

HEI Working Paper No: 05/2004

Economic Growth, Well-Being and Governance under Economic Reforms: Evidence from Indian States

Sudip Ranjan Basu

Graduate Institute of International Studies

Abstract

This paper provides empirical evidence, from the study of sixteen major Indian states for the period 1980-2001, that under the economic reform process, the better institutional mechanism could actually help economies to grow faster with higher level of economic well-being. We estimate economic well-being index (by aggregating fifteen socio-economic variables, viz, education, infrastructure, technological progress, income, etc.) and also index of good governance (by aggregating thirteen variables indicating rule of law, government functioning, public services, press freedom, etc) by multivariate statistical measures. Panel regression showed that governance measures, and economic policy variables are crucial to explain differential level of development performance across states in India during the last two decades.

© The Authors.

All rights reserved. No part of this
paper may be reproduced without
the permission of the authors.

Economic Growth, Well-Being and Governance under Economic Reforms: Evidence from Indian States

Sudip Ranjan Basu[†]

July, 2004

International Economics Department
Graduate Institute of International Studies (IUHEI)
University of Geneva, Switzerland

Abstract

This paper provides empirical evidence, from the study of sixteen major Indian states for the period 1980-2001, that under the economic reform process, the better institutional mechanism could actually help economies to grow faster with higher level of economic well-being. We estimate economic well-being index (by aggregating fifteen socio-economic variables, viz, education, infrastructure, technological progress, income, etc.) and also index of good governance (by aggregating thirteen variables indicating rule of law, government functioning, public services, press freedom, etc) by multivariate statistical measures. Panel regression showed that governance measures, and economic policy variables are crucial to explain differential level of development performance across states in India during the last two decades.

JEL Classification: B25, C23, O18, R11

Keywords: Growth, Well-being, Governance, Economic Reforms, Panel data, India

[†]Ph.D. candidate, International Economics Department, Graduate Institute of International Studies, Geneva. I would like to thank John Cuddy, M.Muqtada, Michael Mussa and A.L.Nagar for their helpful discussions during preparation of this paper. I received valuable comments from the participants at the Swiss Society of Economics and Statistics Annual Congress 2004 at the University of Basel. My thanks are due to Gayatrika Gupta. I am entirely responsible for any errors in this paper.
Email: basu1@hei.unige.ch

1. Introduction

This paper is proposed to provide a framework to explore the linkages among growth, well-being and governance in the era of economic policy changes in India since early 1990s. Under the framework, we have tested our hypothesis that there runs a positive link from provisioning of better institutional mechanism to rising per capita income growth and higher level of well-being in the backdrop of economic reform policies. Although India's new economic reform policies were initiated in 1991, the analysis of this present paper has gone back to 1980s to illustrate the contrast and changes during the last one decade. So, the final analysis of the paper is based on the sixteen major states of India for the last two decades (1980-2001).

The Economic policy changes are often triggered by the logic of low level of equilibrium of output level and employment. To overcome this low level of equilibrium trap, governments/states often adapt policies so as to achieve high level of income, and employment growth. To embark upon this road to growth and development, coherent policy instruments are essential to meet the policy targets.¹ Perhaps, the crucial role here lies in the extent to which the state/governments are putting the different policy packages together and implementing them subsequently to overcome the economic inefficiencies and problems with resource allocation. In our analysis, we study the extent to which economic reforms help a country to adapt new policy changes to remove inefficient resource allocation, regulation and other controls that unnecessarily hinder the growth potential of economies.² The key features of economic reform policy involve macroeconomic stability, removal of quantitative restrictions (QRs) on imports, reduction in import tariffs, privatisation of the key state-owned enterprises, removal of state sponsored subsidies, reform in the labour markets, reform of financial and banking

¹ During 1950s, Tinbergen advocated three different types of policy changes depending on the degree of underlying policy structure. These are namely, first, quantitative policy constitutes a quantitative change in given instruments of policy (e.g., changes in tax rates); secondly, qualitative policy changes for changing economic structure, keeping the foundation intact (e.g., a change in the type of taxes implemented), and finally, is economic reform as an instrument to changes in foundations, which he defines as 'changes in more fundamental features of social organisations are the most far-reaching types of policy' (as quoted from Bruno 1989). For interested readers, a classic in this literature is that of Knight, as he writes 'Ethics and Economic Reform' (1939).

²As Stiglitz (2002) noted that 'technically reform can mean any change, or at least any change perceived by those perpetrating it to be an improvement on the status quo'.

sectors, and other judicial and administrative restructuring to reduce the bureaucratic hassles.

During the economic reform process, the crucial elements are to focus on modes of political and economic accountability, transparency, quality of governance and socio-economic participation and dialogue at different levels of society so that public and private sectors can provide incentives to each other for *efficient players* in the market that allows more socio-economic stability and economic prosperity. The Reform policies are supported to dismantle different weaknesses in economic system, which hinder potential for growth and development. The Policies are directed towards the freeing up of foreign trade, and also to take policies to decontrol and deregulate the industries and service sectors. The opening up of trade encourages domestic firms to diversify their products and export structure and help initiate policies to become cost effective by introducing technical changes in the production structure. The import competing industries do change their production structure and become dynamic through incorporating new technologies, either by investing in R&D or through foreign collaboration and joint ventures. In such an environment, private economic agents take as active part, which actually encourages more effective public actions to build up a solid economic fundamental, where institutional and governance qualities flourish along with guarantee of positive complementarities in terms of social partnership.

In our framework, we introduce both the growth and well-being components of quality of life so as to correlate with reform policies. We believe that the institutional mechanism is a critical element in translating growth and well-being to a more sustainable path. We measure well-being with different dimensions of the socio-economic characteristics that foster a healthy environment for growth and development. In this context, we also measure the governance quality to explore its possible link with growth and well-being.

It may be interesting to note that during the 1960-70s, the ‘trickle down’ mechanism could not solve the problem of mass poverty.³ The Bank-Fund stabilisation and structural adjustment policies (SAPs) received much criticism for their alleged failure

³The growth and development literature in 1960s emphasised that the per capita growth would automatically trickle down in the society and would eventually alleviate the prevalent mass poverty.

to address and/or to correct the economic condition of developing countries.⁴ This has caused international organisations and governments across the regions/continent, to look carefully at the government's role in provisioning public goods and to ensure efficiency for supporting and supplementing the markets.

Thus the role of institutions in supporting and enhancing the economic well-being of the society has been receiving much attention in recent years. The role of the government is to seek economic development so as to enlarge the 'capabilities' of individuals in the society. With increasing economic integration of countries around the world, there has been a rising fear of exclusion from the social safety net and more generally the concern about the *quality of life and well-being*. In recent years policies have been directed towards reducing the level of poverty and inequality of distribution, vis-à-vis raising the quality of life in society by providing efficient and effective governance. This new economic philosophy has resulted in a massive change in the policy orientation of countries; the priority is now centred on issues of governance, e.g., voice and accountability, government effectiveness, political stability, regulatory quality, rule of law and control of corruption.⁵

We know that many of the developing countries have registered an increase in economic growth (of per capita income growth), but failed to progress in terms of social indicators (literacy, infant mortality, etc). Thus the focus is now shifting towards a *qualitative nature* of this growth and development. According to Sen, the realisation of human *capabilities*, which enlarge the range of human choices, is essential for a broader notion and measure of economic well-being.⁶ The institutional framework is then considered as one of the essential elements for translating growth and well-being into a sustainable process.

Thus in the conceptual framework of our analysis, we indicate that there are several factors that would account for the explanation of society's growth and development/standard of living and better performance of an economy (see Appendix Figure F1). The factors that would help explain growth and well-being are the economic strategies and mode of their implementation. The institutional/ governance framework is

⁴ See Stiglitz (2002) and Muqtada (2003) for elaborate discussion on this issue.

⁵ See Kaufmann et al (2002)

⁶ See Sen (1983) for a detailed conceptual discussion.

vital for sustainable economic growth and development, along with other policy factors, like government policies to allocate the resources at the states/sub-national or at the local level of government (fiscal decentralisation) and/or to provide resources for alleviating the incidence of poverty, to reduce economic inequality and generate employment opportunities.

We attempt to emphasise this approach of integrating a society in such a way so as to increase economic and social sustainability of economic policy changes. We believe that institutions/governance and social partnership (NGOs, Civil society, workers and employee groups, mass media etc.) are to play a more constructive role in enhancing and sustaining economic growth and development.

2. Review of the Literature

The basic purpose of this section is to briefly show how economic research on factors explaining differential growth rate and development across countries have changed over the decades, and then aim to link that to our present study.

The theories of economic growth or long-run equilibrium analysis primarily account for the factors that are responsible for growth differential among countries. Perhaps, after the *Great Depression* in 1930s, the development of Keynesian model has changed many the thinking about the functioning of the real world. The primary focus of Keynesiansim is to show how the steady state of the economy is influenced by the equilibrium values of output and employment through macroeconomic policies.⁷ The Solow-Swan growth model, within a neo-classical framework, emphasised the role of capital accumulation that would lead to a changing capital-output ratio.⁸ However, the Solow-Swan model does not fully explain some of these basic facts about growth in developing countries and their differential level of performance. This has led to a new set of growth theories that has endogenised the process of technological progress. The model is extended in two ways: firstly, it endows a crucial role to human capital and secondly to the share of national product devoted to investment in education.⁹

⁷ The basis of modern macroeconomic thought originated from the General theory, Keynes (1936).

⁸ See Solow (1956), and Swan (1956).

⁹ See Romer (1986), Lucas (1988), and Grossman and Helpman (1991)

The above theoretical literature has motivated the empirical growth literature, as we find that considerable attention has been given to convergence across countries/regions and shows that the initial conditions of this vast array of countries differ significantly leading to differences in their growth performance. However, the issue of per capita income convergence can be either unconditional or conditional. Unconditional convergence refers to the tendency of poor countries/regions to grow faster than rich countries, while conditional convergence refers to convergence conditional on a determinate steady-state income level.¹⁰

On the other side, over the years, economists have come to sort a of consensus that per capita income as a measure to show the differential level of performance is rather weak and partial picture of a country's development. The concept of accommodating other socio-economic indicators have taken up a significant amount of attention, since the United Nations (1954) expert group recommended that, in addition to real per capital national income quantitative measures in the fields of health education, employment, and housing should be used for assessing the standard of living. So, real national income was to be supplemented by a further set of indices, reflecting various constituents and determinants of aggregate development/well-being (UN 1954). The studies by Adelman and Morris (1967) also examined the interactions among the processes of social, economic and political change with the level and pace of economic development.

One of the significant contributions to measure the quality of life with some social indicators was proposed by Morris D. Morris (1979) and who constructed the Physical Quality of Life Index (PQLI) and later by Dasgupta and Weale (1992). UNDPs Human Development Index (HDI, 1990-2003) had brought together the production and distribution of commodities and the expansion and use of human capabilities in their measure. All these indices essentially focus on choices—on what people should have, be and do to be able to ensure their own livelihood, as they are based on indicators like, life expectancy, educational attainment, and per capita income, civil and political rights.¹¹ These are thus some of the studies that have looked beyond the per capita income level,

¹⁰ The convergence type study started with a seminal research by Barro (1991), Barro & Sala-I-Martin (1992), as they studied convergence of per capita GDP growth among a group of countries, eg. regions of the USA, Japan etc.

¹¹ See Nagar and Basu (2002) for an alternative technique to measure of HDI.

for a more comprehensive yardstick for development and well-being. Thus, we argue that the initial level of social indicators is also equally important to observe the level of differences in countries economic growth and subsequent level of well-being. We have outlined above that economic policy changes and their successful implementation are crucial to accelerate growth and sustainable well-being. Perhaps this is one of the most heated debates in the economic literature; as varying degrees of cross-country evidence suggest that the economic reform policies and/or the opening of the economy to outside world (a.k.a. Globalisation) and/or economic liberalisation and its impact on growth and social development is not always positive; rather ambiguous!¹² In some of the most cited papers in recent years on the relationship between trade policy and economic growth and poverty reduction, are probably Dollar (1992), Ben-David (1993), Sachs and Warner (1995), Edwards (1998), Frankel and Romar (1999), Dollar (2001) and Dollar and Kraay (2001). In all these studies, the basic message is to show that the evidence from the cross-country regression primarily suggests that countries that have opened up and took robust trade policies are the ones growing faster than others, in terms of economic growth. On contrary, there is still plenty of scepticism about the above relationship of liberalisation and economic growth. Stiglitz (1999) raised concern about the success of reform policies, as he notes that ‘the limited success in so many of the countries means that their remain many opportunities for applying the lessons of such studies’.¹³ Rodriguez and Rodrik (2000) raised analytical questions about some of the above studies, and concluded that ‘ little evidence that open trade policies—in the sense of lower tariff and non-tariff barriers to trade—are significantly associated with economic growth’. Moreover, another concern is now about the quality of growth, rather than quantity per se.

In this context now the role of social policies and the better institutional framework is getting at the centre stage of the development policies across the countries.¹⁴ We presume that the legitimacy of reform policies, and/or the process of globalisation would not be able to induce economic growth and social development

¹² See for more discussion on economic reforms, trade policies, growth and inequality, Dollar & Kraay (2001), Marti (2001), Rodriguez & Rodrik (2000), Aghion & Williamson (2000), Baldwin & Martin (1999), and Edwards (1998).

¹³ ‘Whither Reform? Ten Years of the Transition (1999), Keynote address at the ABCDE, World Bank, Washington, D.C.

¹⁴ See Rodrik (1997), Barro (2001) for more discussion and empirical investigation respectively.

unless the policies include (what may be termed as) a **3-D approach** to development to widen overwhelming consensus upon reducing **“Discrimination, Distress and Destitution”** at the global level and/or within countries.

In some major studies now, researchers are showing that the differential performance level across countries is mostly because of the quality of institutional mechanism and other policy level implementation factors. The recent literature on governance proposes that an efficient and effective institutional mechanism is critical in influencing growth and well-being into a sustainable process.

Now the obvious question is what is *good governance*? The World Bank (1994) defines good governance as the ‘manner in which power is exercised in the management of a country’s economic and social resources.’¹⁵ Further, the IMF in its Interim Committee meeting (1996), identified ‘promoting good governance in all its aspects, including ensuring the rule of law, improving the efficiency and accountability of public sector, and tackling corruption’ as the key for economic efficiency and growth of the countries. The UNDP (1997) report observes that the result of good governance is development that ‘gives priority to poor, advances the cause of women, sustains the environment, and creates needed opportunities for employment and other livelihoods’. Thus, we see the concept of good governance is multifaceted, and encompasses different elements of the state and the society.

Now the question is how to *measure good governance*? In a pioneering study, Kaufmann et al (1999a, 1999b, 2002) proposed different dimensions of governance measures. They measured good governance in terms of six aggregate indicators corresponding to six basic governance concepts, namely, *voice and accountability, political stability and violence, government effectiveness, regulatory burden, rule of law, and graft*. Their study indicates a strong causal relationship running from good governance to an increasing level of per capita income and other social outcomes. According to Rodrik (2000) the institutes would work efficiently in which they: protect private property and contract environment; moderate some business activities; support macroeconomic stability; provide social insurance and protection; and manage social

¹⁵ The World Bank (1992) in its report on ‘Governance and Development’ indicated the urgent need to look comprehensively at the institutional environment in order to pursue a constant effort for all round development.

conflict; are the one where economies could handle the differential level of economic development and could achieve sustained economic advancement!¹⁶ Under such an environment, the countries initiate their economic policies to sustain economic growth rates and to embark upon a higher standard of living.¹⁷

Hence we observe that the wheel of development profession is turning its research towards the role of institutional quality and/or the good governance as an important determinant of improving well-being of the countries.¹⁸ Furthermore, these studies are trying to show the *causality* of institutions to economic outcome.¹⁹ There is another set of studies that are also indicating that for better development outcomes, the role of democracy is essential.²⁰

We propose here a new measure of quality of governance and subsequently for Indian states to show a link between growth and well-being. There are some major initiatives at the World Bank to construct governance index, as described by Kaufmann et al (1999a, b, 2002).²¹ Other international research institutes have been preparing international rankings of the countries in terms of governance, economic risk; economic freedom, corruption, competitiveness, to indicate quality of institutions, in order to reflect the economic standings of individual countries.²² The better rankings/ratings of such index would imply that those countries are doing better in terms of providing better and efficient institutions, and possible factors of differential level in economic performance.

The World Development Report (2003) emphasised that for *sustainable development in a dynamic world*, the *institutions need to be improved at many levels*,

¹⁶ See the World Bank studies on governance, www.worldbank.org/wbi/governance

¹⁷ There could possibly be 60 factors to affect economic growth, as discussed in Sala-i-Martin (1997).

¹⁸ See Basu (2002, 2003a, b, c) for empirical evidence on the issue of economic performance and quality of good governance for studies based on Indian states and cross-country results.

¹⁹ Kaufmann et al (2002) estimated governance index for 175 countries on the basis of all the above six dimensions of governance, and showed link to income, infant mortality and adult literacy. See also for further results on this causality, Chong and Calderon (1997, 1998, and 2000), Knack and Keefer (1995, 1997), Ross (1997).

²⁰ Rodrik (2000a) provided a wide range of evidence of participatory democracies enable higher-quality growth.

²¹ See also Huther and Shah (1998) for proposing a governance index, and to show its link to social outcome.

²² The rankings of the International Country Risk Guide (ICRG), Business International (BI), Business Environmental Risk Intelligence (BERI), Gastil's Civil Liberties Index, Heritage Foundation-Wall Street Journal's Index of Economic Freedom, Transparency International's Corruption Perception Index, World Economic Forum's Competitiveness Index, etc., as the explanatory factors for countries economic growth and development. See Kaufmann et al (2002) for a comprehensive guide on the database and their analysis.

from local to global. Moreover, the World Bank's, Quality of Growth (2000) stressed that there are four factors especially relevant for poverty outcomes: distribution, sustainability, variability, and governance surrounding the growth process.²³

The above brief review of the literature shows how economic research has been shifting in providing theories and empirical framework to show the factors responsible for economic growth and well-being differential across countries. In the traditional growth theory, the initial condition of the countries was given importance, as that is the factor responsible for countries' state of economic level in the long run. The new growth theories later emphasised the role of capital accumulation, and technical progress as being responsible for differential level of growth and as well as the role of human capital and physical infrastructure were put into place to explain the growth process. Perhaps, since 1990s, the upsurge of institutional economics provided another route to explain the differential level across countries. The role of governance is now seen as a critical factor for exploring the growth dynamics, and subsequent differences. We shall now briefly discuss the conceptual framework for our measure of well-being and governance in the next section.

3. Conceptualising Economic Well-being and Quality of Governance

In the present study we develop two different measures with two different statistical methods; the *well-being index* and *governance index* (see Technical notes TN1, TN2 for a detailed analysis). Here, we discuss all these indicators and rationale for including them in constructing two separate indices.

The proposed *economic well-being index (EWBI)* is constructed on the basis of **five** different socio-economic dimensions, namely, *health, knowledge; income, technological progress, and infrastructure* (see Table 3.1 below). These dimensions are supposed to evaluate the society's overall well-being and/or standard of living. There are two indicators to measure the *health status* of the people in the region: *infant mortality* and *life expectancy* at birth. We have included two indicators for *knowledge: adult*

²³ See Bassanini et al (2001) for the OECD countries, role of policies and institutions for enhancing growth in a panel data framework.

literacy and *combined enrolment* (primary to high school level) ratio. For income, we take per capita real income (real) to measure the purchasing capacity of the people, and this indicator, as described above, has been recognised as the single most important yardstick for well-being, until economists start constructing the composite measure of quality of life. *Intensity of cropping*, and *fertiliser consumption* are considered here as a measure of technological progress. In India, agriculture has been the critical force for sustaining development, as this sector provides food and other essentials for the industrial sector, which help induce overall development. Moreover, these factors also help increase agricultural productivity, which generally lead to faster growth through chain effects.

Table 3.1: Indicators of Economic Well-being Index (EWBI)

HEALTH	KNOWLEDGE	INCOME	TECHNOLOGICAL PROGRESS	INFRASTRUCTURE
1. Infant mortality rate (per 1000 live births)	3. Adult literacy rate (%)	5. Per capita real Income (Rs)	6. Intensity of cropping (% , irrigated area/total sown area)	8. Population per hospital bed (no) 9. Per capita electricity consumption (kwh)
2. Life expectancy at birth (years)	4. Combined gross enrolment ratio (primary to high school)		7. Fertiliser consumption (% , chemical fertiliser/total grain sown area)	10. Post offices (per 100000 population) 11. Bank branches ('do') 12. Telephone lines ('do')
				13. Road length (per 100 sq.km) 14. Railways route (per 100 sq.km) 15. Village electrification (%)

Finally we have *infrastructural* dimension and it is believed to be an essential element for growth and development. In our analysis, we have eight different indicators to capture this dimension. They include *population per hospital bed*, *per capita electricity consumption*, *post offices*, *bank branches*, *telephone lines*, *road and railway route*, and *village electrification*. These indicators focus on availability of health, financial, transport, communication and rural infrastructure respectively. The better infrastructure facilities help allocate resources quickly to every place, and reduce cost of production, hence induce economic growth & development process.²⁴ The higher value of the index

²⁴ See Nagar and Basu (2002) for an empirical link between quality of infrastructure and income from a study based on the Indian states.

indicates better level of well-being for the region in this analysis. Thus, our measure of well-being is a comprehensive composite measurement to capture the quality of life of the people.

We then propose to compute *quality of governance index (QGOI)* to evaluate the quality of institutional framework. Our governance measure is based on *seven different* dimensions, and indicates a more comprehensive arrangement of the economy to create conducive environment for growth and development (see Table 3.2). In the *rule of law* dimension, we have three indicators, namely, *crime rates, riots, and police personnel*. Better rules of law enable to attract more investment by guaranteeing greater confidence among the investors, and to induce economic performance. Then we have three *expenditure indicators, education, health and infrastructure*, to capture the role of the state in providing *public services*. Then we have an indicator of *debt burden* of the government, as more debt in the current period would leave more tax burden for the future, which might lead to a fall in present investment rate, and thereby retard growth process to capture the dimension of *government functioning*. *Worker's involvement* is crucial in the smooth process of the industrial growth, as indicated by *trade union membership*. *Voting* (% of population voted in the election) indicates people's willingness to legitimise the ongoing economic programmes of the governments. *Labour disputes and strikes* are considered to be the prime indicators to show overall economic environment of the economy as they are crucial indication to the investors perception about the economies. We also introduce the *social participation* dimension and are proxied by the *women workers* in the labour force (organised sector) and *women representation in parliament*. These two indicators are considered here on the basis of growing empirical evidence that women's participation is an important element to reduce corruption and thereby increase quality of governance.²⁵ Finally, we recognise that the

²⁵ The impact of gender on corruption has also been looked into by Swamy et al. (1999) and Dollar et al. (1999). The indicators used are the percentage of women in the labour force and in parliament. In a cross section study of 66 countries, they showed that indicators negatively impact on the level of corruption. The study suggests that policies designed to increase the role of women may help in lowering the level of corruption (see http://www.transparency.org/working_papers/lambsdorff/lambsdorff_eresearch.html)

free mass media is also crucial in raising peoples' voice and make governments feel more accountable to their service for the people. The *circulation of the daily newspaper* is considered to be a proxy for press freedom in our analysis. The higher value of the governance index indicates better quality of governance in present analysis.

Table 3.2: Indicators of Quality of Governance Index (QGOI)

Rule of Law	Public service	Government functioning	Worker's and peoples participation	Economic environment	Social participation	Press freedom
1. Crime rates (% per 100000 population)	4. Educational expenditure (% of GDP)	7. Debt burden of the governments (% of GDP)	8. Trade union density (% of total organised sector employment)	10. Labour disputes & strikes (% of total organised sector employment)	11. Women in work force (% of total employment)	13. Circulation of daily newspapers (per 100000 population)
2. Riots (% per 100000 population)	5. Health expenditure (% of GDP)		9. Voting turnover (% of total voters for the state assembly)		12. Women representation in parliament (% of total members)	
3. Police personnel (per 100000 population)	6. Infrastructure expenditure (% of GDP)					

This present analysis is thus carried out in the backdrop of initiation of such economic policies, and then to relate how in India, the growth performance and development has evolved. We attempt to provide a systemic approach to unveil a possible link of institutional quality and policy changes with accelerating growth phenomenon and well-being in this empirical framework.

4. Estimation Methodology and Data Sources

In this section we discuss the empirical methodology and the data sources of this study. Initially we explain our model to obtain the economic well-being index (EWBI) and quality of governance index (QGOI). Then we set out the basic econometric model to test our hypothesis to indicate the link between the quality of governance and well-being within our conceptual framework.

4.1. Empirical Framework

In this sub-section, we discuss the statistical methods of constructing the composite measures of well-being and governance. Then, we describe our econometric methodologies in brief that we have employed for the determination of well-being differential across states.

4.1.1. Measuring EWBI and QGOI

We present the estimation procedure for measuring, i) Economic Well-being Index (EWBI); and ii) Quality of Governance Index (QGOI).

We use the statistical technique of factor analysis, to compute the **economic well-being index (EWBI)**. The Factor Analysis (FA) technique is used to do the following: a) to reduce the number of influencing indicators, and b) to detect structure in the relationships among indicators, that is to classify variables according to their effect on the variables of interest.²⁶ (See for technical details of the methodology in TN1).

We define the Economic Well-being Index (EWBI) as a weighed average of the factor scores, where the weights are the eigenvalues of the correlation matrix R.

Thus:

$$EWBI^s = \frac{\sum F_j \lambda_j}{\sum \lambda_j}, \text{ where } s=1, 2, \dots, S \text{ (states) } \text{-----1}$$

Then we measure the **quality of governance index (QGOI)** for the states to run the panel data estimation later in the econometric estimation. We use a latent variable model where the **QGOI** is supposed to be linearly dependent on a set of observable indicators plus a disturbance term capturing error (See technical details of the methodology in TN2).

We estimate the QGOI as weighted average of the principal components, thus:

$$QGOI^s = \frac{P_1 \lambda_1 + P_2 \lambda_2 + \dots + P_k \lambda_k}{\lambda_1 + \lambda_2 + \dots + \lambda_k}, \text{ where } s=1, 2, \dots, S \text{ (states) } \text{-----2}$$

We apply these two methods to obtain well-being index and quality of governance index for all the 16 Indian states.

²⁶ See Anderson (1984) for more on the theoretical discussion.

4.1.2. Econometric Approach

In order to explore the possible determinants of economic well-being, we set out Panel data model to capture different explanatory factors which are critical for empirical analysis.

In panel model, we pooled cross-section time series (i, denotes cross-section units/states, and t time points) as it is well documented in the literature that to obtain *more efficient estimates*, one may attempt to use this **Panel Data** model framework.²⁷ Initially, we look at the pooled ordinary least square model of estimation. The pooled model contains observations on N units of observations (cross-section units), over the T time points (time points). The purpose is to estimate a standard regression model of the following specifications:

$$Y^{PO}_{it} = \alpha + \beta'X_{it} + e_{it} \text{-----}3$$

where $i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$, by assumption the e_{it} are *iid* over i and t , i.e.,

$E(e_{it}) = 0$ and $\text{var}(e_{it}) = \sigma_e^2$, where Y is the dependent variable (Well-being index).

The vector X_{it} contains K regressors (institutional and policy variables), not including constant term. The assumptions about the error term (e) are the standard regression assumptions of OLS.

Our next model specification is to estimate the fixed effects (FE) model, which allows us to take into consideration the unobservable differences in the dependent variable specific to individual states. In this estimation all the intercepts differ across cross section units (states) by estimating different estimates for each unit. In this model, the estimation is done by subtracting the 'within' mean from each of the indicators and estimates the model. The FE estimation is the most intuitive way to control for unobservable effects specific to individual states in the panel data model. The key assumption of this model is that the state specific effects do not vary over time, residuals are cross section heteroskedastic and that they are contemporaneously uncorrelated with other regressors.

²⁷ See Hsiao (1986), Baltagi (1995), and Islam (1995) for a theoretical and empirical discussion on Panel data.

In this Fixed Effect estimation model, specification for the individual state specific effects is given by ,

$$y^{FE}_{it} = \alpha_i + \beta'x + e_{it}, i=1\dots N; t= 1\dots T \text{ -----4}$$

where β' is $1 \times k$ vector of constants and α_i is a 1×1 scalar constant representing effects of those variable peculiar to the i^{th} individual. The error term e_{it} represents the effect of omitted variable that are peculiar to both the individual periods and time periods. We assume that e_{it} can be characterised by *iid* random variable with mean zero and variable σ_e^2 .

Now, with this specification, we extend the model previous model specification to include a time effects as well. We formulate the extended model by simply adding the effect as,

$$y_{ite}^{FE} = \alpha_i + \lambda_t + \beta'x + e_{it} \dots\dots\dots 5$$

where, α_i is the individual state specific effect (which is taken to be constant over time), β is a matrix of regression coefficients for the x_{it} vector, λ_t is the time effect and e_{it} is the cross-section error component, which is uncorrelated with the regressors and is distributed normally with a mean of zero and variation of $\sigma^2_{e_{it}}$. After this, we also use the time trend, just by adding δt for the linear time trend effects, so as to exploit the changes over time in this model simultaneously. In general, the panel effects can be either taken to be fixed effects or random. In our case, since the individuals are the ‘States’ and all of them are included in the data, it is appropriate to consider them to be fixed.

4.2. Data sources

In this sub-section we discuss about the data we have used to carry out the present analysis. We have the state-level database for India (16 major States of India) for the period of last two decades; more generally, our data is running from 1980 to 2001.

Then, we sub-divide the entire time of our analysis into four different time points. The criteria for choosing the different time points are based on the policy changes over the period. With the introduction of distinct policy, the countries have experienced

differences in growth and development record. In the present analysis, we divided last two decades into four different periods: 1980-1985, 1986-1991, 1992-96, and 1998-2001.

In terms of the Indian database, we have per capita GDP of all the 16 states from 1980-81 to 2000-01(1980-81 base prices). We also compute the growth rates for all the states over the period.

Apart from our quality of governance measure to explain the differential performance of the well-being level across the states, we also include few other indicators to explain variation, by introducing policy variables, and other economic characteristics.

We use the measure of financial decentralisation index (**FIDI**) as a ratio of compensation and assignments to local bodies and panchayati raj institutions to total states governments' revenue expenditure. The more resources at the local level are supposed to induce development. To account for the differences in climate and land features in different parts of India, we consider agricultural productivity (**AGPO**) as an explanatory variable for the well-being differential, and this variable is measured by the agricultural output (kg.) per hectare. With the migration of people from rural areas to urban areas, that there is a shift in sectoral distribution in the economy, and is supposed to supply labour force for industrial demand. The Urbanisation (**URBA**) is measured as the population living in the urban areas. To account for the large variation in the population level among the Indian states, we use population (logarithms of, **LPOP**) in our analysis as a conditioning variable. The regression analysis for the panel data framework also considers the period specific effects, as we mention above that there have been continuous policy changes during the reform period in both countries. The inclusion of period specific effects would certainly show its impact on the economic performance differential among the region (see Appendix Table T1 for details about the sources of all the indicators described above).²⁸

²⁸Among 28 states and 7 Union territories, the 16 major states are used here for consistent data availability for all the years and variables in our analysis. These 16 states cover more than 94 % of the total India's population in 2001 Census of India.

5. Economic Reform Process in India

In this section, we briefly discuss the economic reform process in India that was initiated in 1991 to understand some basic changes in terms of economic policies and structure of the economy. When India got her independence in 1947, the country was pretty much handicapped with mass poverty, a stagnating agriculture sector, and had industry with age-old machines faced with very low level of productivity growth. The Prime Minister of India, Jawaharlal Nehru, initiated the planning model to emphasise the role of heavy industry for the development, which is known as Nehru-Mahalanobis model aimed at accelerating growth to increase India's overall development potential, and thus help reducing the mass poverty.²⁹

At the beginning the growth-accelerating strategy was placed in the forefront to attack poverty, and to increase the investment rates further in India. India took more protectionist '*inward-looking*' economic strategy, the so-called 'Import Substitution Industrialisation' (ISI) strategy, to help develop the domestic industries and adopted anti-export biased policies. In agricultural sector, the policies emphasised mechanisation and R&D. This is often known as the *Green Revolution* in Indian agriculture.³⁰ Perhaps, all these policies could not bring the momentum required to overcome the 'Hindu' rate of growth to reduce the poverty and inequality.³¹

5.1. Economic Reform Strategies

In 1991, Indian economic reform policies were initiated under a severe balance of payments problem.³² This crisis has finally helped India to change her economic system

²⁹ According to Bhagwati (1998), this growth rate was an 'instrumental variable, a policy outcome that would in turn reduce poverty'.

³⁰ Green revolution started in India in 1966, mostly in the states, like Punjab, Haryana and West Bengal, and is consisting of three basic elements: continued expansion of farming areas; double-cropping existing farmland; using seeds with improved genetics- HYV of which, K68 variety for wheat is most important.

³¹ In the first three decades of the planning process in India, the economy grew at the rate of around 3-3.5 percent annually which could not bring economy out of the low level employment trap.

³² The annual inflation rate reached at nearly 14%, gross fiscal deficit of the central government reached to 8% (of GDP), central government debt reached at 51% (of GDP), current account deficit peaked at nearly 3% (of GDP), external debt went up to more than 26% (of GDP) in 1990. World Development Indicator 2001, World Bank. See Agarwal (1997) for further discussions.

(from closed door/inward looking to outward looking/open door policy), which India has pursued over the last four decades.³³

In the wake of such an event, Rao-Singh government took initiatives to reform Indian economy, with support from international organisations, such as IMF-WB in mid-1991 to open up economy to the world.

The key element of India's reform strategy initially includes *structural measures*, consisting of industrial policy reform, trade and exchange rate reform (i.e., external sector), and reform in the financial sector, public sector reform and measures to streamline tax reforms among many other series of reform measures.³⁴ Also de-controlling of the private sector investment, trade liberalisation and opening up to foreign investment (both for FDI and FII), and vis-à-vis the financial sectors, etc, are some of the policy measures. Moreover, some of the important public sector industries were opened up (e.g., iron and steel, heavy plant machinery, telecommunications, air transport services, etc) to the private sector.³⁵ Series of measures were directed to *de-regulation of imports* and in general opening up of the trade and investment regime for outside competition, which is by the way a step forward towards India's attempt to integrate with the world economy, easing the *quantitative restrictions (QRs)* that were used as an instrument to restrict the imports of not only finished consumer goods, but also input of raw material components, and capital goods. In the first phase of the reform, the import licensing was dismantled with respect to industrial raw materials, intermediate components and capital goods. However, keeping with the WTO commitment, the Indian government promised that QRs on all imports would be phased out within a period of six

³³ There was a tremendous pressure on India's foreign exchange reserve, as it stood at 3105 m. US\$ in 1989, and went to 1205 m. US\$ in 1990 (IMF, IFS 2002), could only be able to sustain two weeks of imports coverage.

³⁴ The Committee of Tax Reform was set up in 1992; it proposed that the share of customs duties in total taxes to be reduced and the share of direct taxes to be raised. More revenue needed to be mobilised via excise duties by transforming them into value added taxes. Maximum rates of personal and corporate income taxes were reduced.

³⁵ The production of certain items in the small-scale sector has been reserved to keep the interest of the small-scale units.

years starting from 1998.³⁶

In line with international standards (WTO regulations), India had to *reduce the average rate of tariff*, as India's import duties were the highest among the countries with more than 200% on certain items. The *Exchange rate management* is another area where reform has been done very cautiously and with care. There was a strong feeling among reformers to tap foreign investment (both short-term and long-term capital) in the economy, as the public sector investment has no longer been feasible and sustainable given the huge losses and inefficiency in resource mobilisation. The law allowed the FDI of up to 51 % foreign equity in a defined list of 48 industries and up to 74% for 9 high priority industries.³⁷ The *decontrol of price regime* is also a crucial component of the overall structural adjustment policy, along with the setting up of the *Disinvestment Commission in 1996*, to privatise the chronically loss-making public sector units, and to sell their shares in the market.³⁸

In the next section, we discuss economic performance at the sub-national level to correlate with economic policy changes and governance measure.

6. Economic Performance at the Sub-national Level in India

The issue of regional disparity has been a major concern for the policy makers in India.³⁹ There are many factors that are responsible for differential level of growth among countries (see Section 2), but within a country differential level of economic development has been a major issue of empirical study in countries like India, where many states are bigger in size and population as compared to many developed countries.

³⁶ The central government in New Delhi under the 'United Front', coalition government introduced this phasing out of QRs in 1998. After that the BJP government took over power in the central, it endorsed phasing out of QRs, and as a first step they removed QRs from 350 items in April 1998., which still leaves 2200 items subject to QRs. (Ahluwalia, 1999).

³⁷ In 1993, Foreign Institutional Investors (FIIs) were, for the first time, allowed to invest in Indian equity once they fulfil certain minimum standards, and further the policies were simplified to enable them to trade in debt instruments through secondary market purchases in the stock market. Another channel for portfolio investment was provided by allowing Indian companies to issue fresh equity abroad through the new mechanism called, *Global Depository Receipts* (GDRs).

³⁸ The Commission set up by the United Front government to restructure public sector undertakings (PSU) either by privatising them or off-loading shares in favour of workers. The objective of the plan is to divert the revenues generated from such disinvestment to be utilised for allocations for education and health and for creating a fund to strengthen public sector enterprises in future.

³⁹ See Marjit et al (1996), Sachs et al (2002), Rao et al (1999) among many other studies.

In recent time, research has indicated that geography-climate, policy focus, cultural differences, sectoral composition and rate of urbanisation are some of the key factors that could explain the level of economic differences across regions within a country. In this paper, we incorporate some of these indicators to explain the unevenness in growth and well-being levels.

6.1. Growth Performance

Initially, we look separately at the economic growth (per capita state domestic product growth) performance of all the 16 major states in India. In Table 6.1, below, we present the growth rate of the four different periods for all the 16 Indian states. During the pre-reform years (1980-1985), Gujarat and Rajasthan grew with more than 4 percentage points per annum, whereas Bihar and Karnataka grew at an average of more than 3 percent. On contrary states like Himachal Pradesh and Kerala's growth rates were negative. Also, Madhya Pradesh and Orissa were some of the slowest growing states in this period.

Table 6.1: Per Capita SDP Growth Rates: Indian States

	GR1980-85	GR1986-91	GR1992-96	GR1997-2001
Andhra Pradesh (AP)	1,6	4,5	4,2	8,5
Assam (AS)	2,9	0,7	0,6	3,0
Bihar (BI)	3,8	1,7	-2,1	4,4
Gujarat (GU)	4,6	5,1	8,6	0,8
Haryana (HR)	1,5	4,6	1,7	3,7
Himachal Pradesh (HP)	-1,5	5,3	3,2	5,6
Karnataka (KA)	3,4	4,7	3,2	7,6
Kerala (KE)	-0,9	4,4	5,6	5,1
Madhya Pradesh (MP)	0,1	4,1	3,9	0,7
Maharashtra (MH)	1,6	6,1	7,3	2,5
Orissa (OR)	0,9	1,3	1,7	-0,8
Punjab (PU)	2,9	3,2	2,2	3,6
Rajasthan (RA)	4,2	8,1	3,0	-1,2
Tamilnadu (TN)	2,9	5,0	5,6	4,3
Uttar Pradesh (UP)	1,8	4,1	0,7	1,3
West Bengal (WB)	2,4	2,1	4,9	5,1

Source: see Appendix Table T1

During the two post-reform sub-periods (1992-96) and (1997-2001), the per capita growth trend scenario has been mixed, as the eight states (eg. AP, AS, WB etc) have shown overall increase in their growth rates, whereas many states which were high growth performing states before 1991, failed to keep up their growth rates (eg., GU, MP, OR, RA etc).⁴⁰ It should be noted that the growth dynamics at the state level is very much dependent also on the different economic reform policies adopted by the respective states to boost their own state level economic performance.

6.2. Growth and Poverty

It is believed that in India, there has been a steady decline in the level of poverty since the early 1990s. So, the obvious question is that if this is related to the rise in the growth level during the same period. Table 6.3 presents that during the last two decades poverty rate has fallen for all the states.

Table 6.3: Poverty (headcount ratio, based on national poverty lines, %)

India	1983	1987-88	1993-94	1999-2000
Andhra Pradesh	28,91	25,86	22,19	15,77
Assam	40,47	36,21	40,86	36,09
Bihar	62,22	52,13	54,96	42,60
Gujarat	32,79	31,54	24,21	14,07
Haryana	21,37	16,64	25,05	8,74
Himachal Pradesh	16,40	15,45	28,44	7,63
Karnataka	34,24	37,53	33,16	20,04
Kerala	40,42	31,79	25,43	12,72
Madhya Pradesh	49,78	43,07	42,52	37,43
Maharashtra	43,44	40,11	36,86	25,02
Orissa	65,29	55,58	48,56	47,15
Punjab	16,18	13,20	11,77	6,16
Rajasthan	34,46	35,15	27,41	15,28
Tamilnadu	51,66	43,39	35,03	21,12
Uttar Pradesh	47,07	41,46	40,85	31,15
West Bengal	54,85	44,72	35,66	27,02

Source: Planning Commission, Government of India

⁴⁰ See for more details on India's experience with economic planning and development strategy, Agarwal and Basu (2004), Datt and Ravallion (1998), Ravallion & Datt (1996) etc.

In many of the Indian states, poverty rate has actually fallen considerably during the post-reform period; with Haryana, Kerala, Punjab and West Bengal as some of the best stories (these are the states also which have done well in terms of well-being and governance, see later). The regions own administrative mechanisms are often responsible for failing to implement different pro-poor economic policies, the failure of which attributed to a bad ‘quality of governance’. The above discussion also testifies the fact that during the 1990s, with the rise in the level of per capita income in India, there has been a sharp decline in the rate of poverty across regions. Thus, with Indian experience shows that during the era of economic reforms, the poverty has declined steadily with a rising real income level.

6.3. Economic Inequality: A Glance

The issue of economic inequality (of income or consumption) is a major source of concern in India as some of the states are having higher inequality rates than the other, raising questions about the equal benefits percolating to all the states in the era of the economic reform process. With the rising income growth rates in some states, the distribution has not been even, that too creating inequality among different socio-

Table 6.4: Economic Inequality (Gini Index)

India	1983	1993-94	1997	1999-00
Andhra Pradesh	0,311	0,289	0,31	0,274
Assam	0,230	0,231	0,251	0,256
Bihar	0,279	0,265	0,369	0,263
Gujarat	0,214	0,261	0,264	0,261
Haryana	0,293	0,29	0,262	0,263
Himachal Pradesh	0,288	0,355	0,251	0,267
Karnataka	0,319	0,292	0,281	0,281
Kerala	0,352	0,315	0,315	0,295
Madhya Pradesh	0,301	0,302	0,284	0,277
Maharashtra	0,311	0,326	0,322	0,302
Orissa	0,282	0,274	0,289	0,267
Punjab	0,299	0,27	0,262	0,264
Rajasthan	0,324	0,275	0,266	0,245
Tamilnadu	0,337	0,326	0,263	0,339
Uttar Pradesh	0,305	0,301	0,308	0,286
West Bengal	0,307	0,293	0,245	0,276

Source: Planning Commission, Government of India

economic groups of people and types of workforce.⁴¹ This growing rate of inequality in a society could actually fuel more social tension and disorder that could eventually negate growth process smoothly.

We present above in Table 6.4, the Gini ratio (of per capita consumption expenditure) to offer some indication of the status of the economic inequality among states. Over the period, the inequality has gone down to some extent, yet the average of all these 16 states show that the ratio is still as high as 0.276 (perfect economic equality implies Gini value of 0.00). The states like Tamilnadu and Maharashtra have recorded highest inequality; while Assam and Rajasthan have recorded the lowest rate of inequality in the recent sub-period. We observe that during the post-reform period in India, the majority of the states have recorded a fall in the economic inequality.

7. Estimating Economic Well-being at the Sub-national Level in India

The per capita income per se is not a true indication of the quality of life of the people in society. The estimation of well-being for society shows the quality of life in a more comprehensive manner. The quality of life therefore provides the basic element for growth and development as a feedback mechanism. One of our basic purposes here is to indicate that the level of well-being, which is necessary to show the differential level of economic performance in a country like India. We estimate the economic well-being index for the 16 Indian states. We propose that the level of well-being increases with the higher values of the index.

Table 7.1 clearly shows that states like Kerala, Punjab, Maharashtra, Tamilnadu are the best performing in terms of well-being level. On the other hand, Bihar, Madhya Pradesh, Uttar Pradesh, Orissa, Assam is in the lower end of well-being level over this period. The trend has not changed that much even during the two periods of post-reform era.

⁴¹ See Basu, Krishnakumar and Flores (2004) for poverty and inequality rates of different socio-economic groups in India for 1999-2000 (NSS 55th Round) .

We also present the descriptive statistics of the well-being index for Indian states in all the four sub-period in Table 7.2. The figure shows that there is a rise in the mean value of the index, so as the median. However, the standard deviation has increased during the period. This shows that there has been overall increase in the well-being level across Indian states, but still the level of well-being is divergent in nature.

The southern Indian state of Kerala has been the best performer in terms of well-being level through out the study period, where as Bihar has always been the state with the poorest quality of life.⁴²

Table 7.1: Economic Well-being Index (EWBI): Indian States

	SWBI1980-85	SWBI1986-91	SWBI1992-96	SWBI1997-2001
Andhra Pradesh	0,355	0,394	0,350	0,446
Assam	0,093	0,250	0,337	0,067
Bihar	0,048	0,000	0,000	0,000
Gujarat	0,575	0,672	0,623	0,650
Haryana	0,578	0,490	0,484	0,608
Himachal Pradesh	0,467	0,681	0,733	0,514
Karnataka	0,497	0,547	0,552	0,375
Kerala	0,885	1,000	1,000	1,000
Madhya Pradesh	0,000	0,109	0,162	0,124
Maharashtra	0,643	0,775	0,725	0,811
Orissa	0,107	0,118	0,142	0,061
Punjab	1,000	0,883	0,758	0,990
Rajasthan	0,138	0,156	0,236	0,196
Tamilnadu	0,639	0,722	0,672	0,698
Uttar Pradesh	0,079	0,055	0,111	0,123
West Bengal	0,388	0,412	0,433	0,456

Notes: SWBI is the normalised figure (see equation 7, TN2).

The rank correlation coefficient between the period's well-being levels is pretty high

Table 7.2: Descriptive Statistics of Well-Being Index: India

	Mean	Median	Standard Deviation	CI for Mean
SWBI1980-85	0,405	0,427	0,308	(0,241, 0,569)
SWBI1986-91	0,454	0,451	0,316	(0,285, 0,622)
SWBI1992-96	0,457	0,458	0,283	(0,306, 0,608)
SWBI1997-2001	0,445	0,451	0,331	(0,268, 0,621)

Note: Confidence interval (CI) at 95% level.

⁴² See Dreze and Sen (1997) for more details on the discussions on Kerala and Bihar

(more than 0.900, for any of the two periods). This is also an indication that the relative position of the states' well-being level has not changed much in our analysis, and hence a slow catching up of the states poor states to the good ones.

8. Well-being, Income and Poverty: Some Correlates

In this section, we show simple correlation of well-being level and income with the poverty incidence. One might wonder as to what extent our well-being index is in fact contributing to either give an impetus to income or to poverty reduction. We rather would like to have a 'value' of our well-being measure in our analysis. To provide some preliminary justification of our well-being measure, we yield to basic correlation of well-being with income and poverty reduction.

The simple rank correlation coefficient between well-being and per capita income (real) level during 1990s is 0.836 for India (coefficients are significant at 1 % level). Similarly, the correlation between well-being and poverty in India is -0.753 (coefficients are significant at 1 % level) during the same period. This is a good initial pointer that our

Table 8: Rank of Economic Well-being Index (EWBI): Indian states

	SWBI1980-85	SWBI1986-91	SWBI1992-96	SWBI1997-2001
Andhra Pradesh	10 (9)	10(9)	10(11)	9(9)
Assam	13(11)	11(15)	11(14)	14(14)
Bihar	15(16)	16(16)	16(16)	16(16)
Gujarat	6(4)	6(4)	6(4)	5(4)
Haryana	5(3)	8(2)	8(3)	6(3)
Himachal Pradesh	8(6)	5(6)	3(8)	7(8)
Karnataka	7(8)	7(8)	7(7)	10(7)
Kerala	2(10)	1(11)	1(9)	1(10)
Madhya Pradesh	16(12)	14(13)	13(12)	12(12)
Maharashtra	3(2)	3(3)	4(1)	3(1)
Orissa	12(15)	13(14)	14(15)	15(15)
Punjab	1(1)	2(1)	2(2)	2(2)
Rajasthan	11(13)	12(10)	12(10)	11(11)
Tamilnadu	4(7)	4(7)	5(5)	4(5)
Uttar Pradesh	14(14)	15(12)	15(13)	13(13)
West Bengal	9(5)	9(5)	9(6)	8(6)
Rank correlation	.797*	.706*	.771*	.838*

Notes: (...) rank of per capita GDP; * significant at 1% level. Rank 1 is the best performer and 16 is the worst.

well-being index can explain the economic performance of the states.⁴³ We can therefore see that the states, which are doing better in terms of per capita income are also the states that yield better scores in terms of well-being level. In the above Table 8, we show the rankings of the state in terms of well-being and income level. We can clearly observe that there is a strong correspondence between rise in the level of well-being and reduction of poverty rate for Indian states (see Appendix Figures F2, F3 and F4).⁴⁴

Perhaps, one question is not yet answered adequately. Why is there differential level of well-being level among the states in India? In the final part of our analysis, we argue that the quality of governance and some other economic policies are crucial parameters that help explain this unevenness of the level of development across states in India.

9. Estimating Quality of Governance at the Sub-national Level in India

We estimate the quality of governance index for Indian states with the statistical technique as described in the Section 4. We propose that the quality of governance improves as the value of the index increases. The results of the Indian states show that Kerala, the best performer in terms of economic well-being index, is also at the top in terms of governance index. Similarly, the states like Tamilnadu, Karnataka and Maharashtra, are showing the same pattern (Table 9.1). The rank correlation has increased over the period with well-being index, as during the first period the value was only 0.032, and has increased to 0.415 for the last period. This is possibly some indication about the fact that with the initiation of new economic policies, the states are now making their institutions better to do away with all the inefficiencies and ineffectiveness that subsequently hinders the economic growth and well-being.

⁴³ See Basu (2004) for more detailed discussion of growth and well-being at the sub-national level in India and China.

⁴⁴ It may be interesting just to point here that in the Indian case, apart from the experience of Kerala, other states have shown a strong correspondence between income growth and well-being level.

We now seek to investigate and relate how our measure of governance is related to income and well-being level. A simple correlation between governance measure with income and well-being (during 1990s) is 0.235 and 0.423 respectively. This implies that

Table 9.1: Quality of Governance Index (QGOI): Indian states

	QGOI1980-85	QGOI1986-91	QGOI1992-96	QGOI1997-2001
Andhra Pradesh	0,235(11)	0,280(5)	0,000(16)	0,370(9)
Assam	0,633(4)	0,232(6)	0,452(3)	0,440(5)
Bihar	0,382(6)	0,209(7)	0,178(7)	0,098(13)
Gujarat	0,000(16)	0,017(15)	0,106(9)	0,288(10)
Haryana	0,083(15)	0,141(10)	0,008(15)	0,136(12)
Himachal Pradesh	0,333(9)	0,163(8)	0,105(10)	0,064(15)
Karnataka	0,432(5)	0,392(4)	0,229(6)	0,407(6)
Kerala	1,000(1)	0,883(2)	1,000(1)	0,845(2)
Madhya Pradesh	0,227(12)	0,068(12)	0,158(8)	0,401(7)
Maharashtra	0,364(7)	0,058(13)	0,040(12)	0,483(3)
Orissa	0,330(10)	0,133(11)	0,052(11)	0,000(16)
Punjab	0,102(14)	0,057(14)	0,028(13)	0,177(11)
Rajasthan	0,762(2)	0,436(3)	0,329(4)	0,467(4)
Tamilnadu	0,677(3)	1,000(1)	0,775(2)	1,000(1)
Uttar Pradesh	0,159(13)	0,000(16)	0,026(14)	0,083(14)
West Bengal	0,334(8)	0,146(9)	0,270(5)	0,376(8)

Notes: QGOI is the normalised figure (see equation 7, TN2). Ranks indicated in parentheses, with rank 1 imply best performing, and the 16 is the worst performer.

quality of governance is positively related to per capita income and quality of life; from the available state level measures for India (see Appendix Figure F5).

10. Exploring Possible Determinants of Well-being in India

In this final section of our empirical analysis, we show the factors that could possibly explain the differential well-being level across the states in India. The dynamics of well-being level is critically dependent on the quality of governance, decentralisation, and other changes which are accompanied with economic reforms, like urbanisation, changes in agricultural productivity etc. The results of the analysis are reported in the Table 10.1.

With different specifications in the model, we propose to show the factors that are crucial in explaining well-being level across the states. The above results are a clear

indication that the quality of governance is the driving element for determining the level of well-being. In all the above six different model specifications, we observe that the coefficient of QGOI is positive and statistically significant (meaning better level of governance can potentially help explain improvements in the level of well-being). In the

Table 10.1: Panel Data Regression Results of Economic Well-being Index (EWBI)

(Pooled estimation)	Dependent variable: EWBI					
Independent variables	M1	M2	M3	M4	M5	M6
QGOI	0.319*** (0.122)	0.270*** (0.097)	0.304*** (0.104)	0.343*** (0.102)	0.356*** (0.105)	0.347*** (0.101)
LPOP	-0.139*** (0.044)	-0.192*** (0.036)	-0.180*** (0.038)	-0.152*** (0.038)	-0.145*** (0.040)	-0.143*** (0.039)
URBA		0.016*** (0.002)	0.016*** (0.003)	0.014*** (0.003)	0.014*** (0.003)	0.014*** (0.002)
FIDI			-0.023 (0.026)	-0.027 (0.025)	-0.029 (0.025)	-0.031 (0.025)
AGPO				0.001** (0.001)	0.001** (0.001)	0.001** (0.001)
Time effects 80-85					0.060 (0.082)	
Time effects 86-91					0.072 (0.076)	
Time effects 92-96					0.046 (0.076)	
Time Trend						-0.021 (0.025)
Constant	1.826*** (0.471)	2.009*** (0.375)	1.892*** (0.396)	1.493*** (0.414)	1.357*** (0.455)	1.438*** (0.420)
#of states	16	16	16	16	16	16
# of obs., for each state	4	4	4	4	4	4
# total panel obs.	64	64	64	64	64	64
Adj.R2	0.190	0.489	0.217	0.528	0.512	0.521
F-statistics(p-values)	8.43 (0.000)	21.14 (0.000)	16.02 (0.000)	15.11 (0.000)	9.24 (0.000)	12.65 (0.000)

Notes: : M (i) denoted Model i, in our all the specifications standard errors are in the parentheses. ***- significant at 1% level, **-significant at 5% level, *-significant at 10% level

model 1, we only estimate with QGOI and LPOP (log of population), and we see that the coefficient of QGOI is positive and statistically significant, with LPOP is negative (for all the model specifications), as the population puts pressure to the level of well-being, as the states would find this difficult to effectively implement all the policies and administer

public works efficiently. The coefficient of financial decentralisation index (FIDI) has come out to be negative in all models, but is not statistically significant.⁴⁵

As expected, the coefficient on urbanisation has always been positive, and is statistically significant. With growing urbanisation, and movement of labour from agriculture to the industry and other skilled jobs, this could actually lead to a rise in the level of well-being. The coefficient of agricultural productivity is some sort of indication here that countries in like India, where still the large chunk of the economy is dependent on the agriculture sector that it is still a crucial factor for differential level of well-being performance in the States in India. The AGPO has come out to be positive and statistically significant, but we may note that the magnitude of its effects to well-being is rather negligible.

We then added the time effects in the panel model 3 and the time trend in model 4 (see section 4). The coefficients of time effects are positive but not statistically significant, and on the other hand the time trend coefficient is negative, implying that even in the well-being level, there has been little changes in the status of the states over the period, as this is confirming our previous finding in terms of descriptive statistics and rank correlation measure.

In the next Table 10.2, we report the results of the panel estimation (with FGLS method) allowing for with group specific heteroskedasticity in the model.⁴⁶ Apart from the six basic model specifications, we have introduced Model 7, as this is based on group specific heteroskedasticity with common ar (1) process in the panel. All the model specifications show that the QGOI coefficient is positive and statistically significant as in the above results. One of the differences in the result is that of the coefficients of FIDI, which is now negative and statistically significant (except in model 4). Time effects are now positive and statistically significant (except for TE3), which indicates that during

⁴⁵ However, there is also another set of studies that is arguing with more decentralisation, the probability of corruption is high, which might lead to have some negative externality for growth and development. See Mauro (1995), Bardhan and Mookherjee (1998), and Fishman and Gatti (2000) for more empirical and theoretical discussion on the issue of decentralisation, corruption, governance and development.

⁴⁶ As Greene (1997) noted that for a 'cross-country comparison, we would expect tremendous variation in the scales of all variables in the model. We can relax the classical assumption by allowing σ^2 to vary' (p.653).

Table 10.2: Panel Data Regression Results of Economic Well-being Index (EWBI)

(Pooled estimation)	Dependent variable: EWBI						
Independent variables	M1	M2	M3	M4	M5	M6	M7
QGOI	0.392*** (0.066)	0.114** (0.057)	0.173*** (0.059)	0.164*** (0.060)	0.184*** (0.057)	0.184*** (0.052)	0.227*** (0.055)
LPOP	-0.142*** (0.020)	-0.191*** (0.020)	-0.182*** (0.023)	-0.203*** (0.020)	-0.188*** (0.023)	-0.188*** (0.023)	-0.167*** (0.032)
URBA		0.019*** (0.001)	0.019*** (0.001)	0.017*** (0.002)	0.019*** (0.002)	0.019*** (0.002)	0.013*** (0.003)
FIDI			-0.020* (0.012)	-0.009 (0.010)	-0.026** (0.011)	-0.025** (0.012)	-0.023* (0.012)
AGPO				0.001*** (0.001)	0.001*** (0.001)	0.001*** (0.001)	0.001*** (0.001)
Time effects 80-85					0.092** (0.037)		0.092** (0.042)
Time effects 86-91					0.053** (0.027)		0.066** (0.028)
Time effects 92-96					0.032 (0.024)		0.052** (0.023)
Time Trend						-0.027** (0.012)	
Constant	1.869*** (0.219)	1.956*** (0.229)	1.883*** (0.257)	1.961*** (0.226)	1.713*** (0.269)	1.831*** (0.255)	1.589*** (0.365)
#of states	16	16	16	16	16	16	16
# of obs., for each state	4	4	4	4	4	4	4
# total panel obs.	64	64	64	64	64	64	64
Log likelihood	17.808	37.524	36.868	45.600	49.126	49.223	56.230
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: : M (i) denoted Model i, in our all the specifications standard errors are in the parentheses. With FGLS estimation method, with group specific heteroskedasticity. Model 7 is based on group specific heteroskedasticity with common ar (1) process in the panel. ***-significant at 1% level,**-significant at 5% level,*-significant at 10% level

these specific periods well-being level across states has improved (in conformity with our results on the descriptive statistics in Table 7.2). The log likelihood values reject the homoskedasticity, as the values are statistically significant at 1% level. So, we confirm that our specifications are suitable for the data structure.⁴⁷ Thus, we show that governance and other policy variables are critical in explaining the variation in the level of well-being in regions, especially with respect to the economic reform policies.

⁴⁷ See Basu (2003b) for detailed analysis of determinants of well-being on the basis of Indian states.

11. Concluding Remarks

Our conceptual framework provided some basic confirmation to the fact that under the economic reforms, we observe that economies have underwent changes in terms of structures and other factors which could actually help economies to overcome underutilisation and inefficient use of available resources. The empirical evidence from Indian states for the last two decades have substantially shown that the adoption of different economic policies (even at the state level) is critical in explaining the uneven level of economic performance. Our study has also provided evidence that the efficiency of institutional mechanism is also critical for explanation of well-being differential at the sub-national level.

During economic reforms, states registered an overall increase in economic growth rates and also in well-being level. At the same time, there has been a substantial rise in the governance efficiency after economic reforms that actually helped states to improve their well-being level substantially.

This paper is therefore a modest attempt to put forward growth, well-being and governance in the canvass of economic reforms process. With our proposed conceptual framework, we have provided some preliminary evidence that with better institutional mechanism and/or good quality governance and economic reforms measures could simultaneously allow economies to put its development process in the higher ladder of growth and well-being level.

Bibliography

- Agarwal, M. (1997). *India*, in Desai, P. (ed.). *Going Global: Transition from Plan Market in the World Economy*. The MIT Press.
- and Sudip Ranjan Basu (2004). 'Development Strategy and Regional Inequality in India', in Barua, A. (ed.) *India's Northeast: Development Issues in a Historical Perspective*, Manohar Publishing, New Delhi (forthcoming).
- Aghion, P. and J.G. Williamson.(2000). *Growth, Inequality and Globalisation. Theory, History and Policy*, Cambridge.
- Anderson, T.W. (1984). *An Introduction to Multivariate Statistical Analysis*. 2nd Edition. John Wiley and Sons. New York.
- Baldwin, R., and P. Martin (1999). 'Two Waves of Globalisation: Superficial Similarities, Fundamental Differences', *WP 6904, NBER*.
- Baltagi, B. H. (1995). *Econometric Analysis of Panel Data*, Wiley, Chichester.
- Bardhan, P. and D. Mookherjee. (1998). 'Expenditure Decentralisation and the Delivery of Public Services in Developing Countries' (mimeo), *University of California at Berkeley*.
- Barro, R. (1991). 'Economic Growth in a Cross-section of Countries', *Quarterly Journal of Economics*, 407-43.
- (2001). 'Quantity and Quality of Economic Growth', *Fifth Annual Conference of the Central Bank of Chile*.
- Xavier Sala -I- Martin. (1992). 'Convergence', *Journal of Political Economy*, 100, 2,223-251.
- Bassanini, A., S. Scarpetta, and P.Hemmings. (2001). 'Economic growth: The role of policies and Institutions. Panel Evidence from OECD countries' *Economics Department working papers No. 283. OECD*, Paris.
- Basu, Sudip Ranjan (2002). 'Does Governance Matter? Some Evidence from Indian States', Paper presented at the *VIIIth Spring Meeting of Young Economists*, 17-19 April, Paris, France.
- (2003a). 'Estimating the quality of economic governance: A cross-country analysis'. Paper presented at the *Swiss Society of Economics and Statistics Annual Congress*, March 20-21, Bern, Switzerland.
- (2003b). 'The Determinants of Economic Well-being: An Application in the Indian States'. Paper presented at the *VIIIth Spring Meeting of Young Economists*, 3-5 April, Leuven, Belgium.
- (2003c). 'Measuring Economic Well-Being and Governance: Some Methodological Tools'. Paper presented at the *International Conference of Computational Methods in Sciences and Engineering, ICCMSE 2003*, 12-16 September, Kastoria, Greece.

- (2004). 'Correlating Growth with Well-being during Economic Reforms: Evidence from India and China'. A Paper prepared for presentation in the IXth Spring Meeting of Young Economists, 23-25 April, Warsaw, Poland.
- Jaya Krishnakumar and Gabriela Flores (2004). 'Spatial Distribution of Welfare across States and Different Socio-Economic Groups in Rural and Urban India', Swiss National Science Foundation project, Department of Econometrics, University of Geneva, (work in progress).
- Ben-David, D (1993). 'Equalising Exchange: Trade Liberalisation and Income Convergence', *Quarterly Journal of Economics*, 108/3.
- Bhagwati, J.N. (1978). *Foreign Trade Regimes and Economic Development. Anatomy and Consequences of Exchange Control Regimes*. Cambridge. Ballinger.
- (1998) *The Design of Indian Development*, in I.J.Ahluwalia and I.M.D. Little (eds) India's Economic Reforms and Development Essays for Manmohan Singh, Oxford.
- Bruno, M. (1989). 'Econometric and the Design of Economic Reforms', *Econometrica*, 57/2/March, 275-306.
- Chong, A. and Cesar Calderon. (1997). 'Institutional Change and Poverty, or Why is it Worth it to Reform the State?' (mimeo), *The World Bank*.
- Dasgupta, P., and M. Weale. (1992). 'On Measuring the Quality of Life', *World Development*, 20,1, 119-131.
- Datt, G. and Martin Ravallion (1997). 'Macroeconomic Crises and Poverty Monitoring: A Case Study for India', *Review of Development Economics*, Vol.1, No. 2.
- Dollar, D. (1992). 'Outward-Oriented Developing Countries Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-85'. *Economic Development and Cultural Change*, April, 523-544.
- (2001). 'Globalization, Inequality, and Poverty since 1980', *World Bank*, Development Research Group.
- R. Fisman and R. Gatti (1999). 'Are Women Really the 'Fairer' Sex? Corruption and Women in Government'. Policy Research Report on Gender and Development, *Working Paper Series*, # 4, *World Bank*.
- Dollar, D., and A.Kraay (2001). *Trade, Growth, and Poverty. World Bank, Policy Research Working Paper # 2199*.
- Dreze, J and Sen, A. (eds) (1997). *Indian Development: Selected Regional Perspective*. Oxford University Press.
- Edwards, S. (1998). 'Openness, Productivity and Growth: What do we really know?' *Economic Journal*, 108, 383-398

- Frankel, J. and D. Romer (1999). 'Does Trade Cause Growth?', *American Economic Review*, 89/3, 379-399.
- Government of India (various years). *Planning Commission*, New Delhi.
- Grossman, G.M and E. Helpman. (1991). *Innovation and Growth in the Global Economy*. MIT Press.
- Greene, W. (1997). *Econometric Analysis*, 3rd Edition, Prentice Hall.
- Hsiao, C. (1986). *Analysis of Panel Data*. Cambridge University Press.
- Huther, J. and A. Shah (1998). 'Applying a Simple Measure of Good Governance to the Debate on Fiscal Decentralisation'. *World Bank Policy Research Working Paper # 1894*
- Islam, N.(1995). 'Growth empirics: A panel data approach', *Quarterly Journal of Economics*, 110, pp.1127-70.
- Kaufmann, D., A.Kraay, and P.Z-Lobaton. (1999a). 'Aggregating Governance Indicators', *World Bank Policy Research Working Paper, #2195*, Washington, DC.
- (1999b). 'Governance Matters'. *World Bank Policy Research Working Paper, # 2196*, Washington, DC.
- (2002). 'Governance Matters II: Updated Indicators for 2000/01', *World Bank Policy Research Working Paper, # 2772*.
- Keynes, J.M (1936). *The General Theory of Employment, Interest and Money*. London.
- Knack, S. (1997). 'Why Don't Poor Countries Catch Up? A Cross-Country Test of an Institutional Explanation', *Economic Inquiry*, 35,3,590-602.
- and Philip Keefer. (1995). 'Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures', *Economics and Politics*, 7, 207-27.
- Knight, Frank. H. (1939). 'Ethics and Economic Reform', *Economica*, New Series, 6/23, 296-321.
- Lucas, R.E. (1988). 'On the Mechanisms of Economic Development', *Journal of Monetary Economics*, 22, 1, 3-42
- Marjit, S. and S. Mitra (1996). 'Convergence in Regional Growth Rates: Indian Research Agenda'. *Economic and Political Weekly*.
- Marti, W. (2001). 'Trade Policies, Developing Countries, and Globalisation', *Development Research Group, WB*
- Mauro, P. (1995). 'Corruption and Growth'. *Quarterly Journal of Economics*. 109, 681-712.
- Morris, D. Morris. (1979). *Measuring the Condition of the World's Poor: The Physical Quality of Life Index*. New York, Pergamon.

- Muqtada ,M. (2003). 'Macroeconomic Stability, Growth and Employment: Issues and Considerations Beyond the Washington Consensus', *EMP WP#48, ILO*, Geneva.
- Nagar, A.L, & Sudip Ranjan Basu. (2002). *Weighting Socio-Economic Indicators of Human Development: A Latent Variable Approach*, in Ullah, A. et al (eds.) *Handbook of Applied Econometrics and Statistical Inference*, Marcel Dekker, New York, USA.
- (2002). 'Infrastructure Development Index: An Analysis for 17 Major Indian States (1990-91 to 1996-97)', paper presented at *the Ninth International Conference of Forum for Interdisciplinary Mathematics on Statistics Combinatorics and Related Areas*, December 21-23, University of Allahabad, India.(under editorial consideration)
- Rao, M.G., RTS Shand and KP Kalirajan (1999). 'Convergence of Income Across Indian States', *Economic and Political Weekly*.
- Ravallion, M. and Gaurav Datt (1996). 'How Important to India's Poor is the Sectoral Composition of Economic Growth?' *World Bank Economic Review*, Vol.10.
- Rodriguez, F. and D.Rodrik.(2000). 'Trade Policy and Economic Growth: A Skeptic's guide to the cross-national evidence', *J.F.K. School of Government*, Harvard University.
- Rodrik, D.(1997). *Has Globalisation Gone too far?* IIE, Washington, D.C.
- (1997). 'Globalisation, Social Conflict and Economic Growth', *WP* , *J.F. Kennedy School of Government*, Harvard University.
- (2000) 'Institutions for high-quality growth: What they are and how to acquire them', WP#7540, NBER.
- Romer, P.M. (1986). 'Increasing returns and Long Run Growth', *Journal of Political Economy*, 92, 1002-37.
- Ross, L. (1997). 'Law, Finance and Economic Growth', (mimeo), World Bank..
- Sala -I- Martin , Xavier(1997). 'I Just Ran Two Million Regressions', *American Economic Review*, 87/2, 178-183.
- Sachs, J. and A. Warner (1995). 'Economic reform and the Process of Global Integration'. *Brookings paper on Economic Activity*., 1, 1-118.
- Sachs, J., N.Bajpai, and A. Ramiah (2002). 'Understanding Regional Economic Growth in India', *CID WP# 88*, Harvard University.
- Sen, A.K. (1983). 'Development: Which way now'. *Economic Journal*, 93, December.
- Solow, R.M. (1956): A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 70, 75-94.
- Stiglitz, J. (1999). 'Whither Reform? Ten Years of the Transition'. *ABCDE, World Bank*, Washington, D.C. April 28-30.

- (2002). *Globalization and its Discontents*. Norton , New York.
- Swamy, A., S.Knack, Y. Lee and O. Azfar (1999). 'Gender and Corruption'. Draft Paper, *IRIS Center*, University of Maryland.
- Swan, T.(1956). 'Economic Growth and Capital Accumulation'. *Economic Record* 32, 334-61.
- United Nations. (1954). *International Definition and Measurement of Standards and Levels of Living*. New York, United Nations.
- UNDP (1990- present). *Human Development Report*. New York, Oxford University Press.
- World Bank (various years). *World Development Report*. Oxford University Press.
- World Bank (2000). *The Quality of Growth*. Oxford University Press, New York.
- (2003). *Sustainable Development in a Dynamic World: Transforming Institutions, Growth, and Quality of Life*. *World Development Report*. Oxford University Press, New York.

ANNEXURE

Technical Note

TN1) Measuring Economic Well-Being Index (EWBI):

In this section we discuss in detail the statistical technique that we have employed to compute the economic well-being index.

The Factor analysis (FA) technique reduces the set of observed indicators to a smaller number of unobserved factors, which have a common causation influence. The underlying assumptions of factor analysis are that there exist a number of unobserved 'factors' that account for the correlation among the observed indicators, and because of this relation, the unobserved factors can be inferred from the observed indicators

The structure of the model to obtain our EWBI is expressed as following:

$$X = \Lambda f + e \text{-----1}$$

where X = p -dimensional vector of observed indicators, $X' = (x_1, x_2, \dots, x_p)$,

f = q -dimensional vector of unobserved indicators called common factors,

$$f' = (f_1, f_2, \dots, f_q),$$

e = p -dimensional vector of unobservable indicators called unique factors,

$e' = (e_1, e_2, \dots, e_p)$ and

$$1. \quad \Lambda = \begin{pmatrix} \lambda_{11} \lambda_{12} \cdots \lambda_{1q} \\ \lambda_{21} \lambda_{22} \cdots \lambda_{2q} \\ \vdots \\ \lambda_{p1} \lambda_{p2} \cdots \lambda_{pq} \end{pmatrix}$$

where $\Lambda = p \times q$ matrix of unknown constants called factor loadings.

There are p unique factors and it is generally assumed that the unique part of each indicator is uncorrelated with each other or with their common part. The total number of parameters in need of estimation is the number of factor loadings, namely pq . The relationship within a set of p observed indicators reflects the correlation of each observed indicators with q mutually uncorrelated underlying factors, with the above assumption that number of factors to be extracted should be less than the number of indicators, $q < p$.

Thus, the base model can be rewritten as,

$$X_i = \sum_{j=1}^q \lambda_{ij} f_j + e_i \text{ -----2}$$

This set of equations in (2) is called a factor pattern. The $p \times q$ matrix of factor loadings with factor designations as columns is referred to as the pattern matrix. The correlation between the observed indicators and the common factors is called a factor structure for a complete solution.

However in practice, the original observed indicators are standardised (by subtracting from means and dividing by their variance respectively), the basic FA model is the correlation matrix of R.

Now writing (1) in a linear FA model yields:

$$\left. \begin{aligned} X_1 &= \lambda_{11}f_1 + \lambda_{12}f_2 + \dots + \lambda_{1q}f_q + e_1 \\ X_2 &= \lambda_{21}f_1 + \lambda_{22}f_2 + \dots + \lambda_{2q}f_q + e_2 \\ &\vdots \\ X_p &= \lambda_{p1}f_1 + \lambda_{p2}f_2 + \dots + \lambda_{pq}f_q + e_p \end{aligned} \right\} \text{-----3}$$

The total combination of factor f_j to the total variance of the entire set of variables is given by the eigenvalue of the factor f_j , obtained as

$$V_j = \sum_{i=1}^p \lambda_{ij}^2 = \lambda_j' \lambda_j \text{ -----4}$$

where λ_j denotes j^{th} column of Λ .

Thus (4) implies the squared factor loadings, $\sum_{i=1}^p \lambda_{ij}$ for $j= 1, 2, \dots, q$.

The objective of the model framework is to determine the minimum of common factors that would satisfactory produce the correlations among the observed indicators. We discuss only the Principal Factor method to find out initial solutions here. This method extracts factors such that each factor accounts for the maximum possible amount of the variance contained in the set of indicators being factored. Here, the method generates the coefficients $\lambda_{11}, \lambda_{21}, \dots, \lambda_{p1}$ for the factor f_1 in such a manner that the contribution of f_1 to the total communality V is maximised, subject to $\frac{1}{2} p(p-1)$

correlations and the P specified communalities. This solution is equivalent to finding the required eigenvalues and eigenvectors of the reduced correlation matrix R.

Now FA analysis involves, finding simpler and more easily interpretable factors through rotation, while keeping the number of factors and communalities of each indicator fixed. This rotation is done to see how the observed indicators are clustered into sub-groups, one sub-group lying close to one rotated factor and the other sub-groups lying close to the other rotated factor and so on. There are two types of rotation method: a) orthogonal rotation, and b) oblique rotation, where no such restrictions are involved.

However in orthogonal rotation, we focus only on the most used algorithm, i.e. the Varimax. This method is used to rotate principal component rotation that seeks to rotate the factors so that the variation of the squared factor loadings for a given factor is made large. Moreover, these loadings are normalised (Kaiser Normalisation), as obtained by first dividing each variable loadings by the square root of its communality. By such a scaling all indicators are given equal weight in the rotation.

Then we estimate factor scores in the FA model as below: for a given factor f_j the i^{th} extracted factor score, denoted by F_{ij} , is given by

$$\hat{F}_{ij} = \beta_1 X_{i1} + \dots + \beta_p X_{ip} \text{ -----5}$$

where $\beta_1, \beta_2, \dots, \beta_p$ are referred to as regression coefficients and $X_{i1}, X_{i2}, \dots, X_{ip}$ are p observed indicators, for the i^{th} observations.

TN2) Measuring Quality of Governance Index (QGOI):

Now, we briefly discuss the statistical technique to compute the governance index.

We use a latent variable model where the **QGOI** is supposed to be linearly dependent on a set of observable indicators plus a disturbance term capturing error.

$$\text{Let } Y = \alpha + \beta_1 X_1 + \dots + \beta_k X_k + e \text{ -----6}$$

Where X_1, X_2, \dots, X_K is set of indicators that are used to capture the 'quality of governance index', so that the total variation in the Y (or QGOI) is composed of two orthogonal parts: a) variation due to set of indicators, and b) variation due to error.

If the model is well specified, including adequate number of indicators, so that the mean of the probability distribution of e is zero, ($Ee = 0$), and error variance is small relative to the total variance of the latent variable QGOI. It can be reasonably assumed that the total variation in QGOI is largely explained by the variation in the explanatory variables.

However, in the present analysis, we propose to replace the set of indicators by an equal number of their principal components (PC), so that 100% of variation in indicators is accounted for by their PCs.

To compute PCs, we proceed as follows:

we transform the indicators into their standardised form i.e.,

$$X_k = \frac{X_k - \text{minimum } X_k}{\text{maximum } X_k - \text{minimum } X_k} \dots\dots\dots 7$$

where maximum X_k and minimum X_k , are the values of X_k for $k=1,2,\dots\dots n$ (number of states in the sample), and then

We solve the determinantal equation, $|R - \lambda I| = 0$ for λ

where R is a $K \times K$ matrix ;this provides a K^{th} degree polynomial equation in λ and hence K roots. These roots are called eigenvalues of R .

We arrange λ in descending order of magnitude, as $\lambda_1 \rangle \lambda_2 \rangle \dots\dots\dots \rangle \lambda_k$.

Now, corresponding to each value of λ , we solve the matrix equation $(R - \lambda I)\alpha = 0$ for the $K \times 1$ eigenvectors α , subject to the condition that $\alpha' \alpha = 1$.

Then we write the characteristic vectors as

$$\alpha_1 = \begin{pmatrix} \alpha_{11} \\ \vdots \\ \alpha_{1k} \end{pmatrix}, \dots\dots\dots, \alpha_k = \begin{pmatrix} \alpha_{k1} \\ \vdots \\ \alpha_{kk} \end{pmatrix},$$

which correspond to $\lambda = \lambda_1 = \dots\dots\dots, \lambda_k$ respectively.

Then, we obtain the principal components as:

$$\left. \begin{array}{l} P_1 = \alpha_{11}X_1 + \dots\dots\dots + \alpha_{1k}X_k \\ P_2 = \alpha_{21}X_1 + \dots\dots\dots + \alpha_{2k}X_k \\ \vdots \\ P_k = \alpha_{k1}X_1 + \dots\dots\dots + \alpha_{kk}X_k \end{array} \right\} \dots\dots\dots 8$$

Thus we compute all these PCs using elements of successive eigenvectors corresponding to eigenvalues, $\lambda_1, \lambda_2, \dots, \lambda_k$, respectively.

Finally, we estimate the QGOI as weighted average of the PCs, thus:

$$QGOI^s = \frac{P_1\lambda_1 + P_2\lambda_2 + \dots + P_k\lambda_k}{\lambda_1 + \lambda_2 + \dots + \lambda_k}, \text{ where } s= 1, 2, \dots, S \text{ (sates/provinces) } \text{-----9}$$

where the weights are the eigenvalues of the correlation matrix R and is known that $\lambda_1 = \text{var } P_1, \dots, \lambda_k = \text{var } P_k$. Hence, we attach highest weights to the first PCs, because it accounts for the largest proportion of total variation in all indicator variables. Similarly, the second PC accounts for the second largest and therefore, the second largest weight (λ_2) is attached to this, and so on.

Appendix Figures

FigureF1: Conceptual Framework of Economic Reforms, Growth, Well-being and Governance

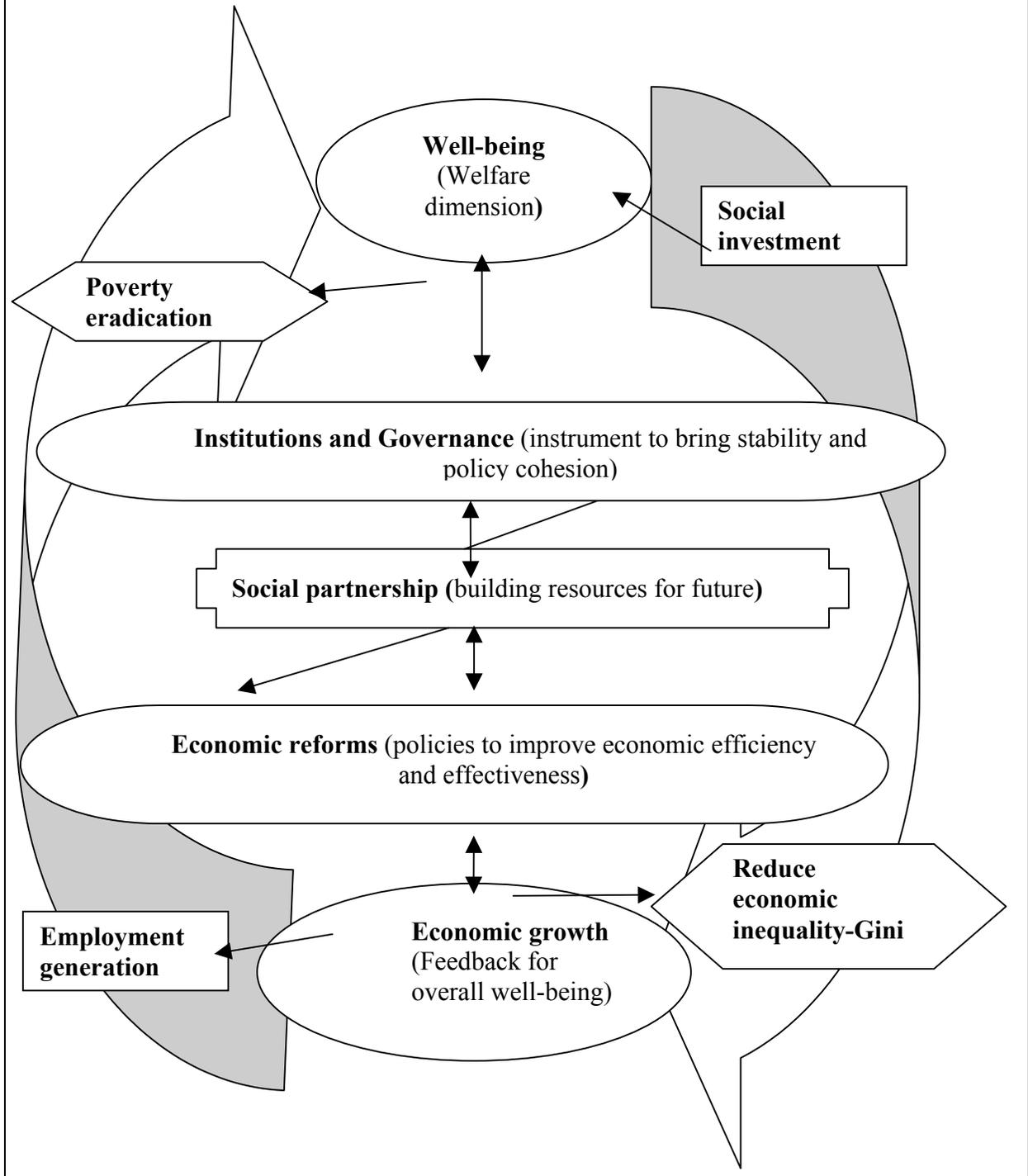
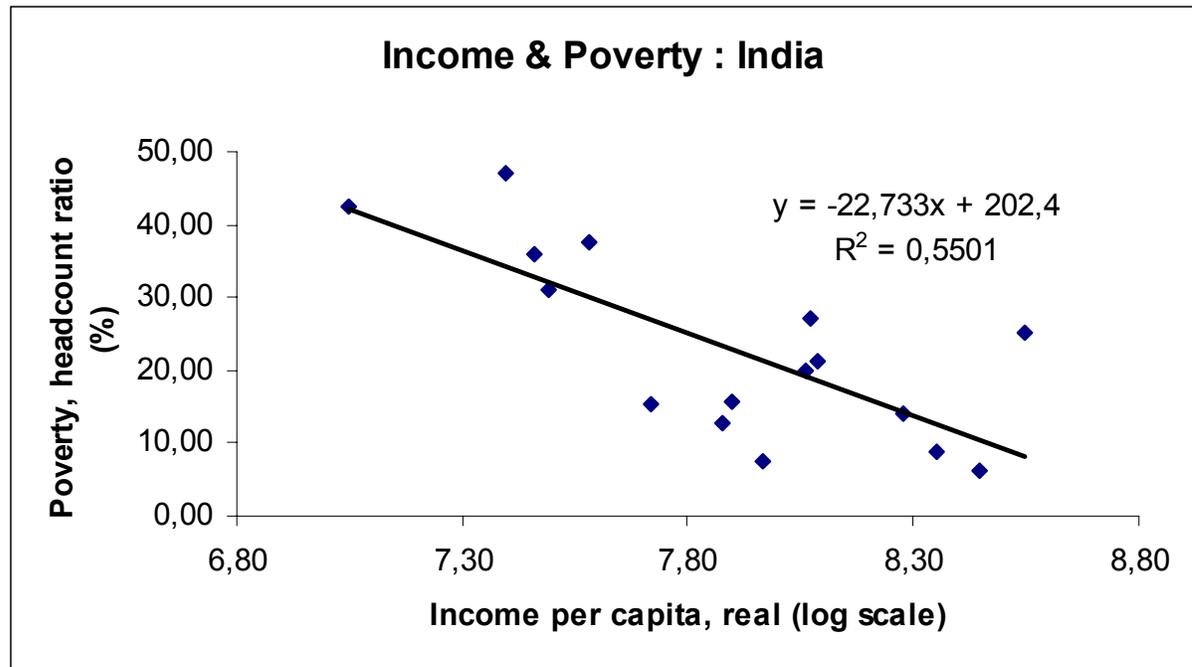
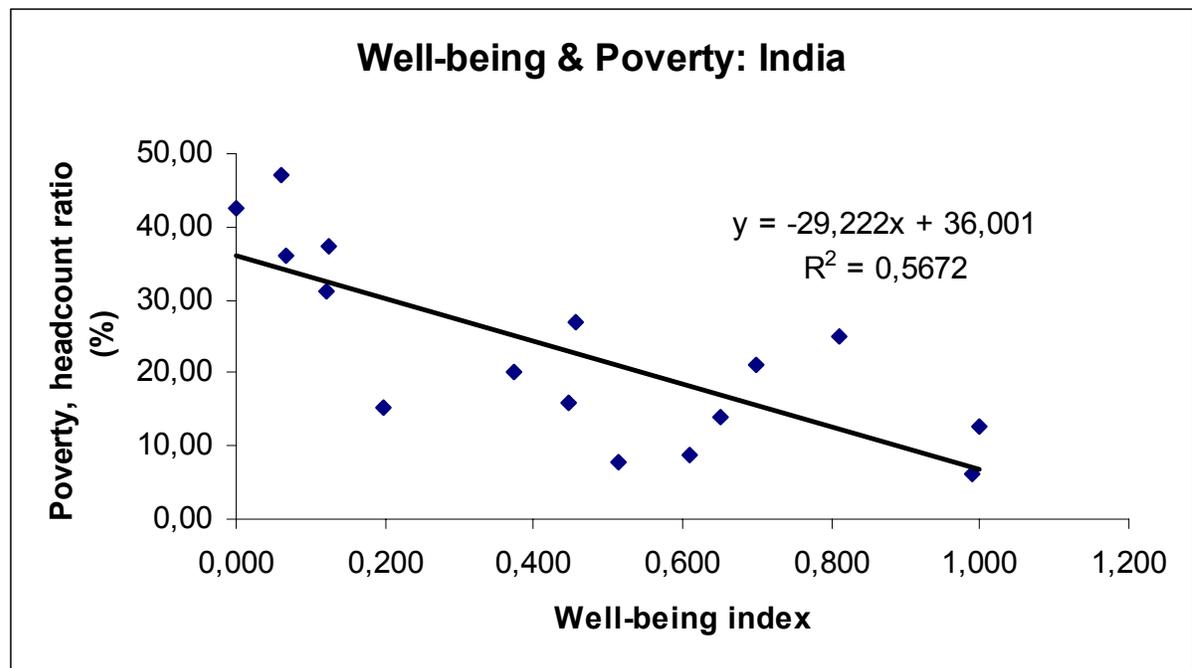


Figure F2: Per Capita Income and Poverty, 1990s



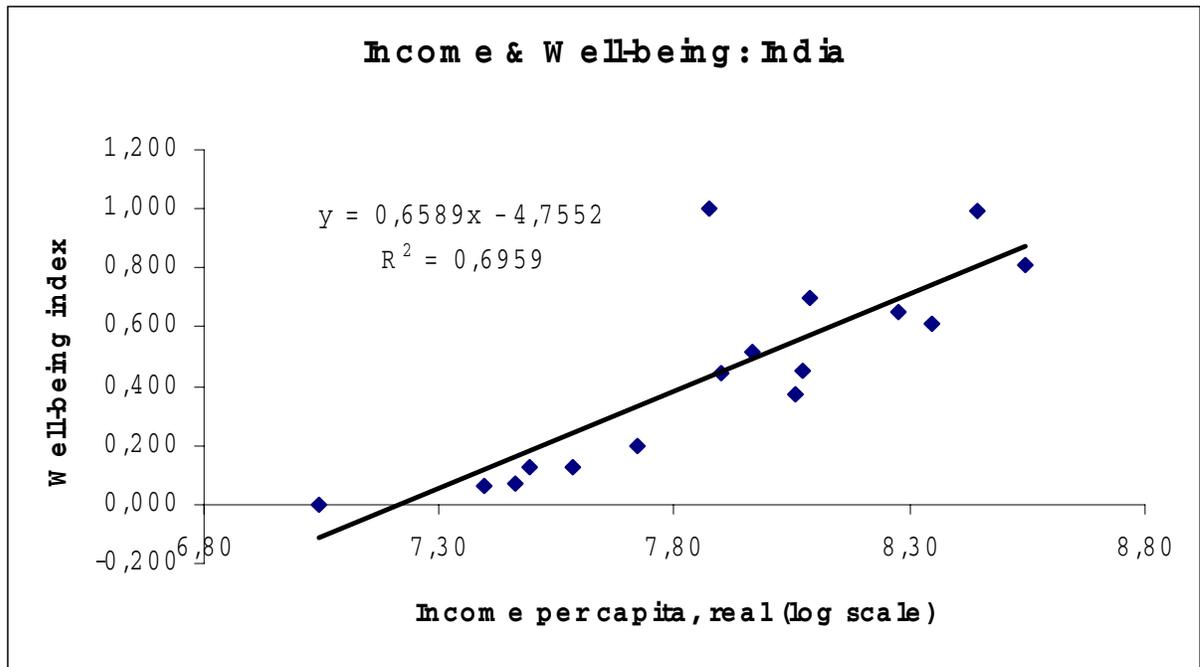
Note: per capita income and poverty ratio (headcount ratio) for 16 Indian states

Figure F3: Economic Well-being and Poverty, 1990s



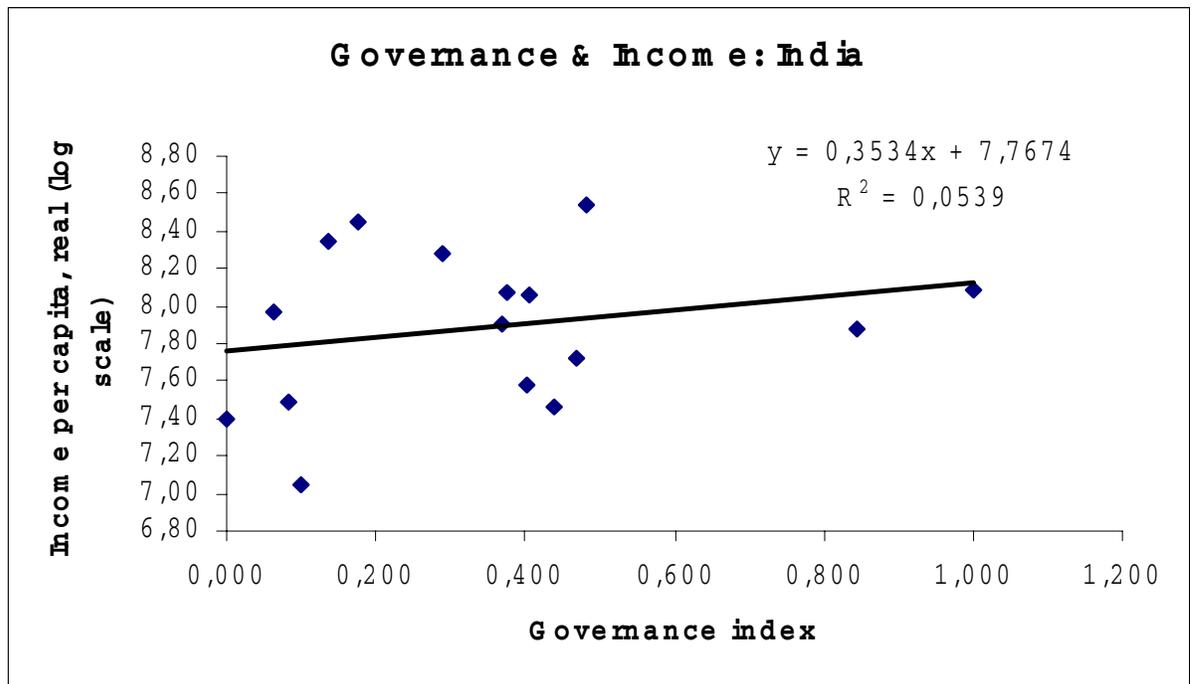
Note: EWBI value and poverty ratio (headcount ratio) for 16 Indian states

Figure F4: Economic Well-being and Income Per Capita, 1990s



Note: EWBI value and per capita income for 16 Indian states

Figure F5: Governance, Income Per Capita and Well-being, 1990s



Note: Per capita real GDP, with normalised QGOI value

Table T1: Sources of Indicators for 16 major Indian States

Indicators/variables	Units/period covered	Sources
Gross Domestic Product	(in Rs), 1980-2001	EPW, Economic survey (various years)
Population	(in persons), 1981,1991, 1992-2001	Census of India, CMIE
Adult Literacy Rate	(%), 1981, 1991, 1995,1997,1998, 2001	Census of India, NHRD 2002
Combined Enrolment ratio (gross enrolment for boy and girls for primary and middle schools, Classes I-VII: 6 to 14 years)	(%), 1981, 1991, 1995-2001	CMIE, Economic survey (various years)
Infant mortality rate	(per 1000), 1981,1991, 1992-2001	CMIE, Economic survey (various years)
Life expectancy	(years),1981, 1991-95, 1992-96, 2001-06	Statistical Abstract of India CMIE(various issues)
Population per hospital bed	(number), 1981, 1989, 1996,1998-99	Health Information of India, CMIE
Per capita electricity consumption	(kwh), 1980-81, 1986-91, 1992-96, 1996-99	Statistical Abstract of India CMIE(various issues)
Post offices	(per 100000 population), 1980, 1990, 1997, 1999-00	CMIE(various issues), GOI
Bank Branches	(per 100000 population), 1980, 1990, 1997, 2002	CMIE(various issues), GOI
Telephone lines	(per 100000 population), 1980, 1990, 1997, 2000	CMIE(various issues), GOI
Road length	(per 100 sq.km), 1981,1991, 1996-97, 1998	CMIE(various issues), GOI
Railways	(per 100 sq.km), 1981, 1991, 19989, 2001	CMIE(various issues), GOI
Irrigated area	(1000 hectares), 1980-81, 1990-91, 1995-96, 2001	Fertiliser Statistics of India & CMIE(various issues)
Total sown area	(1000 hectares), 1980-81, 1990-91, 1995-96, 2001	Fertiliser Statistics of India & CMIE(various issues)
Chemical fertilisers	(kg per 1000 hectares), 1980-81, 1990-91, 1995-96, 2000-01	CMIE, Fertiliser Statistics of India
Total grain sown area	(1000 hectares), 1980-81, 1990-91, 1995-96, 2000-01	CMIE, Fertiliser Statistics of India
Fixed investment	(in rs), 1978-2001	Statistical Abstract of India
Villages Electrified	(%), 1981, 1991, 1996, 1999	Census of India, Economic survey (various years)
Total employment	(number), 1981, 1991, 1997, 1999-2000	Labour Bureau of India, Manpower profile
Compensation & assignments to LB/PRI's	(in Rs.) 1980-82, 1990-92, 1995-97, 1998-01	State Budget Documents, NIPFP
Total revenue expenditure	(in Rs.), 1980-82, 1990-92, 1995-97, 1998-01	State Budget Documents, NIPFP
Crime Rates	(%), 1982, 1990, 1997, 1998	Statistical Abstract of India
Riots	(%), 1982, 1990, 1997, 1998	Statistical Abstract of India
Labour disputes	(%), 1982, 1990, 1997, 1998	Statistical Abstract of India
Public debt	(in Rs.), 1985, 1986-91, 1992-96, 1997-2001	State Fiscal Forum, 2002
Police personnel	(per 100000 population), 1982, 1990, 1997, 1998	Statistical Abstract of India,

Women's participation in workforce	(%), 1981, 1991, 1997, 1999-00	Manpower profile
Women candidates in state assembly	(%), 1980-85, 1986-91, 1992-96, 1997-2001	Election Commission of India
Trade unions density	(%), 1984, 1992, 1994, 1997,	Statistical Abstract of India
Trade union members	(%), 1984, 1992, 1994, 1997	Statistical Abstract of India,
Number of daily newspaper	(%), 1984, 1995, 1998, 1999	Statistical Abstract of India,
Gini Index	(%), 1983, 1993-94, 1997, 1999-00	NSSO, Planning Commission
Poverty rate (headcount)	(%), 1983, 1987-88, 1993-94, 1999-2000	NSSO, Planning Commission
Population living in Urban Area	(%), 1981, 1991, 1997, 2001	CMIE, NHRD 2002

MAP: INDIAN STATES 2004

