

The Determinants of Economic Well-being: An Application in the Indian States

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Paper prepared for presentation at
VIIIth Spring Meeting of Young Economists,
Leuven, 3-5 April 2003, Belgium

Abstract: The purpose of this paper is to explore the determinants of economic well-being. We provide a methodology to compute well-being by aggregating different socio-economic dimensions with factor analysis technique. We also estimate quality of good governance (using latent variable approach) and a financial decentralisation index. Panel data is employed to explore if better quality of institutional arrangements (of governance and more financial decentralisation) lead to better outcome in the economic well-being index. The evidence shows a strong positive link (from using data of 16 major Indian states over four points of time (1970s to 1997-latest)).

Key Words: Economic Well-being, Governance, Decentralisation, Panel data, India

JEL Classification: O1, C10, C23, R11

*I am grateful to A.L.Nagar, Manmohan Agarwal, J.D.Cuddy and Jaya Krishnakumar for their useful comments and suggestions. My thanks go to M.Muqtada for his encouraging discussion on the theme of this paper. I would like to thank Joana Queiroz and Grégoire Lacoïn for kindly discussing the results of this paper. Thanks are also due to Anne Drougard and Chandan Bose. Financial support from the International Economics Department, Graduate Institute of International Studies is gratefully acknowledged. Any remaining errors are of course my responsibility.

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1. Introduction

The World Development Report (2003) observed that “*Three billion people will be added to the world's population over the next 50 years and 2.8 billion people today already live on less than \$2 a day—almost all in developing countries. Ensuring these people have access to productive work and a better quality of life is the core development challenge of the first half of this century*”. Given this background, we attempt to explore the *appropriate* determinants of economic development that constitute the rationale of any public policy in the individual countries!

The purpose of this paper is manifold: i) to propose a measure of the economic well-being; ii) to propose a measure of the quality of institutions; iii) to identify the role of institutions in enhancing the economic well-being; and iv) to offer explanation for differential level of well-being at the inter-state level in India.

In the 1960-70s, the concept of ‘*trickle down*’ mechanism could not solve the problem of mass poverty, and this theory is no longer an accepted version of growth/development¹. In recent years the role of the institution/government is getting much attention in all the policy making discussion. Lately, the Bank-Fund *stabilisation and structural adjustment* policies received much criticism for its alleged failure to address and/or to correct the economic condition of the developing countries². This has led the international organisations and the governments across the regions/continents, 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 government is to seek economic development so as to enlarge the ‘capabilities’ of the individuals in the society. With the increasing level economic integration of the economies around the world, there has been a rising fear of exclusion from social safety net, and more generally the concern about the ‘quality of life/well-being’!

Under such circumstances, the fundamental policy making has now been re-directed towards reducing the level of poverty and inequality of distribution in the society and to increasing the standard of living. The increasing level of well-being helps the societies, over

¹ The 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.

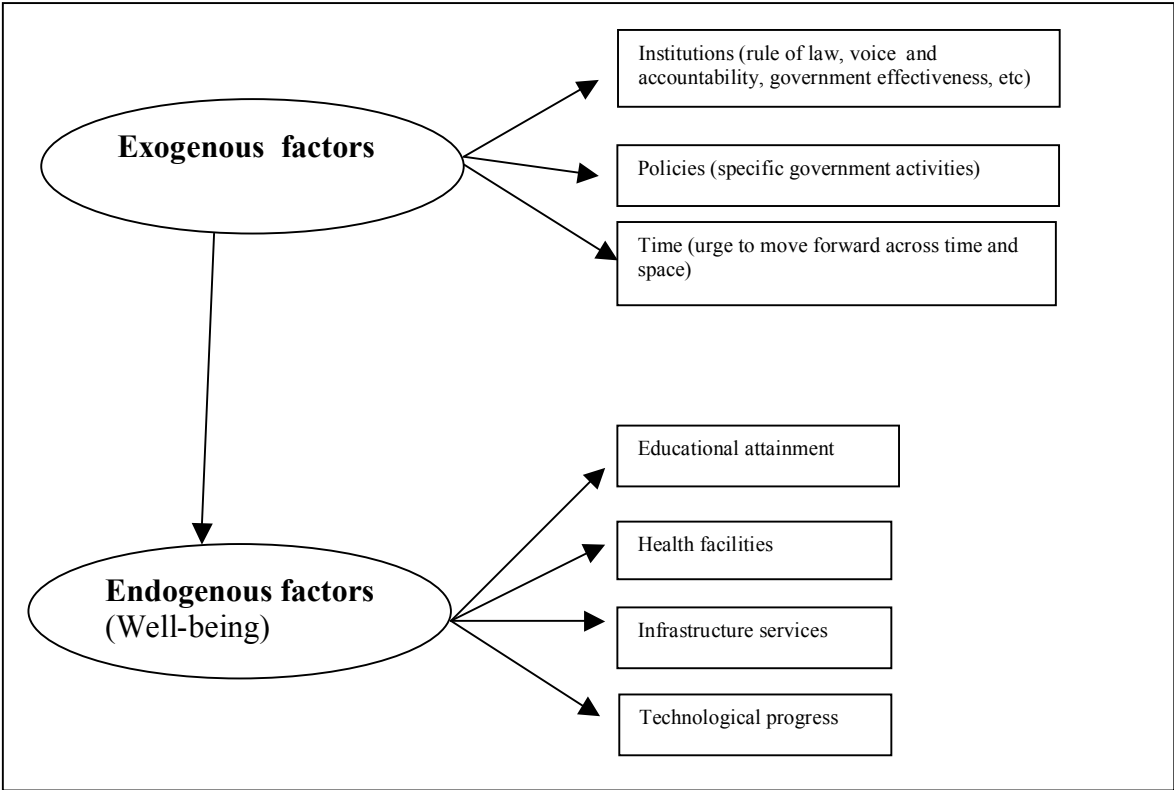
² See Stiglitz (2002) and Muqtada (2002) for more discussion on this issue.

time and space, to develop some in built characteristics for more productive and efficient framework of government activities.

There are many countries/regions at the sub-national level have shown an increase in economic growth (of per capita income growth), but the concern has now been shifting towards more on the qualitative nature of this growth and development. According to Sen, the realisation of human *capabilities* , which enlarges the range of human choices is essential for a broader notion and measure of economic well-being³.

In our framework , the measurement of economic well-being depends on different dimensions of the socio-economic characteristics that foster conducive environment for growth and development. In this paper we focus on economic well-being by taking into account a broad perspective of different dimensions sketched below in Figure 1.

Figure 1: Schematic presentation of the conceptual framework



On this note, we would attempt to show how the institutions and policy environment in the society helps improve the standard of living of the individuals, vis-à-vis the overall development level of the society. The quality of institutions set the path for the improvements in well-being irrespective of societies. The better level of institutions would facilitate suitable

³ See Sen (1983) .

environment for economic well-being. In a nutshell, the idea is that efficient and reliable institutions help promote a stable and sustained level of economic well-being/development.

In Figure 1, we provide the schematic presentation of the conceptual analysis of the paper. We believe that there are several factors which would account for the explanation of the society's development level or standard of living. The factors that would help explain the well-being, are the institutional and political variables which are actually pre-requisite for economic development, along with policy factors, like the 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. Rodrik (2000) illustrated that 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 conflict; are the one where economies could handle the differential level of economic development and could achieve sustained economic advancement! The conventional dimensions for measuring the institutional quality are as follows: voice and accountability, political stability, control of corruption, rule of law, regulatory quality, government effectiveness⁴, etc.

Also, there are some factors which could not be accounted for in our analysis, but would help enhance the development level. The aspiration of the people to move forward, awareness in the society, and general change in the people's perception about the society and life, are some of the key factors which could bring about the higher level of well-being/development in the society. We present all the different indicators that are used for computing this aggregate level of well-being in the Section III (sub-section-Data sources).

On the other hand, in our analysis, the endogenous factor is the measure of well-being. This is composed of different dimensions in the society and economy. The better availability of educational, health and infrastructural facilities are the key components. We also capture the technological progress in the economy, by the indicators like: telephone lines, fertiliser consumption, intensity of cropping, etc.

We attempt to provide empirical evidence to test our conceptual framework of this paper. Now, the obvious observation from the above discussions is that we should now focus more on the quantification of the economic well-being to show the standing of the societies in terms of development across cross-section units (e.g. states or countries at the global level). Hence, in this paper we attempt to provide a methodology to compute the measurement of the

⁴ See the World Bank studies on governance, www.worldbank.org/wbi/governance.

economic well-being. Then, we also compute the quality of governance to measure the society's performance in terms of institutional achievements. The current literature is now heavily focussing on the quality of institutions as a pre-requisite of economic well-being.

In this paper we attempt to explore some of the possible determinants of well-being by taking evidence from major states of India . The paper is organised in the following section. In section II, we present some existing literature about the well-being and other developmental issues. In Section III, we describe the statistical and econometric model, and the data sources for the present study. The empirical results are described in the Section IV. Initially we discuss the income growth of the states as a measure of welfare level. Then, we discuss the trend of the economic well-being level and the quality of institutions of the states. Later, we present in an integrated framework of the panel data estimation results to show the determinants of economic well-being. Section V sums up the main findings of the paper.

2. Literature survey

In this section we discuss briefly the evolution in the thinking about the growth and development literature. Theories of economic growth or long run equilibrium analysis account for the factors responsible for growth among the nations. The theory of growth originated in the writings of Classical economists, such as, Smith, Ricardo, Malthus. In the classical framework, the dynamics of the total wage bill and of population, as propounded by Malthus, would end up leaving no surplus for accumulation and expansion, i.e., the stationary state is attained. However, the Keynesian theory developed since the 1930s provided a model, which could influence the equilibrium values of output and employment through macroeconomic policies⁵. The Solow-Swan growth model, within a neoclassical framework, emphasised the role of capital accumulation that would lead to a changing $\frac{K}{L}$ ratio⁶. Calibration of the Solow-Swan model based on a Cobb-Douglas production function implies that the rates of return to capital in poor countries should be very large multiplies of those in rich countries, something that is not corroborated by the data⁷. Therefore, the Solow-Swan model does not fully explain some of these basic facts about growth in developing countries. This has led to a new set of Growth Theories, with the influential contribution of Romer (1986), Lucas (1988), Grossman and Helpman (1991). These theories have endogenised the process of technological progress.

⁵ The basis of modern macroeconomic thought originated from the General theory, Keynes (1936).

⁶ See Solow (1956), and Swan (1956).

⁷ See Mankiw (1995).

The growth model, in the general version, developed by Mankiw, Romer, and Weil (1992) extended the Solow-Swan model as:

$$\frac{y}{l} = \alpha\left(\frac{Y}{K} I - \delta_k - l\right) + \beta\left(\frac{H}{K} E - \delta_h - l\right) + \tau$$

The model is extended in two ways: it endows a crucial role to 'human capital (H) and to the share of national product devoted to investment in education (E).

In the above review of the growth literature, we find that considerable attention has been given to convergence across countries/regions. However, in the literature, 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.

However, over the years, the economists could come to a some sort of consensus that the per capita income as a measure of a country's development is an inadequate and limited concept, and a better indicator of the development/well-being of the countries/regions is needed. As early as in 1954, an United Nations 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). In a seminal study, Adelman and Morris (1967) examined the interactions among the processes of social, economic and political change with the level and pace of economic development. They inferred that the quality of life could be measured by looking at these, and stressed an intimate association between the pace of economic progress and the state of the non-economic forces. They indicated that the importance of the non-economic determinants of economic dynamism tends to vary systematically with the stage of a country's socio-political development. They used multivariate analysis to study the mutual association of economic and institutional change in the process of development.

In an influential study, Morris D. Morris (1979) proposed the Physical Quality of Life Index (PQLI) to focus on development as achieved well-being. The social indicators used in the construction of PQLI are: life expectancy at age one(LE) , (ii) infant mortality rate(IMR) and (iii) literacy rate(LIT). In particular, he took a simple average of the indices for each of the three factors. For each indicator, the performance of individual countries is placed on a scale of 0 to 100, where 0 represents worst performance and 100 represents best performance.

Dasgupta and Weale (1992) constructed a measure of social well-being to focus on the quality of life on the basis of the following indicators: (i) per capita income (1980 ppp US \$) (ii) life expectancy at birth (years), (iii) infant mortality rate (per 1000), (iv) adult literacy rate (percent), (v) an index of political rights (1979) and (vi) an index of civil rights, 1979. They proposed using Borda method to rank 48 countries.

The UNDP's Human Development Index (1990-2003) revolutionised the concept of human development. The HDI differs from the conventional approach in economic growth models as described earlier in bringing together the production and distribution of commodities and the expansion and use of human capabilities. HDI also focuses on choices – on what people should have, be and do to be able to ensure their own livelihood. HDI is based on three indicators: life expectancy, educational attainment, and per capita income⁸.

There are some studies now which are looking into the *causality* of institutions and economic performance. In this line, the studies carried out in the World Bank provided a setting for our analysis. Kaufmann et al (1999a) proposed a method of simple variant of an unobserved component to combine the different dimensions of governance into composite measure of governance. This composite index was then used to group the countries according to levels of their governance. Then, Kaufmann et al (1999b, 2002) aggregated the different dimensions of governance on the basis of six aggregate indicator corresponding to six basic governance concepts: voice and accountability, political stability and violence, government effectiveness, regulatory burden, rule of law, and graft. They subsequently examined the association between each of the six aggregate governance indicators and three development outcomes: per capita income, infant mortality, and adult literacy. The paper provided evidence that improvements in governance have very large pay off in terms of development outcome⁹. In other studies, Chong and Calderon (1997, 1998, 2000) showed that improving institutional quality positively affects economic growth, reduce incidence of poverty, and income inequality. Furthermore, Knack and Keefer (1995, 1997) showed that countries which have institutions that protect property rights, ensure trust and civic co-operation, have grown faster and achieved high rates of investment-GDP ratio. The study by Ross (1997) showed that the countries, which have more developed institutions, in terms of legal and regulatory framework, are the countries with better-developed financial intermediaries, and hence grow

⁸ See Nagar and Basu (2002) for an alternative measure of HDI, and broadening up of the concept of human development.

⁹ Author's (2002) estimated governance index for 175 countries on the basis of all the above six dimensions of governance.

faster. The above studies point out that with cross-country analysis, the quality of governance matters for effectively promoting economic growth and development¹⁰.

There are few attempts to compute the governance index (Kaufmann et al, Huther and Shah etc.) on the basis of different dimensions of institutional features. Many studies are now using the different country ratings, for e.g., 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 development¹¹. These international rankings are now also considered to be an indication of quality of institutions that reflect the economic standings of individual countries. The better rankings/ratings of such index would imply that those countries are doing better in terms of providing better and efficient institutions, which are a cornerstone for enhancing economic development.

OECD (2001) report on "The Well-being of Nations", addressed the interlinkage between the investment in human and social capital with positive outcome of the sustainable economic and social development. The role of social capital has been stressed for enlarging the human well-being of the countries¹². The World Bank's latest publication, the World Development Report (2003), emphasised that for *sustainable development in a dynamic world*, the *institutions need to be improved at many levels, from local to the global*. Moreover, the World Bank's, Quality of Growth (2000) publication also stressed that there are four factors especially relevant for poverty outcomes: distribution, sustainability, variability, and governance surrounding the growth process. Therefore, the report identifies that 'broadening the policy framework from a quantitative agenda for short-term economic growth to a qualitative agenda involving human, social, and environmentally sustainable development' should be the given priority to alleviate the incidence of poverty.

Thus, we find that in the literature there has been now a consensus that for quality of economic growth and development, the pre-requisite is to make efficient and reliable institutions that could sustain the process.

¹⁰ Barro (2000) provided a wide range of evidence that *participatory democracies enable higher-quality growth*.

¹¹ See Kaufmann et al (2002), and the World Bank website on governance research for a comprehensive guide.

¹² See Bassanini et al (2001) for the OECD countries, role of policies and institutions for enhancing growth in a panel data framework.

3. Estimation methodology and data sources

In this section we divide our analysis into two subsections, e.g. the empirical framework and the data sources. In the first sub-section, we describe our basic model to obtain the EWBI and QGOI. Then we set out the econometric model to test our hypothesis that better intuitions and polices are essential for better development.

Empirical framework

The statistical approach to measure indices

Now we present the statistical techniques to measure the two crucial indices in the present analysis: i) Economic Well-being Index (EWBI); and ii) Quality of Governance Index (QGOI).

We use the statistical technique, factor analysis, to compute the ***Economic Well-being Index (EWBI)***. The Factor Analysis (FA) technique is used to do the following: to reduce the number of influencing indicators, and to detect structure in the relationships among indicators, that is to classify variables according to their effect on the variables of interest¹³. The 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:

$$X = \Lambda f + e \text{-----} 3.1$$

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,

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

¹³ See Anderson (1984) for more on the theoretical discussion.

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

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; hence

$$E(ee') = \Psi = \begin{pmatrix} \Psi_1 0 \cdots 0 \\ 0 \Psi_2 \cdots 0 \\ \vdots \\ 0 \cdots \Psi_p \end{pmatrix}$$

and $\text{cov}(e, f') = 0$

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,

$$X_i = \sum_{j=1}^q \lambda_{ij} f_j + e_i \text{ -----3.2}$$

This set of equations in (3.2) 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 (3.3) in a linear FA model yields:

$$\left. \begin{array}{l} X_1 = \lambda_{11}f_1 + \lambda_{12}f_2 + \cdots + \lambda_{1q}f_q + e_1 \\ X_2 = \lambda_{21}f_1 + \lambda_{22}f_2 + \cdots + \lambda_{2q}f_q + e_2 \\ \vdots \\ X_p = \lambda_{p1}f_1 + \lambda_{p2}f_2 + \cdots + \lambda_{pq}f_q + e_p \end{array} \right\} \text{-----3.3}$$

Now (3.3) can be seen in as two separate parts

$$X_i = c_i + e_i \text{-----}3.4$$

where $c_i = \lambda_{i1}f_1 + \lambda_{i2}f_2 + \dots + \lambda_{iq}f_q$ is that part of each indicator that is common to the other P-1 indicator, and e_i is that part of each of the indicator that is unique. Since the c_i and e_i of a indicator are assumed uncorrelated and have common unit variances, we write

$$\text{var}(X_i) = \text{var}(c_i) + \text{var}(e_i) \text{-----}3.5$$

where $\text{var}(c_i)$ and $\text{var}(e_i)$ represent the common and unique variance of X_i respectively.

The common variance is known as the communality. The communality of a indicator is the portion of a indicators total variance that is accounted for by the common factor of the indicator.

Letting h_i^2 denote the communality of the i^{th} indicator, we write

$$\text{var}(X_i) = h_i^2 + \psi_i \text{-----}3.6$$

Where $\text{var}(e_i) = \Psi_i$, from (3.1)

$$\text{Now, } \text{var}(c_i) = \sum_j^q \lambda_{ij}^2 = h_i^2 \text{-----}3.7$$

is the sum of the squared element in the i^{th} row of Λ . The unique variance of a variable, Ψ_i , is called the uniqueness of the indicator and reflects the extent to which common factors fail to account for the variance of the indicator- it is the portion left unexplained by the common factors.

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

$$V_j = \sum_{i=1}^p \lambda_{ij}^2 = \lambda_j' \lambda_j \text{-----}3.8$$

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

Thus (3.8) implies the squared factor loadings, $\sum_{i=1}^p \lambda_{ij}$ for $j= 1, 2, \dots, q$.

The total contributions of all the common factors to the total variance among all the indicators

$$\text{is the total communality, i.e., } V = \sum_{j=1}^q V_j \text{-----}3.9$$

The variance among all the variables that is accounted for by a factor f_j as a percentage of that accounted for by all the factors is given by $V_i = \frac{V_j}{V}$ -----3.10

So the total variance is written as

$$\begin{aligned} tr(\sum_{xx}) &= \sum_{j=1}^q V_j + \sum_{i=1}^p \Psi_i \\ &= \sum_{i=1}^p \sum_{j=1}^q \lambda_{ij}^2 + \sum_{i=1}^p \Psi_i \text{ -----3.11} \end{aligned}$$

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 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 is 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 variables 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

$$\hat{F}_{ij} = \beta_1 X_{i1} + \dots + \beta_p X_{ip} \text{ -----3.12}$$

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.

Now, 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:

$$EWBI^k = \frac{\sum F_j \lambda_j}{\sum \lambda_j}, \text{ where } k= 1, 2, \dots, 16 \text{ (States of India) -----3.13}$$

Now, we attempt to measure the **Quality of Governance Index (QGOI)** for the economies in order to do the panel data estimation later in the empirical studies. We postulate 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.

$$\text{Let } QGOI = \alpha + \beta_1 X_1 + \dots + \beta_k X_k + e \text{ -----3.14}$$

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 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. We can reasonably assume that the total variation in QGOI is largely explained by the variation in the indicator 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.,

$$X_k = \frac{X_k - \min X_k}{\max X_k - \min X_k},$$

where maximum X_k and minimum X_k , are the values of X_k for $k=1,2,\dots,16$ (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 . Let us arrange λ in descending order of magnitude, as $\lambda_1 > \lambda_2 > \dots > \lambda_k$.

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

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

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

Then, we obtain the principal components as:

$$\left. \begin{aligned} P_1 &= \alpha_{11}X_1 + \dots + \alpha_{1k}X_k \\ P_2 &= \alpha_{21}X_1 + \dots + \alpha_{2k}X_k \\ &\vdots \\ P_k &= \alpha_{k1}X_1 + \dots + \alpha_{kk}X_k \end{aligned} \right\} \text{-----3.15}$$

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:

$$QGOI = \frac{P_1\lambda_1 + P_2\lambda_2 + \dots + P_k\lambda_k}{\lambda_1 + \lambda_2 + \dots + \lambda_k} \text{-----3.16}$$

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 on¹⁴.

The econometric approach

In order to explore the determinants of economic well-being, we set out simple Panel data model. Before, going to explain the core model, we use two measures that are widely used to test the question of convergence of per capita income. One is the coefficient of variation (per cent), which measures the degree of relative dispersion in the distribution of per

¹⁴ See Nagar and Basu (2002), Basu (2002, 2003) for more discussion.

capita income. This measure is often referred to as a test of '*sigma convergence*'. Another measure is to use a simple regression model of per capita income growth rates to test for unconditional convergence¹⁵. This type of convergence test model is referred as '*beta convergence*'. We describe the model used to test for unconditional convergence takes the following linear form:

$$\frac{1}{T} \log\left(\frac{y_{it}}{y_{i,t-T}}\right) = \beta_0 + \beta_1 \log(y_{i,t-T}) + e_i \text{ -----} 3.17$$

The left-hand side dependent variable represents the annual average growth rate in the per capita income of the state *i* over the periods. The logarithm of per capita income of each country/state in the initial year (e.g, for the present analysis 1970-71) appears as the independent variable on the right-hand side of the model. A *negative and statistically significant* coefficient for β_1 implies the existence of unconditional '*beta convergence*'.

Now we discuss the panel model. We pooled cross-section time series (*i*, denotes cross-section units/states, and *t* time points) of the EWBI as a dependent variable, and we modelled this to explain in terms of QGOI and other key factors. It is well documented in the literature that to obtain *more efficient estimates*, one may attempt to use this **Panel Data** model, by pooling the time series data on the various units together than by running separate time series regressions for each cross-sectional units or separate cross-sectional regressions for each time period¹⁶. We use the model in the following framework: 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 form:

$$Y^{PO}_{it} = \alpha + \beta'X_{it} + e_{it} \text{ -----} 3.18$$

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 $\text{var}(e_{it}) = \sigma_e^2$.

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

¹⁵ See Barro (1991), Barro and Sala-I-Martin (1992) for a detailed discussion on the issue of convergence.
¹⁶ See Hsiao (1986), Baltagi (1995), Islam (1995) for a theoretical and empirical discussion on Panel data.

Our next model specification is to estimate the Fixed effects model, which allows us to take into consideration the unobservable differences in the dependent variable specific to individual states. As, in this estimation all the intercepts differ across cross section units (16 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 estimate 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.

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

$$y^{FE}_{it} = \alpha_i + \beta' x_{it} + e_{it}, i = 1, \dots, N; t = 1, \dots, T \quad \text{-----3.19}$$

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 trend effect as well. We formulate the extended model by simply adding the effect as,

$$y_{it}^{FE''} = \alpha_i + \partial t + \beta' x_{it} + e_{it} \quad \text{-----3.20}$$

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, ∂t is the time trend effect and e_{it} is the cross-section time trend error component, which is uncorrelated with the regressors and is distributed normally with a mean of zero and variation of $\sigma_{e_{it}}^2$. Thus, by allowing for the linear time trend effects, we can 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.

Data sources

The empirical part of this paper is illustrated with the large sets of data obtained from different sources. The detailed description of the data and their respective sources are shown in the Appendix Table A.1. The time period of the model is from 1970s to 1997-later. We have four different time points, 1970s (the data used on the basis of availability of the indicator, and only for income data, we take the average of the first three years of every period. Now for 1970s, we have average data for 1970-71, 71-72, and 72-73, and similar for other three periods¹⁷). Let us now describe briefly the measurement of dependent and independent variables in our model.

Dependent Variable:

*Economic Well-being Index (EWBI)(no.): Our well-being index is a very broad measure of economic development. As described in Figure 1, we included different socio-economic dimension to reflect upon the state of the economy in the societies. We use 14 indicators to compute the EWBI. The variables are the following: per capita NSDP (Rs.), Literacy Rate (%), Combined Enrolment Ratio (%), Infant Mortality Rate (per 1000 live births), Life Expectancy at Birth (years), Population per Hospital Bed (no.), Per Capita Electricity Consumption (Kwh), Post Offices (per lakh population), Bank Branches (per lakh population), Telephone Lines (per lakh population), Road Length (per 100 sq.kms area), Railway Route (per 100 sq.kms area), Intensity of Cropping (percent), and Fertiliser Consumption (percent) . These 14 indicators are expected to capture different aspects of the socio-economic condition for each of the states. The EWBI is computed for the four time points (i.e., 1970s, 1980s, 1990s, and 1997-later) separately for all the 16 major Indian States.

Independent Variables:

* Quality of Governance Index (QGOI)(no.): We compute the QGOI on the basis of five different indicators, these are the following: estimates of crime rates; estimates of riots; estimates of industrial disputes and strikes; Gini inequality and debt-sdp ratio. In this paper we measure the QGOI as an inverse to the index value. Since, we consider all the five indicators for estimating QGOI inversely, a lower value of the index denotes better governance outcome in the states. Therefore, we expect a negative value for QGOI coefficient in the panel model

¹⁷ The data in real terms for some years is in 1970-71 prices, and for other years at 1980-81 prices. We have converted the PCNSDP for all the years of 16 States to 1970-71 prices, by using conversion factor for 1980-81 for which PCNSDP data are available at both the prices.

specifications. This simply means that better institutional measures would lead to better outcome of economic well-being index¹⁸.

* Financial Decentralisation Index (FIDI)(%): This indicator measures the government policy that is directed towards the local administrative level of government. In many developing countries, the local government institutions are getting more power to carry on developmental programmes efficiently at the grass-root level, as the authorities have direct contact with the people. We expect the coefficient of FIDI to be positive. However, there is also another set of studies which argue that with more decentralisation, the probability of corruption can be high, and which might lead to possible negative externality for growth and development¹⁹.

* Plan Outlay (PLOU)(%): This is an important policy variable that plays a crucial role in accelerating the growth process in the states. The Central government, in a federal system of economic structure, provides resources to the States in order to meet any resource crunch, and help implement more developmental programmes. This variable is derived as a total budget allocation for each state individually in terms of total budget allocation for all the states combined. The plan outlay figure is computed as a cumulative average of the previous plan period. The reason for using a one period lag of the plan outlay is that, in India, the budget estimates and the actual plan allocation is not the same. Hence, we use the cumulative average of the outlay figure, and is believed to provide impetus to the development of the individual states. Here, some of the states receive higher allocation than the other states, which has been generating many debates over the decades²⁰.

* Structural Characteristics (STCH)(%): This is measured by the proportion of the economy, which is dependent on the agriculture. Now, given the nature of the Indian economy, it is assumed that more dependence on agriculture would bring more per capita growth rate for that particular state. Perhaps, this would be an interesting framework for study. As some of the better performing states are now more dependent on industrial development, hence are the fastest growing States. With the economic transformation, the sectoral contribution changes, as the population and weight of the economy shifts from primary sector to secondary and tertiary sectors. This would help realise a better outcome in terms of economic development. The coefficients of STCH could be negative in our model formulation.

¹⁸ See Basu (2002) for a detailed analysis of QGOI indicators and related concepts.

¹⁹ 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.

²⁰ The West Bengal state government has always maintained that they were deprived of their legitimate budget share because the state is ruled by the Communist government since 1978. This is often coined in India as a 'step-motherly' attitude by Central government in New Delhi towards the West Bengal state.

*Population (logarithms of)(LPO)(no.):The population figure is used in the model specification so as to control for possible influence on the outcome of EWBI for the populous states in India. The higher population pressure is supposed to release a more pressure on the livelihood in the state. The estimated coefficient therefore could turn out to be negative in our model specifications.

In the next section, we discuss core part of our paper: the empirical analysis of the model on the basis of 16 major Indian states over the last three decades.

4. Empirical results

In this Section, we present the empirical part of the paper. In Table 1, we present the rankings of the 16 states, and also their per capita income growth rankings²¹. A quick glance at Table 1 presents that over the study period, MAHARASHTRA state has been consistently

Table 1: Rankings of the States according to per capita income and its growth rates

	1970s	1980s	1990s	1997-later	Growth rate
ANDHRA PRADESH	9	8	11	11	7.86(15)**
ASSAM	12	15	14	15	8.05(14)***
BIHAR	16	16	16	16	4.88(16)
GUJARAT	4	4	4	3	14.44(2)***
HARYANA	2	2	3	4	12.95(5)***
HIMACHAL PRADESH	6	5	7	8	10.44(7)***
KARNATAKA	7	7	5	5	13.18(3)***
KERALA	11	10	10	9	9.97(9)***
MADHYA PRADESH	13	13	13	12	9.05(13)***
MAHARASHTRA	3	3	2	1	17.28(1)***
ORISSA	15	14	15	14	9.21(11)**
PUNJAB	1	1	1	2	11.63(6)***
RAJASTHAN	10	11	9	10	9.30(10)***
TAMIL NADU	8	9	6	7	13.10(4)***
UTTAR PRADESH	14	12	12	13	9.13(12)***
WEST BENGAL	5	6	8	6	10.30(8)***

Notes: (...) rank of the states. Growth rates are computed taking data for entire period.

*** significant at 1% level, ** significant at 5% level.

²¹ The growth rate is calculated by the regression equation, of the form $\ln X_t = a + bt$, which is equivalent to the logarithmic transformation of the compound growth equation, $X_t = X_0 (1 + r)^t = X_0 (1 + r)^t = X_0 (1 + r)^t$. In this equation X is the variable, t is time, and $a = \ln X_0$ and $b = \ln (1 + r)$ are parameters to be estimated. If b^* is the least-squares estimate of b , the average annual growth rate, r , is obtained as $[\exp(b^*) - 1]$ and is multiplied by 100 for expression as a percentage.

improving its rankings. PUNJAB is also consistently maintaining its rankings status, so as the state GUJARAT. On the other hand, the states like BIHAR is at the bottom over the study period, and the same is true for ASSAM and UTTAR PRADESH. Some of the middle rankings states are WEST BENGAL, KARNATAKA, TAMIL NADU etc.

In the last column of Table 1, we show the growth rates of the states over the study period. The states like MAHARASHTRA, GUJARAT, KARNATAKA are the fastest growing states, while the states like BIHAR, ANDHRA PRADESH, and ASSAM are at the bottom. Here also, we see that WEST BENGAL, HIMACHAL PRADESH etc., are the states where the income growth has been moderate over the study period.

Now, we would see if there is any tendency of the poor states to ‘catch up’ with the fastest growing states. We show below the two different test of unconditional convergence, as described in Section III. Thus, in Table 2 below, we test both the σ and β convergence for these 16 states, covering the entire study period. Our test results show that there is no sign of convergence of per capita income across the Indian states²². The CV (%) has been constantly increasing over all the four time points of the study. This shows that there is no sign of sigma-convergence.

Table 2: Testing for per capita income convergence

σ			
1970s	1980s	1990s	1997-
26.77	32.55	40.20	44.42
β			
β_0	β_1	R^2	<i>s.e.of regression</i>
-0.118983* (2.038693)	0.023773*** (2.610248)	0.448409	0.006803

Notes: t-statistic in parentheses, *** significant at 1 % level.

Then we test the per capita convergence by beta-convergence conditions. We also see that there is no tendency of income convergence across the states. The coefficient β_1 is positive and statistically significant. As we pointed out that if the β_1 coefficient is negative and statistically significant, then only we would have the tendency of income convergence. Thus, we see that over the last three decades, there is no evidence of per capita income convergence among the states at the sub-national level in India. This result simply implies that the poorer states are not being able to come up at the level of richest states in India.

²² See Ghosh, Marji and Neogi (1998) for the similar results.

In Table 3 below, we provide the descriptive statistics of the variables used in computing the EWBI measure. A cursory glance at the Table 3, would show there has been a constant improvement of the socio-economic variables, considered for computing the well-being index. The Table also presents the coefficient of variation and range of variation of the variables separately for all the four time points across the 16 major states.

Table 3: Summary results of variables used in the computation of EWBI

Indicators	Average				Coefficient of Variation (%)				Range(Max-Min)			
	1970s	1980s	1990s	1997-	1970s	1980s	1990s	1997-	1970s	1980s	1990s	1997-
LIT	31	46	55	66	33	28	24	18	41	52	52	44
CER	60	68	85	79	26	25	20	18	61	49	56	48
IMR	118	99	74	66	25	30	34	31	109	113	108	82
LEB	47	59	61	68	9	10	8	14	13	20	18	43
PHB	1640	1414	1653	1790	42	47	49	51	1618	2237	2570	3379
PCEC	89	143	250	372	49	57	57	52	137	281	561	681
PO	18	23	21	19	50	34	43	46	31	29	38	36
BB	3	6	8	7	52	40	24	31	4	7	8	9
TEL	0.17	0.39	.55	2.46	52	60	62	57	0	1	1	4
ROD	57	60	81	99	123	92	97	86	297	232	323	355
RR	2.37	2.38	2.48	2.49	46	45	44	43	4	4	4	4
IR	51	59	69	74	55	52	45	47	83	102	89	96
FC	17	35	67	88	80	84	67	52	48	120	159	152

Notes: See the appendix table for data sources.

Now, we estimate the economic well-being index on the basis of a methodology proposed in the last section. Table 4 shows the EWBI values, obtained from equation 3.13 in Section III. We also present the corresponding rankings of each of period for all the 16 states in our sample. The estimate of EWBI indicates that KERALA is on the top of the rankings in most of the study periods²³. Also, the states like MAHARASHTRA and PUNJAB are consistently doing well over the study period. HIMACHAL PRADESH is improving its well-

²³ See Dreze and Sen (1997) for detailed discussion on Kerala's achievements in socio-economic development.

being level over the study period. On the other hand, the states like BIHAR, UTTAR PRADESH are at the bottom of the EWBI level.

Table 4. Economic well-being index (EWBI)

	1970s	1980s	1990s	1997-	Rank70s	Rank80s	Rank90s	Rank97-
ANDHRA PRADESH	-1.133	-0.603	-0.963	-2.687	10	10	10	11
ASSAM	-3.790	-5.389	-3.952	-1.550	12	14	12	10
BIHAR	-6.695	-5.842	-5.219	-7.381	16	15	15	16
GUJARAT	2.701	3.533	3.271	2.996	5	4	5	5
HARYANA	2.036	2.489	0.442	-0.594	6	6	8	8
HIMACHAL PRADESH	1.152	1.470	1.296	3.676	9	8	6	3
KARNATAKA	1.158	1.477	0.988	1.801	8	7	7	7
KERALA	5.147	6.262	6.512	9.486	2	2	2	1
MADHYA PRADESH	-4.688	-6.607	-5.369	-4.264	15	16	16	14
MAHARASHTRA	3.604	4.117	4.479	5.484	4	3	3	2
ORISSA	-4.033	-5.042	-4.585	-3.286	14	12	14	13
PUNJAB	6.425	10.328	7.237	3.201	1	1	1	4
RAJASTHAN	-3.132	-4.145	-3.661	-3.162	11	11	11	12
TAMIL NADU	3.810	3.232	3.748	2.806	3	5	4	6
UTTAR PRADESH	-3.928	-5.116	-4.360	-5.927	13	13	13	15
WEST BENGAL	1.368	-0.162	0.135	-0.600	7	9	9	9

Notes: Rank 1 denotes best performing state, and Rank 16 worst performing state in the sample.

Now we show the estimate result of the quality of governance index. In Table 5, we present the institutional quality that is used as a composite measure of governance for each of the individual states (see equation 3.16). The analysis of this table shows that PUNJAB is consistently doing well over the study period. Similarly, ASSAM is also doing well as compared to other states. States like WEST BENGAL and MADHYA PRADESH are improving their standards in terms of achieving better level of governance quality.

Table 5. Quality of governance index (QGOI)

	1970s	1980s	1990s	1997-	Rank70s	Rank80s	Rank90s	Rank97-
ANDHRA PRADESH	0.554	0.321	-0.994	0.955	5	8	15	2
ASSAM	-0.684	-0.935	0.450	-1.303	13	14	5	16
BIHAR	0.194	0.923	0.754	0.981	10	3	2	1
GUJARAT	-0.482	0.424	0.009	0.384	12	6	11	7
HARYANA	-1.120	-0.928	-0.894	0.020	14	13	14	10
HIMACHAL PRADESH	-2.485	-1.192	-0.819	-1.254	16	15	13	15
KARNATAKA	0.070	-0.086	0.116	0.120	11	11	9	9
KERALA	0.676	0.386	0.623	0.518	4	7	4	5
MADHYA PRADESH	0.361	0.473	0.694	0.176	8	5	3	8
MAHARASHTRA	0.498	1.078	0.060	0.733	6	1	10	3
ORISSA	0.359	-0.084	-0.002	-0.441	9	10	12	13
PUNJAB	-1.130	-1.672	-1.604	-1.185	15	16	16	14
RAJASTHAN	0.462	-0.469	0.140	-0.333	7	12	8	11
TAMIL NADU	1.068	1.029	0.279	0.532	1	2	7	4
UTTAR PRADESH	0.901	0.506	0.834	0.483	2	4	1	6
WEST BENGAL	0.759	0.227	0.355	-0.386	3	9	6	12

Notes: Rank 1 denotes worst performing state, and Rank 16 best performing state in the sample.

We also show in the above table the rankings of QGOI for each of the states in all the four different time periods. It must be noted that we compute the QGOI in a ‘negative dimension’, which means as the value of QGOI increases, the quality of governance falls. Therefore, a state with better standards in institutions would eventually obtain lower values in the governance measure.

Before we discuss the panel results, it is interesting to show the relationship between the institutional quality and well-being level for the latest period of our study. As our QGOI could not include the rule of law index for the consistent data unavailability for all the four time points. However, we have some proxy for measuring the rule of law, we define this by the average disposal rate of pending cases per court (the data covers the period 1995-98) for all the 16 major states in India. This indicator is assumed to show a judicial efficiency and the institutional efforts to protect the property rights, among the other dimensions previously discussed²⁴. We hypothesise that the higher value of the disposal rate implies better quality of institutions, i.e., the higher rule of law index values, which is a normalised value (computed

as a deviation from actual to minimum values divided by range value obtained from among the 16 states). The Scatter diagram Figure A.1 shows that there is a strong positive and significant relationship with well-being (QGOI value is normalised as we have done for the rule of law index) of the states. The correlation coefficient is 0.663 (significant at 1 % level). This simple preliminary diagrammatic illustration shows that quality of institutions helps obtain higher level of development.

In Table 6, we present the regional variation of the three key indicators in our analysis, viz., EWBI, QGOI, and FIDI. In this Table the values are first combined for all the four time points. Then we ranked them and categorised in three different levels. A quick glance at the Table would reveal that in terms of well-being southern states are doing better on average. The well-being level is also good in western states of India. Punjab is only state from the North and Central, which is on the top of the list. The East & North East states are mostly in the bottom level of development., as also the other North and Central states.

If we look at the governance quality, we see that North and Central states are dominating the list, with southern and other regions are in the middle and bottom ladder of the category. ASSAM is the only state from the East and North East which is on the top in terms of the institutional quality.

Table 6. Regional variation in the level of well-being and institutional quality

Indices	Level	North and Central	South	West	East & North East
EWBI	Top 5	PU	KE, TN	MA, GU	
	Middle 5	HP, HR	KA, AP		WB
	Bottom 6	RA, UP, MP			AS, OR, BI
QGOI	Top 5	HP, PU, HR, RA			AS
	Middle 5		KA, AP	GU	OR, WB
	Bottom 6	MP, UP	KE, TN	MA	BI
FIDI	Top 5	MP	TN, KA, AP		WB
	Middle 5	UP,PU	KE	GU	AS
	Bottom 6	HP, RA, HR		MA	OR, BI

Notes: see the Appendix Table A.2 for regional classification

²⁴ The data obtained from Eleventh Finance Commission of India (2000-2005) Appendix VII.1.

In terms of the fiscal decentralisation measure, we also categorised the states in three different levels of decentralisation ²⁵. In this case, we see that the Southern states are mostly on the top five. The North and Central states are the worst performers in terms of decentralisation. One notable feature in the FIDI categorisation is that WEST BENGAL is now on the top of the ladder. The Communist party is in power in Calcutta (the Capital city of WEST BENGAL) since 1978, which has delegated more administrative power to the local village level units/Panchayats, and emphasised on the tenancy reform, which is evident from the better status in the fiscal decentralisation measure²⁶.

We now present the panel data estimates of the models described in Section III. In Table 7, we present results for the simple pooled estimation. We report two different model specifications, with the Model 2 presents the result with heteroskedasticity consistent standard errors. The coefficients of QEGI is negative and statistically significant. This again implies that better institutional quality (means ‘negative’ value of QGOI) would lead to better outcome in economic well-being level.

Table 7: Panel data regression results of economic well-being index (EWBI)

(Dependent variable: EWBI)

(Pooled estimation) Independent variable	(1)	(2)
QGOI	-2.592*** (0.651)	-2.592*** (0.660)
FIDI	0.248 (0.377)	0.248 (0.318)
PLOU	0.364 (0.359)	0.364 (0.373)
STCH	-0.283*** (0.042)	-0.283*** (0.044)
LPO	1.034*** (0.177)	1.034*** (0.185)
#of states	16	16
# of obs., for each state	4	4
# total panel obs.	64	64
Adj.R ²	0.434	0.434
F-statistics	13.078***	13.078***

Notes: Heteroskedasticity consistent standard errors are in parentheses (Model 2)
 ***-significant at 1% level, **-significant at 5% level, *-significant at 10% level(2-tailed tests)

Then the coefficient of FIDI is positive (as we expected) but is not statistically significant. The PLOU is also positive, but not statistically significant here in this model

²⁵ See Rao (2002) for a comprehensive coverage of fiscal decentralisation framework in India.

²⁶Banerjee et al (2002) showed that tenancy reform had a positive effect on agricultural productivity in West Bengal since they initiated the process in late 1970s.

specification. The STCH coefficient is negative and statically significant. This results impels that as the economy moves from agriculture to other sectors, like industry and services, there is also a positive effect on the level of economic well-being. This result could actually be corroborated to the fact that the states like MAHARASHTRA, GUJARAT (highly industrialised states among the list of 16 states in the present analysis) are the one, which are doing better both in terms of income growth and overall economic development level. This simple pool model, estimated by OLS, shows that it could only explain around 44 % of the total variation in the EWBI level.

Now, we estimate another model, with different specifications of the error structure of the covariance matrix in the panel data. So, in the next set of results, we report the results based on cross-sectionally heteroskedastic model, with common slopes and intercept, assuming that $V(u)$ varies across the cross-sections. Here, we apply GLS to obtain the beta-coefficients of all the explanatory variables.

Table 8: Panel data regression results of economic well-being index (EWBI)

(Dependent variable: EWBI)

(Pooled estimation) Independent variable	(1)	(2)
QGOI	-0.619* (0.367)	-0.619** (0.271)
FIDI	0.393** (0.203)	0.393** (0.159)
PLOU	1.593*** (0.264)	1.593*** (0.232)
STCH	-0.349*** (0.025)	-0.349*** (0.022)
LPO	-3.686*** (0.400)	-3.686*** (0.252)
Constant	83.215*** (7.141)	83.215*** (4.663)
#of states	16	16
# of obs., for each state	4	4
# total panel obs.	64	64
Adj.R2	0.703	0.703
F-statistics	76.773***	76.773***

Notes: Heteroskedasticity consistent standard errors are in parentheses (Model 2)

***-significant at 1% level, **-significant at 5% level, *-significant at 10% level (2-tailed tests)

A look at the table 8. would show that here too the QGOI is negative and statistically significant. The decentralisation measure is also positive and statistically significant, implying that more fiscal decentralisation is favourable to development. The Plan outlay (our policy variables) is positive and now statistically significant in this model specification. This result indicates that our policy variable is also crucial for the development in the states. In the model

we have population (logarithms of) as a control variable. The coefficient shows a negative value and is statistically significant. We could interpret this as the population pressure increases in the economy, there could be a negative fallout on the level of development. The adjusted R² figure has now gone up to 0.703. Here, also we see that our institutional and policy variables are of expected signs.

Finally, we present estimated results for the fixed effect model in Table 9 (see equation 3.20). The coefficients of QGOI, PLOU, STCH and LPO are of expected signs in the fixed effects specification. However, the FIDI coefficient is not statistically significant, but is positive in sign. The coefficient on time trend is positive and statically significant. We could interpret this result as the fact that over the time there is an improvement in general awareness, aspirations of the people, which are not captured from our institutional and policy variables. So, irrespective of the other factors, there are some fundamental changes in the society over the decades that is actually favourable to better outcome in well-being level.

Table 9: Panel data regression results of economic well-being index (EWBI)

(Dependent variable: EWBI)

(Fixed effects) Independent variable	
QGOI	-0.222* (0.135)
FIDI	0.042 (0.055)
PLOU	0.836*** (0.087)
STCH	-0.083*** (0.013)
LPO	-2.802*** (0.584)
Time trend	0.436*** (0.140)
#of states	16
# of obs., for each state	4
# total panel obs.	64
Adj.R ²	0.919
F-statistics	488.079***

Notes: Heteroskedasticity consistent standard errors are in parentheses

***-significant at 1% level, **-significant at 5% level, *-significant at 10% level (2-tailed tests)

Fixed effects coefficients are not shown in the Table.

So, the time trend coefficient is actually accounting for change in some other factors which are not being captured by our other conventional measure of institutional quality and policy variables. We also see that as we have considered the fixed effects model, the goodness of fit of the model has improved a lot. The adjusted R² figure is now 0.919. As in the fixed

effects model, we have considered the heterogeneity of the cross-section units and also the time trend, then the efficiency of the result has improved, along with the expected signs of the factors used in explaining the well-being level.

In the Table 9 above, we have not reported the fixed effects coefficients of the 16 states of India. There is not much variation in the values of all these coefficients, but one significant point to note is that the coefficients are larger for the States like KERALA (56.871), PUNJAB (56.079), MAHARASHTRA (55.324), which are also having the maximum value in the EWBI. The same trend is also for the worst performing states, like ASSAM (47.225), MADHYA PRADESH (47.477), BIHAR (47.902), the states which are also at the bottom of the EWBI status.

We illustrated in the above empirical finding that from the evidence of major Indian states, the quality of institutions and policy environment positively affects the development outcome.

5. Conclusion

In this paper, we attempt to show the possible interpretation for differential patterns in the development level of the major Indian states. The present illustration has been shown on the basis of the 16 major states of India, covering four different time points since 1970s.

We showed that there is *no evidence for income convergence* among these states during the study period. The test of unconditional convergence shows there is no tendency of the poor states to ‘catch up’ with the rich ones.

Then, we propose a methodology to compute development and governance index for each of the states across the four time periods. A simple scatter diagram shows that there is a positive relationship between the quality of institutions (as measured by the rule of law index) and the level of well-being.

Finally, we report Panel data model specifications to observe the robustness of some of the policy and institutional variables discussed in the model. In all the different panel estimations, we found that the *coefficients of governance* and *policy factors* are *robust*. However, the fiscal decentralisation measure is not significant in the fixed effects model.

In conclusion, we must emphasise that our preliminary empirical investigation of the determinants of economic well-being strongly suggests that the improvement in the quality of institution is pre-requisite for sustaining the growth and development level across economies.

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Appendix

Table A1: The data sources and measurements of variables

Variables	Units/Period covered	Code	Sources
Population	(in thousands)/1971,1981, 1991, 2001	POP	Census of India, 1971, 1981, 1991, 2001
Population living in Urban Area	(percent)1971, 1981, 1991, 1995	URBA	CMIE (various issues)
Total Fertility Rate (number of live births for woman between age group 14-49 years)	(no.)/1971, 1981, 1991, 1997	TFR	Census of India (various issues)
Per Capita net State Domestic Product (real , base period 19970-71)	(Rs.)/ 1971-73, 1981-83, 1991-93, 1995-1997	PCNSDP	CSO(various issues), EPW Research Foundation, and Chandok Group
Literacy Rate	(percent)/1971,1981, 1991, 2001	LIT	Census of India, 1971, 1981, 1991, 2001
Combined Enrolment ratio (gross enrolment for boy and girls for primary and middle schools, Classes I-VII: 6 to 14 years)	(percent)/1971, 1981, 1991, 1997	CER	Selected educational Statistics, Ministry of Education, Government of India (various years)
Infant Mortality Rate (per 1000 live births)	(no.)/ 1971, 1981, 1991, 1997	IMR	Census of India(various issues)
Life Expectancy Rate at Birth	(years)/ 1971, 1981, 1991, 1995	LEB	Statistical Abstract of India CMIE(various issues)
Population per Hospital Beds	(number)/ 1971, 1981, 1991, 1997	PHB	Health Information of India & CMIE(various issues)
Per Capita Electricity Consumption (Kwh)	(no.)/1970-71, 1980-81, 1990-91, 1997-98	PCEC	Statistical Abstract of India & CMIE(various issues)
Post Office (per lakh population)	(no.)/1971, 1980, 1990, 1997	PO	Gupta et al (1983) & CMIE(various issues)
Bank Branches (per lakh population)/	(no.)/1971, 1980, 1990, 1997	BB	Do
Telephone Lines(per lakh population)	(no.)/ 1971, 1980, 1990, 1997	TEL	Do
Road Length ((per 100 sq.kms)	(no.)/1971,1981, 1991, 1998	ROD	Do
Railway Route (per 100 sq.kms)	(no.)/1971,1981, 1991, 1998	RR	Do
Intensity of Irrigation	(percent)/1970-71, 1980-81, 1990-91, 1995-96	IR	Fertiliser Statistics of India & CMIE(various issues)
Fertiliser Consumption	(percent))/1970-71, 1980-81, 1990-91, 1997-98	FC	Fertiliser Statistics of India(various issues)
Financial Decentralisation Index	(no.)/1974-76, 1980-82, 1990-92, 1995-97	FIDI	State Finance Accounts (respective states and corresponding years)
Estimates of Crime Rates	(no.)/1973, 1982,1990, 1997	ECR	Statistical Abstract of India
Estimates of Riots	(no.)/ 1973, 1982,1990, 1997	ERI	Statistical Abstract of India (various issues)
Estimates of Industrial Disputes and Strikes	(ratio)/1974, 1982, 1990, 1997	EIDS	Statistical Abstract of India (various issues)
Gini Index	(percent)/1971, 1978, 1991, 1997	GI	R. Jha, 2000 (EPW)
Debt-SDP	(percent)/1974-75, 1981-82, 1991-92, 1996-97	DSR	State Governments Budget Documents(respective states and corresponding years)
Plan Outlay	(percent)/1966-69, 1974-79,1985-90, 1992-9790,	PLOU	Planning Commission, CMIE(various issues)

Table A2: The Indian States and Union Territories

States (Sample)	Code	States (not in sample)	UTs (not in sample)
Andhra Pradesh(S)	AP	Arunachal Pradesh(NE)	Andaman & Nicobar Island (E)
Assam(NE)	AS	Goa(S)	Chandigarh(N)
Bihar(E)	BI	Jammu & Kashmir(N)	Dadra & Nagar Haveli(W)
Gujarat(W)	GU	Manipur(NE)	Daman & Diu(W)
Haryana(N)	HR	Meghalaya (NE)	Delhi(N)
Himachal Pradesh(N)	HI	Mizoram(NE)	Lakshadweep(S)
Karnataka(S)	KA	Nagaland (NE)	Pondichery(S)
Kerala(S)	KE	Sikkim(E)	
Madhya Pradesh(c)	MP	Tripura NE)	
Maharashtra(W)	MA	Chhatishgarh(c)	
Orissa(E)	OR	Uttaranchal(c)	
Punjab(N)	PU	Jharkhand(c)	
Rajasthan(N)	RA		
Tamil Nadu(S)	TN		
Uttar Pradesh(c)	UP		
West Bengal(E)	WB		

Notes: In 2001, with newly constitutes states, there are now 28 States and 7 UTs in India. In 1956 (States Reorganisation Act), there was 14 states and 5 UTs only. Then, new states were created by the subdivision of older ones in 1960 & 1966, and some UTs have been converted into States. However, in this study, we only confine our study to 16 States of India, since 1970s. States/UTs (.) where, S= Southern, N= Northern, W= Western, E= Eastern, NE= North Eastern, C= Central region of India.

Figure A.1: The relationship between institutional quality and well-being

