How are the States Doing?

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Section 1: Introduction

This is a study done by the Rajiv Gandhi Institute for Contemporary Studies (RGICS) for the Confederation of Indian Industry (CII). Although done for CII, the work was done by RGICS, more specifically, three individuals - Bibek Debroy, Laveesh Bhandari and Nilanjan Banik. Hence the blame and hopefully, the credit, vests with these three individuals.

As a result of economic reforms, the focus of policy change has moved to the level of the States. The cutting, or blunting edge, of reforms is now more often at the level of the States, especially since all factor markets are either in the State list or the Concurrent List of the Constitution. Different States have reacted differently to reforms. Inter-State or inter-regional disparities in performance are not a post-reform phenomenon, but have probably increased in importance after 1991. It is therefore important to ask, how are the States and Union Territories doing?

The expression "States and Union Territories" needs to be defined. Ideally, we would have liked to include all of the following - Andhra Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal, Andaman and Nicobar Islands, Arunachal Pradesh, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Lakshadweep, Manipur, Meghalaya, Mizoram, Nagaland, Pondicherry, Sikkim and Tripura. However, data availability was a constraint. Therefore, Andaman and Nicobar Islands, Arunachal Pradesh, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Jammu and Kashmir, Lakshadweep, Manipur, Meghalaya, Mizoram, Nagaland, Pondicherry, Sikkim and Tripura had to be dropped. Generally, these are also Union Territories or Special Category States and it is not quite fair to club them with the rest. Dropped does not mean that the data for these are not reported. Data are reported when available. However, these are not included in the rankings. That is, the rankings are done for eighteen States - Andhra Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Section 2: The Methodology

Many factors or variables affect the rating of a State. It is necessary to form a composite or aggregate index that incorporates all these diverse variables into a single or summary measure. The problem in developing a composite index is that related to the process of integrating various variables into a single measure. The identification of weights to be assigned to different variables is one such issue in the creation of a composite index. There are different methods available to form a composite index. One way to do this is to use subjective preferences to identify the magnitude of weights to be assigned to each factor or variable.

Another method, which reduces subjectivity, is to use a type of Factor Analytic Model called Principal Components Analysis (henceforth PCA). PCA is one of the better methods of computing composite indices where the analysis involves relatively low levels of subjectivity on the part of the researcher. This well used econometric tool assigns weights to variables based on relationships among them and therefore minimizes subjectivity. This is the main departure with similar exercises

conducted to rank States or even countries. There is no subjective or perceptional element in our exercise. The details of this methodology are presented now.

Principal Component Analysis is a part of the Factor Analytic Model. To derive the composite index for States, the following steps were followed:

Step 1: Identification of appropriate categories
Step 2: Identification of appropriate variables under each category
Step 3: Collecting information and normalization
Step 4: Missing data and imputations
Step 5: Generating composite indices

Since the main objective was the determination of the performance rankings of the States, following the received literature and available economic evidence, the following criteria were judged as important a priori:

1. General achievement of the State
2. Investment climate
3. Infrastructure penetration
4. Efficiency of infrastructure
5. Finance
6. Consumer purchases of goods and durables
7. Personal finance
8. Expenditure on employment, education and health
9. Labour
10. Social sector indicators
11. Environmental indicators
12. Law and order, justice
13. Indicators of affluence
14. Mass media penetration

These fourteen categories are thus what we have referred to in Step 1 above. Of these fourteen categories, as will be further explained below, two suffered from severe data limitations - efficiency of infrastructure and environmental indicators. So, although the data are given where available, these were dropped from the composite index. The composite index is therefore based only on twelve categories - general achievement of the State, investment climate, infrastructure penetration, finance, consumer purchases, personal finance, expenditure on employment, education and health, labour, social sector, law, order and justice, affluence and mass media penetration.

Five to seven variables were used for each of these categories. The data were collected from diverse sources and appropriately normalized to account for differences across States. The data pertain generally to the 1990s, more commonly, the second half of the 1990s. Data sources are appropriately indicated in the data tables.

For some variables, data were not available for some States. For reporting purposes, the missing data are not included. However, this creates a problem for the composite index creation exercise. This is so because it is not possible to aggregate various variables into a single one when some data are missing. If only those variables are used for which data for all States are available, then very few variables would be usable. Consequently, the figures where data were missing were imputed.

The imputation was done on the following basis. The variables for which most State data were available were used as explanatory variables in an Ordinary Least Squares (OLS) multivariate regression with the variable with the missing data as the dependent variable. On the basis of the relationship so estimated, the missing data were calculated (or imputed). The results so obtained were also cross-checked with other similar data. Note that the imputation was done by using variables within a category. This was to avoid the impact of other categories showing up. In that sense, care was taken to keep the categories as mutually exclusive as possible.

Thus, data for all the major States and all the variables identified were generated. Next principal components factor analysis methods were used to generate the composite indices. This was done in a two step procedure. First, the indices were generated at each category level. That is, for each of the twelve categories mentioned, there is a ranking across States, which is reported.

Once all the indices for all the categories were generated, then the same procedure was used to derive the overall performance index for each State. This procedure used the twelve individual indices mentioned earlier.

To recapitulate briefly, PCA undertakes the following steps:

1. First the analysis involves standardization of data in question. This is done for many reasons. One such reason is that standardization (that involves subtraction of the mean value and division by the standard deviation) eliminates unnecessary weights given to some measures on account of their high unit values.
2. Following the standardization, PCA involves finding that relationship between the variables that explains the maximum possible variation in the total data. This is done by generating various factors.
3. Each factor is nothing but a linear weighted combination of the various variables used. The factors are ranked according to their ability to explain the maximum possible variation among all the variables. The factors are ranked according to their ability to explain the total variance. In all the indices calculated, we used the first factor only. The first factor in all the cases, explained more than 60 per cent of the variation.
4. Such analysis sometimes involves giving negative weights to some of variables. However, no negative weights are observed in any of the indices generated by our exercise.
5. Once the weights for each measure are obtained (also sometimes referred to as factor loading), then the composite index was calculated as the weighted average. The rankings were done on this basis.
6. The indices calculated for each of the twelve categories were then used to calculate the composite index. The methodology for the composite index was the same as the above (starting from step 1).

More specifically, PCA develops a composite index by defining a real valued function over the relevant variables which would permit defining the performance of States objectively. A set of assumptions behind our method of construction of a composite index is given below:

1. The condition of weak Pareto rule demands that when a State registers values of indicators uniformly higher than those of the other States - the former should have a higher ranking than the latter ones;
2. The condition of non-dictatorship implies that no single indicator should be considered so significant as to determine the final ordering all by itself;
3. The condition of unrestricted domain implies that the method should be capable of giving the final ranking for all possible data matrices;
4. The final condition is that of independence from irrelevant alternatives, which demands that while ranking two States, the decision must be guided by the values of the indicators for these units under study alone and not by any other irrelevant phenomenon.

With these general assumptions, the composite index is defined as,

$$C_i = W_1x_{11} + W_2x_{12} + W_3x_{13} + \ldots\ldots\ldots + W_nx_{1n}$$

or, $C_i = \sum W_i\, x_{ij}$, where C_i is the composite index for the i^{th} observation, W_j is the weight assigned to the j^{th} indicator and x_{ij} is the observation value after elimination of the scale bias.

From the above stated formula of the composite index, it is evident that to compute the composite index two major components need to be known, that is, the weights assigned to the indicators and the observation values after elimination of the scale bias for available indicators. These two issues are now discussed.

Variables chosen for any analysis are usually measured in different units and are generally not additive. Hence, it is necessary to convert them into some standard comparable units such that the initial scales chosen for measuring them do not bias the results. The method that was adopted to achieve this is by standardizing the variables in the following way:

$$x_{ij} = (X_{ij} - X_m / \sigma)$$

where x_{ij} is the scale free observation, X_{ij} is the original observation and X_m is the mean of the series and σ is the standard deviation.

The transformed series now will be scale free and will have a mean of zero and a standard deviation of unity.

Once the bias of measurements is removed from the observations, the crucial problem that remains is that of assigning appropriate weights to the selected indicators or variables. If one has sufficient insight into the nature and magnitude of interrelationships among the variables and their implications, one might choose to determine the weights on the basis of independent judgment. This way of constructing an index stands exposed to subjectivity. Assigning equal weight (or no weight) would imply assumption of equal correlation of each indicator with the composite index of performance, which would hardly be a realistic approach in this case. Therefore, in this analysis, the weights for individual variables or indicators have been assigned on the basis of the factor analytic model.

Factor analysis is a tool used to construct a composite index in such a way that the weights given maximize the sum of the squares of correlation (of the indicators with the composite index). The application of Factor Analysis or Principal Component Analysis in this specific case has been accepted as an 'objective ranking' of States. This method enables one to determine a vector known as the first Principal Component or Factor, which is linearly dependent on the variables, and also has the maximum sum of squared correlation with the variables.

The weights to the indicators are chosen in a way such that the Principal Components satisfy two conditions:

a) The number of principal components are equal to the number of indicators and are un-correlated or orthogonal in nature.

b). The first principal component or P_1 absorbs or accounts for the maximum possible proportion of variation in the set of indicators. This is the reason why it serves as the ideal measure for constructing a composite index.

Accordingly, here are the steps followed.

Step 1 We start by taking the simple correlation coefficients of the k numbers of indicators. These correlation coefficients may be arranged in a table which is called the correlation table. The elements of the diagonal would be unity as they are the self-correlation, that is, the correlation of each X_i with itself ($r_{xi\ xi} = 1$ for all the i's). The correlation matrix is symmetrical, that is, the elements of each row are identical to the elements of the corresponding columns, since $r_{xi\ xj} = r_{xj\ xi}$.

Correlation Table of the set of K Variables

	X_1	X_2	X_3	X_k	$\Sigma^k_i\ r_{xi\ xj}$
X_1	$r_{x1\ x1}$	$r_{x1\ x2}$	..	$r_{x1\ xk}$	$\Sigma^k_i\ r_{x1\ xi}$
X_2	$r_{x2\ x1}$	$r_{x2\ x2}$	..	$r_{x2\ xk}$	
"	..	..	..	..	
"	..	..	..	..	
X_k	..	..	..	..	
"	$r_{xk\ x1}$	..	..	$r_{xk\ xk}$	
$\Sigma^k_i\ r_{x1\ xj}$	$\Sigma^k_I\ r_{xi\ x1}$	$\Sigma^k_i\ r_{xi\ x2}$	$\Sigma^k_i\ r_{xi\ x3}$	$\Sigma^k_i\ r_{xi\ xk}$	$\Sigma^k_i\ \Sigma^k_i\ r_{xi\ xj}$

Step 2 Sum of each column (or row) of the correlation table is computed, obtaining k number of sums of simple correlation coefficients.

$$\Sigma^k_i\ r_{xi\ xj} = \Sigma^k_i\ r_{xi\ xj}$$

Step 3 We compute the sum total of the column (or row) sums

$$\Sigma^k_i\ \Sigma^k_j\ r_{xi\ xj}$$

and we take its square root.

Step 4 Finally, we obtain the factor loadings for the first Principal Component P_1 by dividing each column (or row) sum by the square root of the grand total.

$$a_{ij} = (\Sigma^k_i \, r_{xi\ xj}) / (\sqrt{\Sigma^k_i} \, \Sigma^k_i \, r_{xi\ xj})$$

It should be clear that the loadings thus obtained are the correlation coefficients of the respective indicator with the composite index.

Step 5 The P_1 or the first Principal Component is constructed in the following way.

$$P_1 = a_{11} x_1 + a_{12} x_2 + \ldots\ldots\ldots + a_{1k} x_k$$

Step 6 The sum of the squares of the loading of the Principal Component is called the latent root (or eigen value) of this component and is denoted by the Greek letter l with the subscript of the Principal Component to which it refers. For example, the latent root of the first Principal Component P_1 is

l_1 = [latent root of P_1]

$= \Sigma^k_i \, 1^2_I$

$= 1^2_1 + 1^2_2 + \ldots + 1^2_k$

The sum of the latent roots of all the Principal Components will be equal to the number of indicators -

$$\Sigma^k_i \, l_i = k$$

The importance of the latent root or the eigen value lies in the fact that it expresses the percentage of variation in the set of indicators that the Principal Component explains. If for example, $l_1 = 2.797$ and the number of variables are 8, then P_1 expresses -

$l_1 / k = (2.797/8)*100 = 35\ \%$ of the variation in the set of 8 variables.

Tests of significance of the loadings: the loadings in our study have been tested based on the levels of significance of Pearson Correlation coefficients.

In this particular exercise, we have attempted a method of normal or single stage Principal Component Analysis, as well as Multi-Stage Principal Component analysis. For performing the single stage Principal Component Analysis, all the indicators are taken together and the earlier discussed procedure is followed. The Multi-Stage Principal Component Analysis is to divide the selected variables into well defined subgroups depending on the nature of the indicators. Within a subgroup, they have a high degree of inter-correlation, while the canonical correlation between pairs of subgroups is low on an average. The Principal Component Analysis has then been applied to each of these sub-groups of variables. The first Principal Components obtained from different subgroups have been treated as a set of new variables and combined at a second stage to obtain the final composite index. It has been argued that this method overcomes the necessity of taking more than one principal component in the analysis, since the correlation among the variables in a subgroup is generally high and consequently, the first Principal Component explains an 'adequate' proportion of variation in the data matrix.

Section 3: Data

The data sources are given in the data tables that follow. We began the process by collecting around 120 variables for the States. Many of the variables however duplicated what was being captured by other variables. Hence we reduced the set of 120 variables to 83, the intention being to include between five to ten variables for each of the fourteen categories mentioned. The 83 variables are distributed across the fourteen categories or heads in the following way.

I. General Achievement of the State

1. Per capita state domestic product in 1998, current prices
2. Fiscal deficit as percentage of state domestic product
3. Average annual rate of growth in state domestic product
4. Head count (poverty) ratio
5. Net loans in 1997-98, as percentage of state domestic product

II. Investment Climate

1. Average annual industrial entrepreneurs' memoranda plus letters of intent
2. FDI approvals (1998-99) as share of manufacturing output
3. Inverse of sick SSI units as share of total SSI units
4. Employees in BIFR firms/total number of workers
5. 15-49 (or 15-39) population as percentage of total population
6. High density electricity consumption
7. Actual inflow of private and government investments

III. Infrastructure Penetration

1. Villages with telephones as percentage of total villages
2. Villages with electricity as percentage of total villages
3. Road length/total area
4. Rail length/total area
5. Habitats with drinking water/total habitats
6. Number of net subscribers/total population
7. Number of airports with scheduled commercial flights

IV. Efficiency Of Infrastructure (Dropped From The Final Ranking)

1. Backlog of telephone applications/total number of telephones
2. Inverse of average shipping turn around time
3. Power production not lost in T&D
4. Inverse of average time taken by goods trains
5. Inverse of average time taken by goods vehicles

V. Finance

1. Number of brokers and sub-brokers/total population
2. Number of bank branches/total population
3. Amount of commercial bank credit/total manufacturing output
4. Agricultural credit/gross agricultural output
5. Average annual change in commercial bank credit, 1991-97
6. Small savings/population
7. Contribution of finance to State output/small savings
8. Contribution of finance to State output/population

VI. Labour

1. Inverse of incidence of strikes/total workers
2. Inverse of incidence of lockouts/total factories
3. Number of seats in industrial training colleges & institutes/15-49 age group
4. Literacy rate
5. Number of workers/15-49 age group

VII. Social Sector Indicators

1. Female literacy
2. Population served by doctors/total population
3. Percentage of rural population with access to drinking water
4. Health centres in position/required
5. Daily newspapers/1000 population
6. BCG vaccinations (%)
7. Ratio of secondary enrolment to primary enrolment as measure of continuing education

VIII. Environment (Dropped From Final Ranking)

1. Total forest area/total area
2. Inverse of degraded area/total area
3. Inverse of State-wise consumption of fertilizers/total area
4. Inverse of State-wise consumption of pesticides/total area
5. Total replenishable ground water resources/total area
6. Inverse of index on urban air quality
7. Change in forest cover between 1993 and 1997

IX. Law And Order, Justice

1. Inverse of human rights violation/total population
2. Inverse of rate of murder/lakh population
3. Policemen per million population
4. Inverse of index of violence
5. Inverse of number of cases/population
6. Total cases instituted/pending cases
7. Working judges/lakh cases instituted

8. Cases disposed/working judges

X. Affluence

1. Number of affluent households/total households
2. Number of affluent households/total households (rural)
3. Number of affluent households/total households (urban)
4. NCAER estimates of medium and high income households

XI. Mass Media Penetration

1. Cable television/population
2. Radios/population
3. Televisions/population
4. Newspapers sold/population
5. Literacy rate

XXII. Consumer Purchases

1. Two-wheelers/population
2. Cars, jeeps/population
3. Television sets/population
4. LPG sales/population
5. Telephones/population
6. Expenditure on fuel/population

XXIII. Personal Finance

1. Percentage of households with bank or post office savings accounts
2. Households having operated accounts less than three months ago
3. Number of accounts/total population
4. Per capita deposits in individual accounts

XIV Employment, Education, Health

1. Education expenditure/monthly per capita expenditure
2. Medical expenditure/monthly per capita expenditure
3. Male work participation rate
4. Female work participation rate
5. Literacy rate

Section 4: The Findings

We first give the rankings for the eighteen States in accordance with the twelve categories.

	General achievement	Investment climate	Infrastructure penetration	Finance	Labour	Social sector
Andhra Pradesh	12	9	10	10	3	13
Assam	17	17	6	12	13	11
Bihar	18	18	17	17	18	18
Delhi	4	16	1	1	9	1
Goa	2	4	9	3	5	3
Gujarat	5	1	7	5	2	9
Haryana	8	8	3	13	7	12
Himachal Pradesh	1	7	16	18	10	7
Karnataka	15	5	12	7	11	10
Kerala	6	13	5	6	8	2
Madhya Pradesh	16	3	15	14	14	14
Maharashtra	7	10	11	2	4	6
Orissa	14	12	18	15	16	16
Punjab	3	2	2	9	6	5
Rajasthan	9	14	14	11	17	15
Tamil Nadu	13	6	4	4	1	4
Uttar Pradesh	11	11	13	16	15	17
West Bengal	10	15	8	8	12	8

	Law and order	Affluence	Mass media	Consumer purchases	Personal finance	Education, health exp.
Andhra Pradesh	12	12	13	11	14	12
Assam	16	16	5	15	17	16
Bihar	18	18	14	18	16	17
Delhi	11	1	1	1	1	3
Goa	5	2	4	2	2	2
Gujarat	3	10	10	7	6	14
Haryana	14	6	12	6	7	9
Himachal Pradesh	2	8	15	5	8	7
Karnataka	10	7	9	10	9	8
Kerala	1	3	2	4	5	1
Madhya Pradesh	15	15	18	14	15	11
Maharashtra	9	5	6	8	4	4
Orissa	6	17	17	17	18	18
Punjab	13	4	7	3	3	6
Rajasthan	4	9	11	12	13	13
Tamil Nadu	8	11	3	9	10	5
Uttar Pradesh	17	13	16	13	12	15
West Bengal	7	14	8	16	11	10

The next table gives rankings in terms of the overall composite index. In this table, we have also given the values of the composite index as a test of the robustness of the rankings. The PCA technique is fairly robust. However rankings depend on variables chosen and with an alternate set of variables, a different ranking is in principle, possible. However, the values suggest that as long as one sticks to the twelve categories chosen, some rankings are extremely robust. For example, Delhi far outstrips the rest. Goa and Kerala are clustered together and the relative rankings of Goa and Kerala vis-à-vis each other do not mean much. Next one has a cluster of Punjab and Maharashtra and the relative rankings of these two vis-à-vis each other also do not mean much. Tamil Nadu, Himachal Pradesh, Gujarat, Haryana, Karnataka, West Bengal, Andhra Pradesh, Rajasthan, Assam, Madhya Pradesh and Uttar Pradesh are next clustered together in descending order, with not too much difference in the values. Orissa is some distance behind Uttar Pradesh. Bihar follows a considerable distance behind Orissa and Bihar's lowest rank is therefore also fairly robust.

	Overall composite rank	Value
Andhra Pradesh	**12**	**- 0.5**
Assam	**14**	**- 0.7**
Bihar	**18**	**- 1.6**
Delhi	**1**	**2.4**
Goa	**2**	**1.4**
Gujarat	**8**	**0.0**
Haryana	**9**	**- 0.1**
Himachal Pradesh	**7**	**0.1**
Karnataka	**10**	**- 0.2**
Kerala	**3**	**1.4**
Madhya Pradesh	**15**	**- 0.8**
Maharashtra	**5**	**0.6**
Orissa	**17**	**- 1.1**
Punjab	**4**	**0.7**
Rajasthan	**13**	**- 0.6**
Tamil Nadu	**6**	**0.3**
Uttar Pradesh	**16**	**- 0.9**
West Bengal	**11**	**- 0.3**

The next table maps strengths and weaknesses of the States. Strengths and weaknesses are interpreted in the following way. A State has an overall ranking. If its ranks in the twelve categories are higher than the overall rank, those categories constitute the State's strengths. Conversely, if its ranks in the twelve categories are lower than the overall rank, those categories constitute the State's weaknesses. The table is thus self-explanatory.

	Strengths	Weaknesses
Andhra Pradesh	Investment climate, infrastructure penetration, finance, labour, consumer purchases.	Social sector, mass media, personal finance.
Assam	General achievement, investment climate, mass media.	Infrastructure penetration, finance, labour, social sector, law and order, affluence, consumer purchases, personal finance, expenditure on education and health.
Bihar	Infrastructure penetration, finance, mass media, consumer purchases, personal finance, expenditure on education and health.	-
Delhi	-	General achievement, investment climate, labour, law and order, expenditure on education and health.
Goa	-	Investment climate, infrastructure penetration, finance, labour, social sectors, law and order, penetration of mass media.
Gujarat	General achievement, investment climate, infrastructure penetration, finance, labour, law and order, consumer purchases, personal finance.	Social sector, affluence, mass media, expenditure on education and health.
Haryana	General achievement, investment climate, infrastructure penetration, labour, affluence, consumer purchases, personal finance.	Finance, social sector, law and order, mass media
Himachal Pradesh	General achievement, law and order, consumer purchases.	Infrastructure penetration, finance, labour, affluence, mass media, personal finance.
Karnataka	Investment climate, finance, affluence, mass media, personal finance, expenditure on education and health.	General achievement, infrastructure penetration, labour
Kerala	Social sector, law and order, mass media, expenditure on education and health	General achievement, investment climate, infrastructure penetration, finance, labour, consumer purchases, personal finance.
Madhya Pradesh	General achievement, affluence.	Investment climate, finance, labour, social sector, mass media, expenditure on education and health.

Maharashtra	Finance, labour, social sector, personal finance, expenditure on education and health	General achievement, investment climate, infrastructure penetration, law and order, mass media, consumer purchases
Orissa	General achievement, investment climate, finance, labour, social sector, law and order.	Infrastructure penetration, personal finance, expenditure on education and health.
Punjab	General achievement, investment climate, infrastructure penetration, consumer purchases, personal finance.	Finance, labour, social sector, law and order, mass media, expenditure on education and health.
Rajasthan	General achievement, finance, law and order, affluence, mass media, consumer purchases.	Investment climate, infrastructure penetration, labour, social sector
Tamil Nadu	Infrastructure, finance, labour, social sector, law and order, affluence, mass media, expenditure on education and health.	General achievement, consumer purchases, personal finance.
Uttar Pradesh	General achievement, investment climate, infrastructure penetration, labour, social sector, affluence, consumer purchases, personal finance, expenditure on education and health.	Law and order
West Bengal	General achievement, infrastructure penetration, finance, social sector, law and order, mass media, expenditure on education and health.	Investment climate, labour, affluence, consumer purchases.

Section 5: The Investment Rankings

The composite rankings given above differ somewhat from common perceptions about the investment attractiveness of a State. The reason for this is that the composite rankings given above are about how well a State is doing and not necessarily about the attractiveness of the State as an investment destination. Attractiveness from the investment point of view depends on several variables. We chose five variables from out original set of 83 - per capita State domestic product in 1998, annual average growth of State domestic product in the 1990s, average annual changes in commercial bank credit between 1991 and 1997, population in the 15-39 age group as a percentage of the total population and inverse of incidence of strikes to the total number of workers. Since we wished to avoid usage of imputed values in this ranking, Assam and Himachal Pradesh had to be dropped as some values were missing for these two States.

For the sixteen States that remain, the ranks are given in the table below and seem to be in conformity with usual perceptions about the attractiveness of a State from the point of view of investments. The values are again given and show a clustering, again indicative of some robustness. Delhi is significantly ahead, followed by Gujarat, Maharashtra and Goa. The gaps between these four are significant. Then there is a clustering of Kerala, Tamil Nadu and Punjab, with insignificant differences. Andhra Pradesh and West Bengal are again clustered together. Karnataka follows at a distance, with a clustering again of Madhya Pradesh and Haryana. Significant gaps then exist between Rajasthan, Uttar Pradesh, Orissa and Bihar.

	Investment rank	Value
Andhra Pradesh	8	0.1
Bihar	16	- 1.8
Delhi	1	1.4
Goa	4	1.0
Gujarat	2	1.2
Haryana	12	- 0.2
Karnataka	10	- 0.1
Kerala	5	0.3
Madhya Pradesh	11	- 0.2
Maharashtra	3	1.0
Orissa	15	- 1.4
Punjab	7	0.3
Rajasthan	13	- 0.4
Tamil Nadu	6	0.3
Uttar Pradesh	14	- 1.3
West Bengal	9	0.1