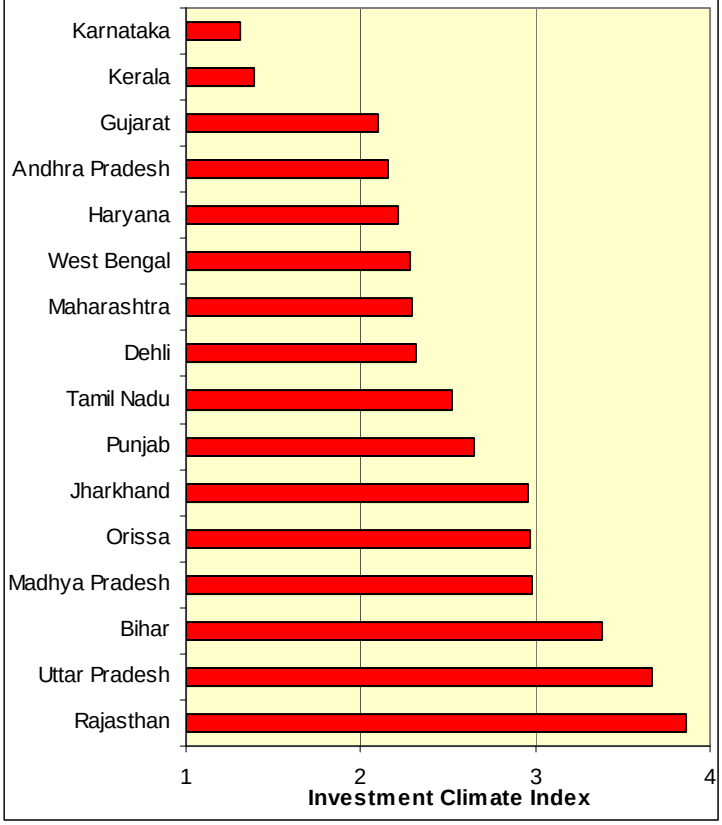
According to the ICI ranking of Figure 3 the states with the best investment climate are Karnataka and Kerala, followed by Gujarat, Andhra Pradesh, Haryana, West Bengal, Maharashtra and Delhi. The worst investment climate is on the contrary found in Bihar, Uttar Pradesh, and Rajasthan (Figure 3).

GDP growth for the 16 Indian states analyzed was not available. In earlier work in a set of 24 ECA countries this relationship has been shown to be significant (see Iarossi, et al. 2007).

[9] Similar significant results were obtained between the ICI and GDP per capita growth as well as between the ICI and the 'Investment Environment' ranking of Indian states reported in the Sept 26 issue of *India Today*.

While it is not surprising to see Karnataka as one of the states with the best investment climate in India the ranking of Kerala within the top tear appears a bit unexpected. A closer examination of the data shows that Kerala consistently scores better than average on most objective and perception indicators, although it appears that Kerala manufacturers and retailers *perceive* their state as having a better business climate than those in the other 15 states in almost all categories of perception questions. Nevertheless perception and objective questions do not contradict themselves in almost all dimensions of the investment climate. Hence although Kerala appears among the most optimistic Indian states, its high ranking does not appears to be driven solely by their perception rankings. As a matter of fact Kerala performs very well on all the 3 categories of indicators, infrastructure, institutions and inputs. More specifically for both objective and perception measures of infrastructure Kerala performs better than average.[10] In objective measures only Karnataka and West Bengal performs better than Kerala in all five indicators. Punjab also performs above average in all indicators but not

Figure 3. Ranking of Business Climate in 16 Indian states



[10] In objective indicators Kerala performs better than average in 4 out of 5 indicators, and in perception measures Kerala performs better than average in all 4 indicators.

as much as Kerala. Within the perception variables Kerala performs above average for all indicators as does Karnataka, Andhra Pradesh, Tamil Nadu, and Orissa.

If we compare objective and perception data on the same investment climate dimensions in Kerala we notice a relative overlap from what the objective and the perception measures indicate.[11] Only in one of the indicators objective and perception data contradict themselves: transport. The reason of such apparent contradiction lies in the fact that 40% of firms in Kerala have their own transport - compared to 11% in the rest of India, so they perceive it less of a problem simply because they are not relying on outside transport. On the other hand objective data show that firms in Kerala suffer losses due to international transport that are 3 times higher than the other firms in India. So in the objective rating Kerala rightly performs worse.[12]

On institutions the picture is the same. In a number of indicators (e.g. corruption, crime) both perceptions and objective measures show that Kerala performs much better than average. There is no instance of contradiction between objective and perception data since a number of perceptions questions measures dimension not measured by objective indicators.

In conclusion, it seems that firms in Kerala tend to complain less about constraints than in other countries. However Kerala is not the only state with above average perception on all indicators. Furthermore the perception and objective data do not contradict themselves. So, it is both perception and objective data that make Kerala second in the ranking. [13]

West Bengal on the other hand ranks higher than many might expect thanks to its high performance on objective indicators of the business environment. As a matter of fact,

[11] As a matter of fact for power where in the objective data Kerala performs worst the perception is the lowest of all
[12] One could argue that there is no contradiction because they measure two separate conditions.
[13] See figures A3-A9 in the Appendix for a detailed representation of the variables employed in the construction of the ICI.

objective indicators in West Bengal show a much lower incidence of power interruption, corruption, and government disservices than in the other 15 states in India. More specifically West Bengal performs well on institutions. This good rating compensates for its relative lower performance on perception indicators both on infrastructure and inputs.

On the other side of the spectrum Delhi and Tamil Nadu appear to be ranked lower than expected. Overall Delhi performs average on infrastructure and poorly on institutions, while Tami Nadu shows the same performance on infrastructure but it scores very poorly on inputs. As a matter of fact while Delhi ranks very well on security, it performs poorly on power. Furthermore Delhi retains the worst performance in terms of corruption within the 16 states under analysis. Tamil Nadu instead performs average on electricity but its ranking is lowered by its poor performance on access to finance, lack of skills, and availability of technology.

Finally at the bottom of the ranking Bihar, Uttar Pradesh and Rajasthan perform poorly on all indicators of infrastructure, institutions, and inputs. Interestingly while Bihar and UP perform similarly worst mainly in infrastructure and less so in institutions and inputs, Rajasthan performs better than the other two on infrastructure but much worse in institutions and inputs. In fact Rajasthan performs close to average on indicators of infrastructure costs, while it is the worst of all states in a number of institution perception questions. Rajasthan performs poorly also on a number of inputs indicators (this helps explains its lower overall ranking). More specifically Rajasthan perform particularly poorly on customs, technology, and labor regulations.[14]

While individual state ranking is interesting in itself, it is more informative to compare the investment climate across typology of states and to identify the key bottlenecks to a better investment climate. India is a continent characterized by states with quite different ranges of economic performance. Some have experienced high growth over the last few years while others have stagnated. Some have considerable level of private investment,

[14] See figures A3-A9 in the Appendix.

while other none. Finally some are considered attractive destinations to FDI and other not. Are these features associated with the quality of the investment climate?

To investigate this relationship we classify the 16 Indian states in our sample in 6 categories: (1) by level of development - according to their per capita income; (2) by growth performance – in proportion to their per capita income growth; (3) by market size - in line with their GDP level; (4) by ease of regulatory environment - according to the ranking of the Doing Business report[15]; (5) by level of FDI attractiveness - depending on the their level of FDI; and (6) by quality of infrastructure – in accordance with their ranking in the infrastructure index published by the Government of India (GoI) in 2000.[16]

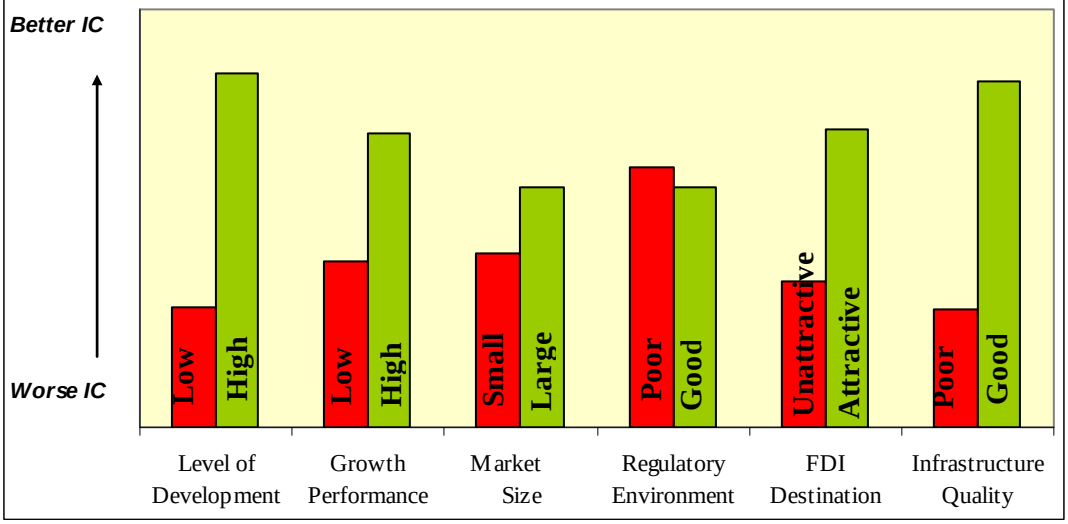
For each of these state typologies we estimate and compare the average value of their ICI ranking. Consequently each column in Figure 4 represents the average quality of the investment climate, as measured by the ICI, for each of these six typologies of states.

The first column shows that a better investment climate is indeed associated with the level of development. More developed states present a much better quality of the investment climate than less developed states. Similarly states that grow faster also show a better business environment. Although unavailability of data makes it hard to establish the order of causality, evidence from other countries[17] shows that the quality of the investment climate is significantly associated with subsequent growth rates.

[15] World Bank (2007)
[16] Source: Report of the Eleventh Finance Commission (for 2000-2005), Government of India, 2000.
[17] More specifically, a similar Investment Climate index in 24 ECA (East Europe and Central Asia) countries (see Iarossi, et al. 2007).

On the other hand, market size has a limited impact on the quality of the investment climate. Large states have almost the same quality of the investment climate than small states. Interestingly the regulatory environment in the 16 states analyzed in this paper does not seem a discriminating factor of the overall investment climate. States that perform poorly on the investment climate composite indicators show the same average ranking in the quality of their regulatory environment than states that have a good investment climate. Since the regulatory environment index measures the *de jure* business environment while the ICI measure the *de facto* assessment of such

Figure 4. Quality of the Investment Climate by typology of states



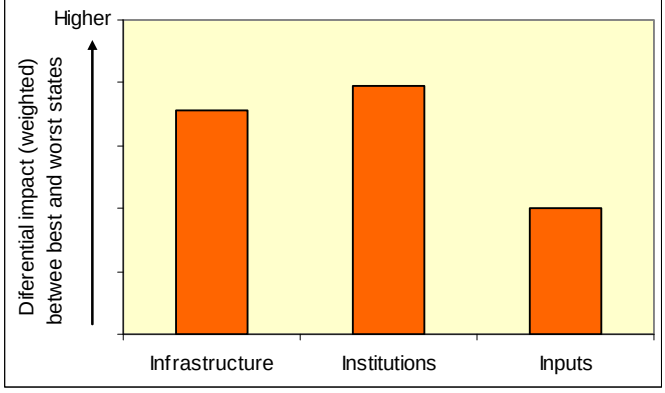
environment, this result seems to indicate that there is a gap between what is seen as the statutory environment of Indian states and the institutional environment in which these rules are applied. Furthermore, even though most of the sample interviewed in the India Surveys includes domestic firms, states with a better investment climate attract more FDI. Foreign investors share the view of domestic investors on the quality of the investment climate in Indian states. Finally, and not surprisingly,[18] the quality of infrastructure has a large impact on the quality of the investment climate. Using the infrastructure quality index developed by the GoI in 2000, states that show a good quality of 'social and economic' infrastructure have a much better investment climate than states with poor infrastructure.

[18] As we will show later, the main determinant of the ICI in India is infrastructure.

What features of the investment climate makes high growth states more business friendly? Why less developed states have a poor business climate? Should states with a weaker regulatory environment concentrate only on improving business regulations in order to improve their investment climate? If we simply compare all the indicators used to describe the investment climate we can see that slow growth states, less developed economies and states with a low level of FDI perform worst in over half of them. We could identify which characteristics of the business environment are more problematic than others, but the list would not provide an order of priority.

The methodology used to build our composite indicator on the contrary enables us to isolate which groups of variables have the most impact on the investment climate in India. By decomposing the ICI we can see that the main drivers to a better business environment in India are represented by variables associated with infrastructure and institutions. As a matter of fact not only these variables explain most of the variance of all the 46 variables representative of the investment climate in India (almost 60%),[19] but infrastructure has the largest difference in indices between best and worst states. This implies that infrastructure and institutions are the variables in which Indian states most often differ and consequently explain most of the variation in the business environment among states. (Figure 5)

Figure 5. Contribution of Infrastructure, Inputs and Instit. sub-indices to ICI, difference between best and worst states



Knowing that infrastructure and institutions are the main impediments to a more friendly business environment does not help policy makers design appropriate interventions. It is important to pinpoint the individual indicators within infrastructure and institutions that contribute most to a poor business climate. We can achieve that by further decomposing

[19] The size of the circle in figure 5 represents the share of total variance explained by each factor.

the infrastructure and institutions sub-indices to identify the indicators that have the highest weight and where the states with a poor ICI perform worst. When we look at the bottom 6 countries in the ICI ranking we notice that among the variables used to build the infrastructure sub-index power, and more specifically the number of power outages and the losses due to power outages, is the single most important infrastructure constraint. This is confirmed by both objective and subjective indicators. The second most important constraint is transportation. In the perception questions on transportation the bottom 6 countries in the ICI ranking perform the worst. Rajasthan is a bit of an exception, since it performs average on electricity. However transportation remains in Rajasthan a key bottleneck.

Within institutions, perceptions and cost indicators show that corruption and tax regulations, including tax administration, are the most important constraints. Finally theft remains problematic for the states showing a poor investment climate ranking.

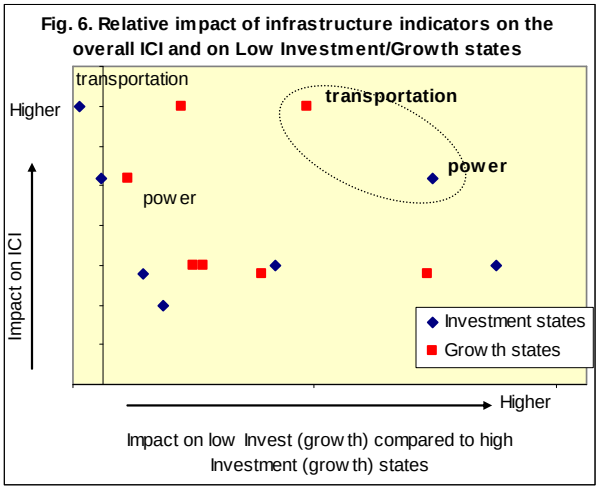


Fig. 6. Relative impact of infrastructure indicators on the overall ICI and on Low Investment/Growth states

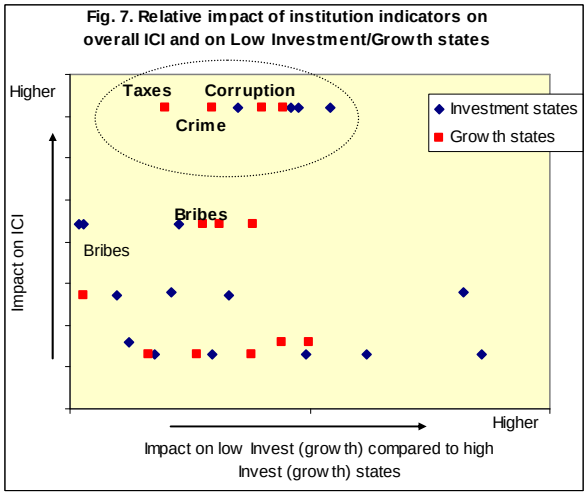


Fig. 7. Relative impact of institution indicators on overall ICI and on Low Investment/Growth states

In order to determine which of the infrastructure and institutions indicators used are most important, we drew a chart that presents on the y-axis the impact of such indicators on the overall ICI. On the x-axis the charts report the difference in magnitude of such indicators between low and high growth (or investment) states. Figure 6 and 7 therefore show the impact of each investment climate variable in low investment (or growth) states[20] as well

[20] Compared to high investment (or high growth) states

its weight in the construction of the composite index. The blue dot in figure 6 labeled 'power' shows that entrepreneurs in states with lower levels of private domestic investment complain more about cost of power than those in states with higher levels of domestic investments[21]. Similarly the red dot labeled 'transportation' shows that transport appears more of a constraint to businesses in states that show lower levels of growth compared to fast growing states. Both these indicators present the highest values on the y-axis, meaning that they are the most important indicators in the construction of the overall ICI. On the contrary figure 7 shows that the most important institution bottlenecks in the construction of the ICI, such as corruption, crime and tax regulations, are all considered equally binding by managers in both slow growth as well as low investment states.

4. Conclusions

In closing, this paper has shown that by building a composite indicator of the investment climate in 16 Indian states, it is possible to identify an order of priority among the most important bottlenecks to a better business climate in India. The analysis of 46 investment climate variables shows that power, transportation, corruption, tax regulations and theft remain the major bottlenecks policymakers need to address in order to improve the business environment in India. This conclusion is confirmed by evidence that infrastructure is particularly binding to states that present a low level of investment and growth. On the contrary, institutions appear to impact high growth (or investment) states as well as low growth (or investment) almost equally.

[21] Figure 6 shows on the x-axis the difference in the level of each constrain between low investment (or low growth) and high investment (or high growth) states, and on the y-axis the importance of the indicators in the construction of the ICI (represented by the share of variance explained by each factor). Consequently values at the top right of the figure represent business environment indicators that have the highest weight in the ICI and for which each category of states performs differently than the other.

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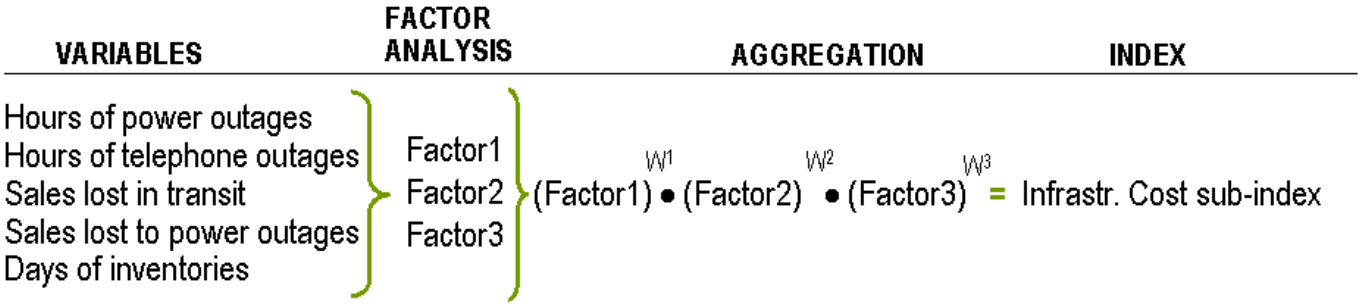
APPENDIX

Appendix 1 – Graphic representation of aggregation process in the construction of the Investment Climate Index (ICI)

Figure A1. First step in the ICI construction



Where:
Factor1 = α Hours of power outages + β Sales lost to power outages

Figure A2 Second and third step in the ICI construction

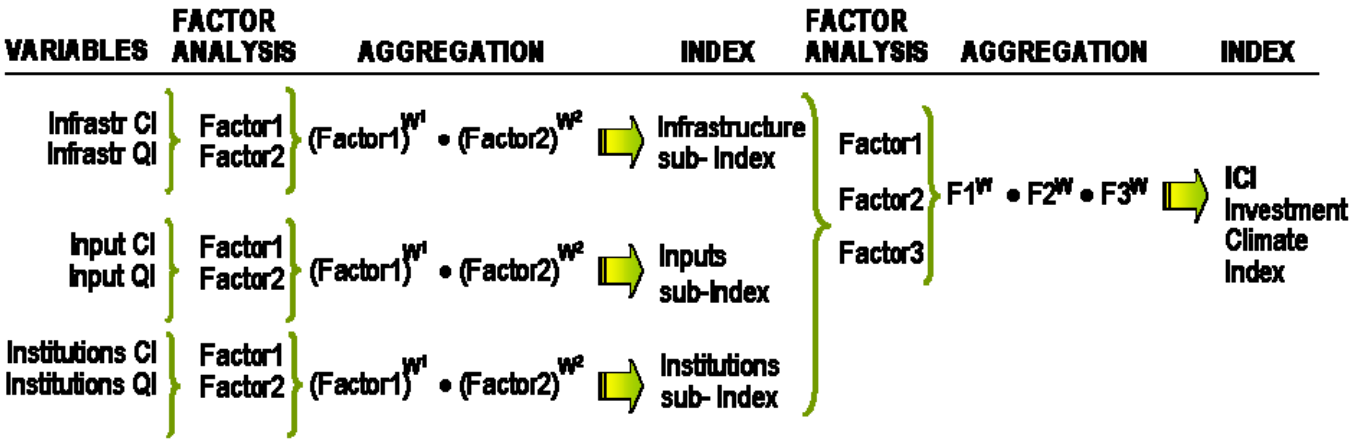


Table A1. Correlation matrix among 'infrastructure' variables (standardized values)

	Power outages	Telephone outages	Sales lost in transit	Sales lost due to power	Days of inventories	Perception on electricity	Perception on telecom	Perception on transport	Perception on access to land
Hours of power outages	1								
Hours of telephone outages	0.4889	1							
Percentage of sales lost in transit	-0.0039	0.2729	1						
Ptg of sales lost due to power outages	0.5333	0.3667	0.4783	1					
Days of inventories kept for main input	-0.1679	0.071	-0.3242	-0.3988	1				
Perception on electricity	0.8089	0.2038	0.1399	0.6666	-0.2347	1			
Perception on telecom	0.0128	0.2658	0.6786	0.4867	-0.4713	0.2389	1		
Perception on transport	-0.0654	-0.0359	0.2275	0.2475	-0.0706	0.2412	0.5722	1	
Perception on access to land	0.1597	0.1062	-0.0095	0.3809	-0.1582	0.2565	0.1828	0.4463	1

Table A2. Correlation matrix among 'institutions' variables (standardized values)

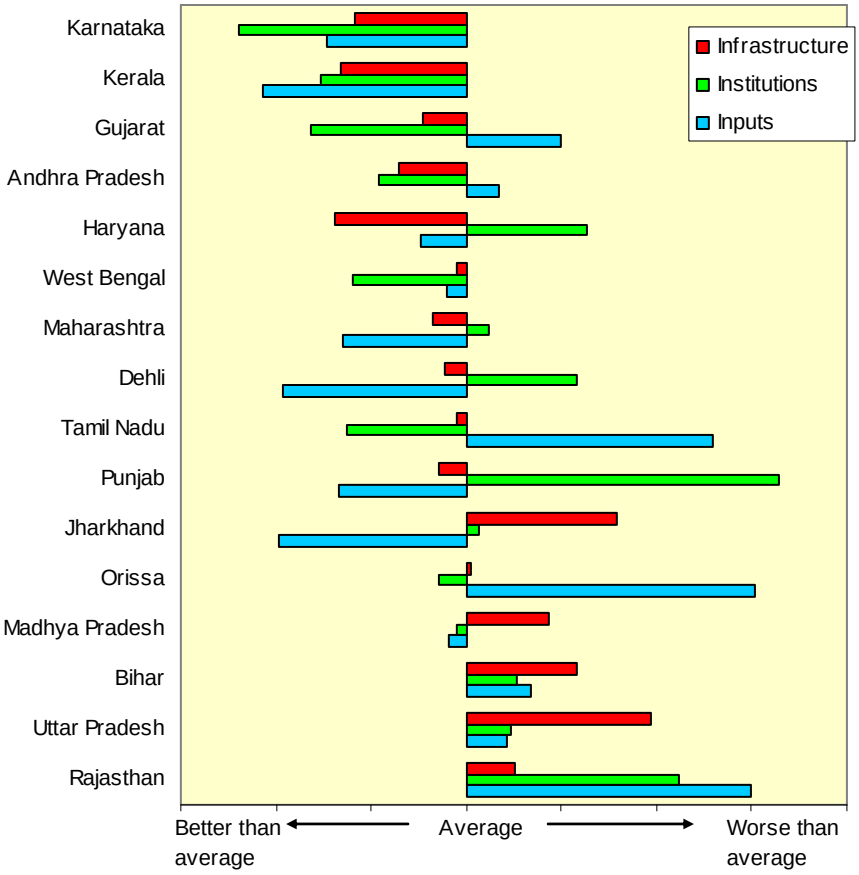
	Law & order: security cost	Law & order: losses due to theft	Manager time dealing with regulations	Days spent with officials	Tax evasion (% of sales not declared)	Days for a telephone connection	Days to obtain an electric connection	Days for a construction permit	Bribes to "get things done"	Ptg firms reporting officials request gifts	Ptg firms reporting gifts to obtain a power connection	Ptg firms reporting gifts to obtain a telephone connection
Law & order: security cost	1											
Law & order: losses due to theft	0.7425	1										
Manager time dealing with regulations	0.5041	0.4364	1									
Days spent with officials	-0.0417	0.4088	-0.0366	1								
Tax evasion (% of sales not declared)	-0.0629	-0.2611	0.093	-0.4726	1							
Days for a telephone connection	0.6701	0.5032	0.8501	-0.2753	0.0554	1						
Days to obtain a electric connection	0.4879	0.4184	0.147	-0.2453	0.1039	0.3396	1					
Days for a construction permit	0.2321	0.3733	0.2875	0.079	-0.2781	0.2719	0.0558	1				
Bribes to "get things done"	0.3277	0.0451	0.2778	-0.2948	0.2075	0.4377	-0.0691	0.4352	1			
Ptg firms reporting officials request gifts	-0.1856	0.1182	-0.1092	0.5248	-0.2988	-0.2439	-0.631	0.0783	0.0348	1		
Ptg firms reporting gifts to obtain a power connection	-0.4992	-0.2026	-0.0253	0.404	-0.1264	-0.4137	-0.2339	0.1989	-0.3408	0.2167	1	
Ptg firms reporting gifts to obtain a telephone connection	-0.3922	-0.0596	-0.0353	0.6377	0.0095	-0.4014	-0.6479	-0.1376	-0.3254	0.6163	0.6097	1
Ptg firms reporting gifts to obtain a construction permit	-0.3679	-0.0416	-0.3357	0.4988	-0.2933	-0.4279	-0.5932	0.3185	0.1317	0.7342	0.341	0.5321
Ptg firms reporting gifts to obtain a main operating license	-0.1779	0.142	-0.0686	0.5736	-0.2746	-0.2495	-0.4693	0.3475	0.1154	0.6423	0.4348	0.5887
Average time to reach a court judgment	0.314	0.5138	-0.0859	0.1271	-0.1208	0.0831	0.6302	0.3247	0.0594	-0.3696	-0.0195	-0.3067
Perception of law & order: crime	0.2683	0.4287	0.1871	0.0898	-0.0532	0.3379	-0.0919	-0.0739	0.0861	0.5339	-0.2307	0.1561
Perception of corruption	-0.2315	0.0188	-0.2048	0.183	-0.0904	-0.1516	-0.4326	-0.3475	-0.2971	0.616	0.0278	0.4848
Perception on licensing & permits	-0.1514	0.0835	-0.1985	-0.0301	-0.178	-0.1349	-0.1957	-0.1377	-0.3225	0.3497	-0.146	0.0538
Consistent interpretation of rules	-0.5019	-0.1741	-0.2092	0.224	0.2505	-0.2831	-0.5086	-0.3589	-0.2524	0.5476	0.1563	0.6426
Perception of tax administration: rates	-0.5676	-0.1335	-0.3008	0.3862	-0.0217	-0.4336	-0.5638	-0.2316	-0.3305	0.725	0.3345	0.7324
Perception of tax administration: administration	-0.2932	-0.1267	-0.4759	-0.0717	0.2092	-0.2289	-0.3494	-0.0775	0.0547	0.3	-0.124	0.1803
Perception of functioning of judicial system	-0.0671	-0.0536	-0.2938	-0.0506	0.4975	-0.1387	0.2631	-0.2556	0.07	-0.142	-0.0517	-0.0124

	Ptg firms reporting gifts to obtain a construction permit	Ptg firms reporting gifts to obtain a main operating license	Average time to reach a court judgment	Perception of law & order: crime	Perception of corruption	Perception on licensing & permits	Consistent interpretation of rules	Perception of tax administration: rates	Perception of tax adm: administration	Perception of functioning of judicial system
Ptg of firms reporting gifts to obtain a construction permit	1									
Ptg of firms reporting gifts to obtain a main operating license	0.8905	1								
Average time to reach a court judgment	-0.034	-0.0076	1							
Perception of law & order: crime	-0.0075	-0.0545	-0.1484	1						
Perception of corruption	0.2003	0.0348	-0.3106	0.7924	1					
Perception on licensing & permits	-0.0497	-0.1623	-0.2345	0.5383	0.6084	1				
Quality of adm.: consistent interpretation of rules	0.2812	0.1508	-0.3796	0.5412	0.8039	0.526	1			
Perception of tax administration: rates	0.539	0.362	-0.2466	0.4632	0.8105	0.466	0.888	1		
Perception of tax administration: administration	0.4457	0.2126	-0.0032	0.3315	0.5381	0.2387	0.5541	0.4963	1	
Perception of functioning of judicial system	0.0305	-0.0677	0.2772	0.0427	0.0713	-0.4557	0.1205	0.0547	0.47	1

Table A3. Correlation matrix among 'inputs' variables (standardized values)

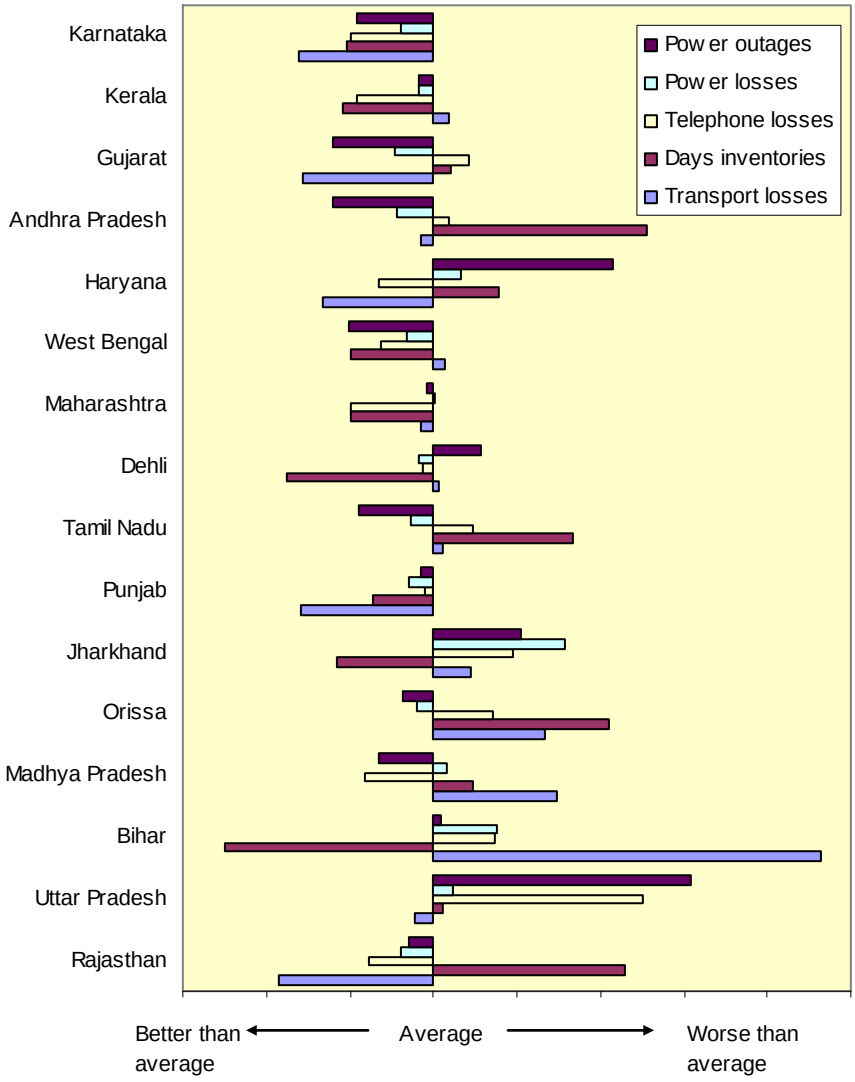
	Excess labor	Cost of finance: value of collateral required	Proximity to raw materials	Proximity to domestic customers	Share of firms using new technology	Trade credit: share of sales sold on credit	Trade credit: share of inputs bought on credit	Share of short term finance obtained by banks	Share of long term finance obtained by banks	Short term finance represented by trade finance	Duration of loan	Perception on access to finance
Excess labor	1											
Cost of finance: value of collateral required	-0.1531	1										
Proximity to raw materials	-0.1767	0.4234	1									
Proximity to domestic customers	0.1309	0.3021	0.0313	1								
Share of firms using new technology	0.3304	0.3525	0.1317	0.8316	1							
Trade credit: share of sales sold on credit	0.0295	0.1113	-0.0587	0.4446	0.4589	1						
Trade credit: share of inputs bought on credit	0.4344	-0.1426	0.194	0.2463	0.4814	0.4331	1					
Share of short term finance obtained by banks	0.0386	0.488	0.6217	0.4482	0.4415	-0.0012	0.3024	1				
Share of long term finance obtained by banks	-0.2881	0.1423	0.4496	-0.125	0.0753	-0.0665	0.3026	0.562	1			
Short term finance represented by trade finan	0.4331	-0.1808	-0.3024	-0.2807	-0.0859	-0.2848	-0.324	-0.2171	-0.195	1		
Duration of loan	0.2177	-0.1211	-0.2198	0.3954	0.3358	0.688	0.5399	-0.0379	-0.2216	-0.3211	1	
Perception on access to finance	-0.2141	0.1942	-0.2291	-0.1988	-0.2413	-0.1815	-0.3067	-0.1041	-0.0466	0.1311	-0.4652	1
Perception on labor regulations	0.2904	0.149	-0.2689	0.6087	0.3246	-0.0419	0.0081	0.1271	-0.4844	-0.0915	0.2071	0.1347
Perception on customs	0.1814	0.1556	-0.0904	0.4906	0.5522	0.0683	0.4439	0.1316	-0.0117	-0.4301	0.2344	-0.0248
Perception on availability of skills	-0.2281	-0.0307	-0.2308	-0.1851	-0.1538	-0.2998	0.0241	-0.1721	0.1462	-0.0797	-0.2284	0.6375

Figure A3. Value* of infrastructure, Institutions, and Input variables used in the construction of the ICI, by state (standardized)



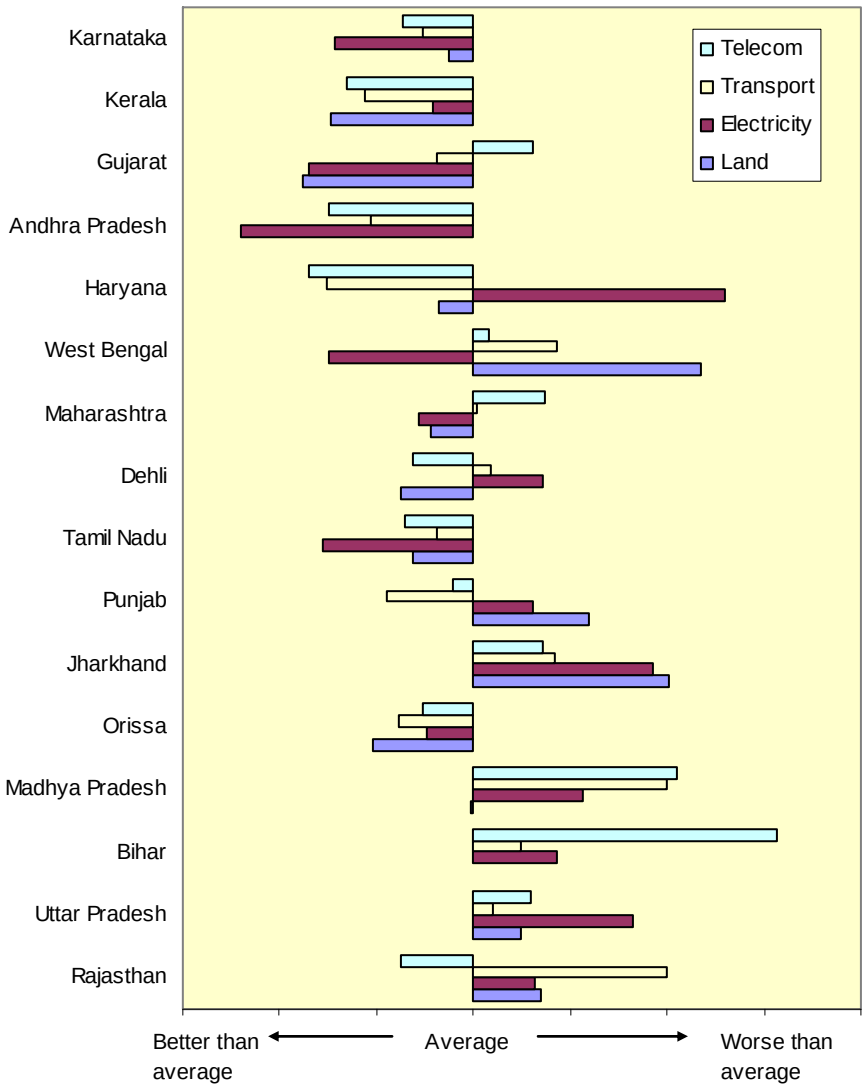
* Values as estimated using only the most important component weighted by its factor coefficient

Figure A4. Value* of infrastructure cost variables used in the construction of the ICI, by state (standardized)



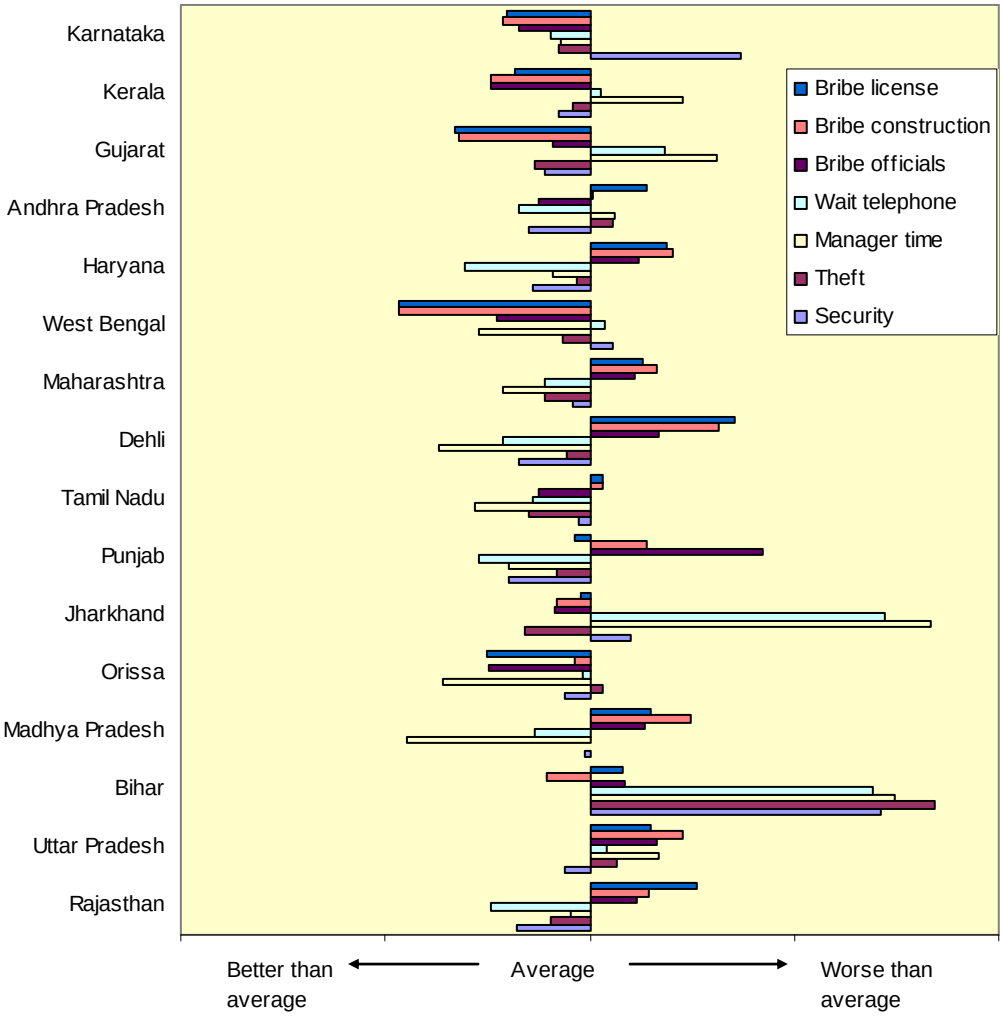
* Values as estimated using only the most important component weighted by its factor coefficient

Figure A5. Value* of infrastructure perception variables used in the construction of the ICI, by state (standardized)



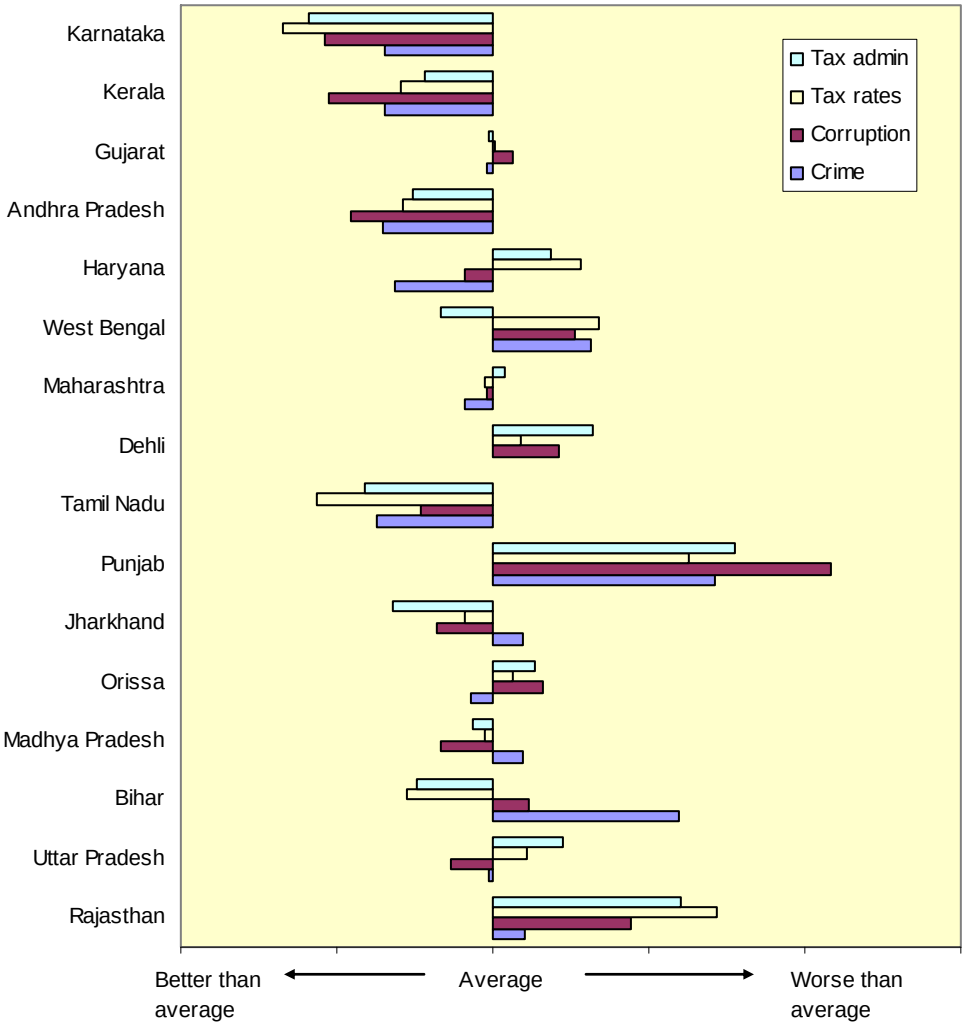
*Values as estimated using only the most important component weighted by its factor coefficient

Figure A6. Value* of most important institution cost variables used in the construction of the ICI, by state (standardized)



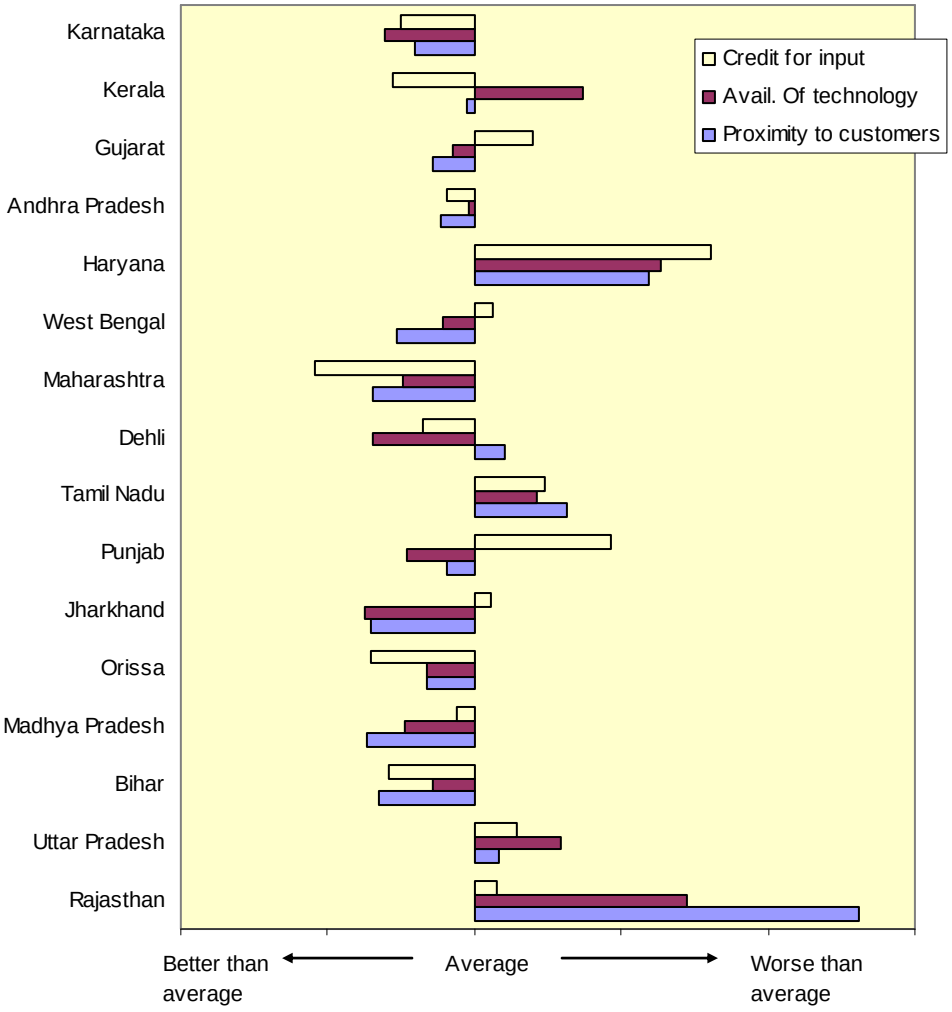
*Values as estimated using only the most important component weighted by its factor coefficient

Figure A7. Value* of most important institution perception variables used in the construction of the ICI, by state (standardized)



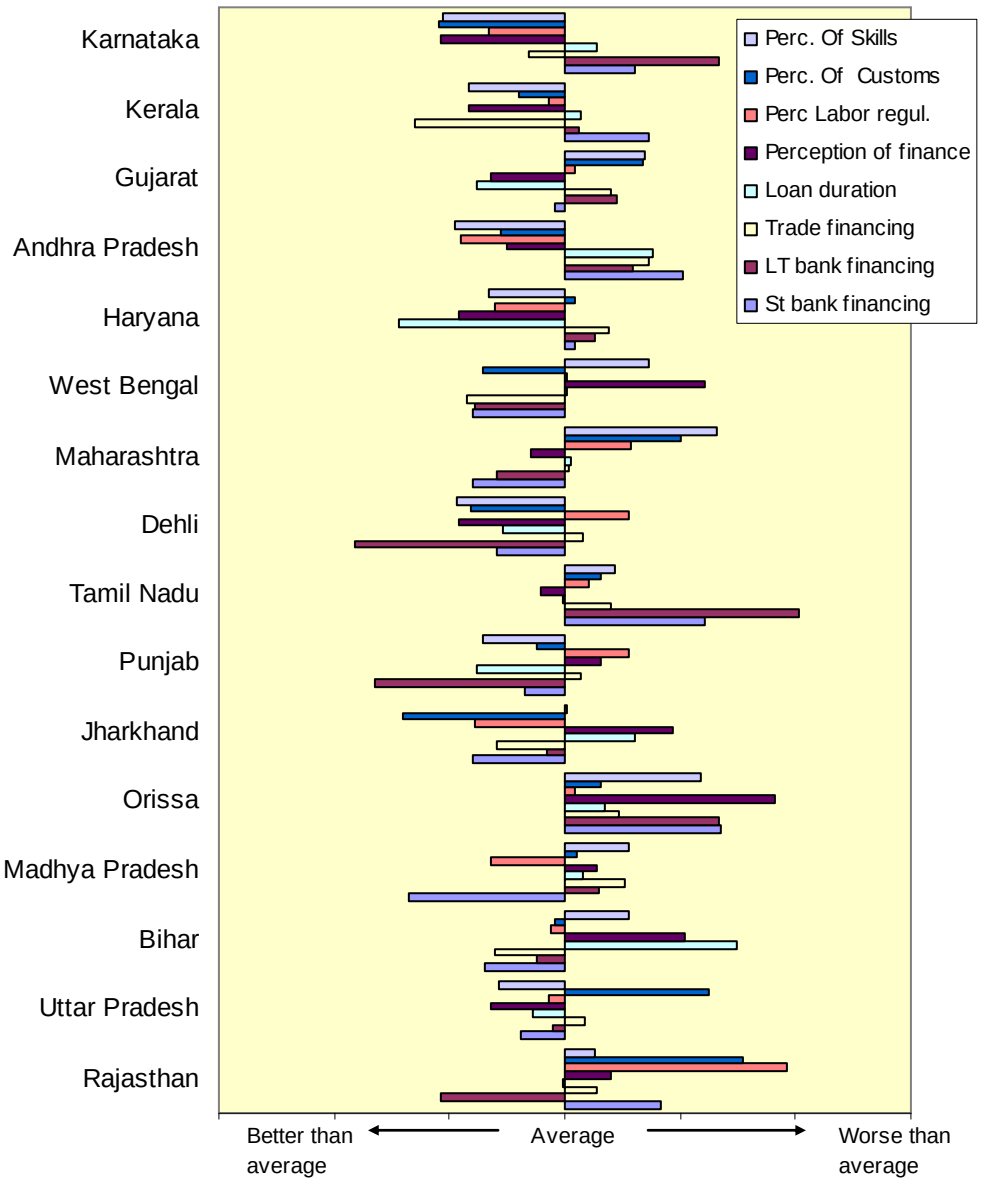
* Values as estimated using only the most important component weighted by its factor coefficient

Figure A8. Value* of most important Input cost variables used in the construction of the ICI, by state (standardized)



* Values as estimated using only the most important component weighted by its factor coefficient

Figure A9. Value* of Input perceptions variables used in the construction of the ICI, by state (standardized)



* Values as estimated using only the most important component weighted by its factor coefficient