Beyond GDP growth: Human development in the 1990s

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Introduction

There has been, especially over the last decade, a growing recognition of the need to measure the effects of public policy not merely by income alone but by indicators of human development. Human development has been defined as 'the process of enlarging people's choices' (UNDP, 1990). The concept encompasses empowerment, co-operation, equity in basic capabilities and opportunities, sustainability and security. As opposed to the basic needs approach that is centred on commodity possession (minimum requirements of food etc) 'the human development approach focuses on the state of existence of people - the lives they lead - not the detached objects they happen to possess." (Anand and Ravallion 1993). The approach places emphasis on the provision of social service, particularly public services and the concept implies a role and responsibility for public policy and public provision in the acquisition of health, nutrition and education.

The adverse impact of public spending cuts in a number of countries undergoing economic reform led to a significant debate on the issue. One of the main arguments for the economic reform process in India was to reduce the role of the government in sectors that did not produce public goods and thereby make it possible to increase it in sectors such as education, health and poverty eradication for which it has the prime responsibility (Narsimham, 2001). The process of reform was thus expected to accelerate the pace of improvement in living standards.

It is not clear that this happened in India. International comparisons of human development suggest that India has not fared very well by international standards. Even though most standard literature studying of the impact of reforms continues to focus mainly on GDP growth there have been a number of studies that have addressed

the issue of human development (see Prabhu, 2000). But results are not easy to interpret as the studies are more suitable for cross sectional comparisons than comparing rates of improvement.

It is meaningful to study the question of rate of improvement because during the 1990s the programme of reducing public spending has, as expected, affected expenditure on health and education programs. It is seen that public expenditure in these areas grew slower than it did in the 1980s. Since the reform process has involved improvement in income on the one hand and cuts in social sector spending on the other the total effect on standards of living is not unidirectional. For instance, health statistics that capture the effect both of health programs as well as of living conditions such as education and income of parents, nutrition, clean water, sanitation, awareness related to disease and the availability of health services show a slower rate of improvement. And, since there is no an absolute decline in living standards, what must be compared are the rates of improvement. So we need to address the question: Did living standards in India in the 1990s improve faster than they did in the 1980s?

The first question that needs to be addressed is how to measure human development. The focus on human development in the 1990s, especially after the publication of the UNDP's human development report, generated a substantial amount of literature on the inadequacy of measuring economic development by income and output measures. The emphasis on including other measures of development such as health, education, gender and distribution led to the development of indices such as the Human Development Index, the Human Poverty Index, the Gender Development and the Gender Empowerment Index. Attempts at developing indicators that take into account environmentally sustainable development have also been made. These try to value marginal damages to critical natural capital stock and the life support functions of natural systems, biological diversity, the ozone layer etc. (Monitoring Environmental Progress: A report on Work-in-Progress, World Bank, 1995).

The basic philosophy underlying UNDP's work is that the ultimate aim of development must be human well being, and expansion of output and wealth is only a means to attain this end. Therefore income cannot be considered to be a good proxy for all human choices. Evidence from UNDP's work supports this conclusion. For a large number of

countries the ranking on a 'Human Development Index' scale is lower than that on a per capita GDP (measured in dollars of purchasing power parity), suggesting that these countries have failed to translate economic prosperity into correspondingly better living standards for their people. This also indicates that there is no automatic link between income and human development, such a link has to be consciously created and reinforced.

Since the UNDP indices for India are available only for the 1990s, there is no suitable measure existing to allow us to answer our question. What we need is an index that draws upon the essential philosophy of the Human Development Index of the UNDP but is available for earlier years as well. While there have been a number of studies in India that have addressed the issues mentioned above, they allow cross-country or inter-state comparisons, rather than inter-temporal comparisons. For instance, in 1990 out of 130 countries India ranked 94th, while in 2001 it ranked 115th out of 174 countries). Or, they permit static comparisons - at two points of time - before the nineties and during them, but do not permit comparisons of the rates of improvement of living standards over the two decades. We therefore construct an index that includes income, health and education indices. It is constructed using publicly available and published data so that it is not survey dependent and is available annually. The index is constructed on an annual basis for India for the years 1970-71 to 1997-98.

In the first section of the paper we discuss very briefly the construction of the Human Development Index and other indicators for measuring human development. Section 2 discusses the empirical research relating to measuring human development in India and outlines the various indices that have been developed. The third section of the paper describes the data that is available on an annual basis for India. It also discusses the trends in the available indicators and shows that there are divergent movements. While per capita income increased faster in the 1990s compared to the 1980s, improvements in some health and education indicators was slower in the 1990s. The index that measured living standards by combining all three also shows a deceleration in the 1990s.

1. Human Development Indices

The publication of the "Human Development Report" (HDR) by the UNDP since 1990 vastly improved the empirical work related to the measurement of human development by constructing a number of development indices. Given the data constraints and the complexity involved in including many indicative variables, UNDP's approach has been to measure human development by focusing on three essential elements of human life- longevity, knowledge and decent living standards. Human development is defined as the process of enlarging people's choices, in order to enable them to lead a long and healthy life, to be educated and to enjoy a decent standard of living (UNDP, 1990). Since 1990, the HDR has published a composite index of human development called the Human Development Index (HDI) for several countries including India. The HDI is based on average achievements in the above three basic dimensions of human development. Data pertaining to HDI components is collected from estimates reported by the United Nations and its agencies and by other internationally recognised organisations. For each component indicator of the HDI, individual indices are computed as follows:

$$\text{Index (Xi)} = \frac{\text{Actual Xi value} - \text{Minimum Xi value}}{\text{Maximum Xi value} - \text{Minimum Xi value}}$$

Thus achievement in each indicator component is measured as the relative distance from the desirable goal. The distance measured is taken as the actual value minus the minimum value relative to the range- that is the maximum minus the minimum. If maximum and minimum values were to change over time, this might lead to an anomaly in which the actual value of an indicator might go up while its score goes down. Prior to 1994, maximum and minimum values were defined by the sample, which led to annual 'moving of goalposts'. In order to avoid this situation and to make HDI for a country comparable over time, the Human Development Report 1994 fixed the maximum and minimum values for each indicator. On the basis of past trends and future projections in cross-country longevity estimates, the minimum value of life expectation at birth was fixed at 25 years and the maximum was fixed at 85

years. The literacy variables are assumed to lie within their natural range of 0-100 per cent. The income variables are assumed to lie within PPP$100 to PPP$40,000.

The component indices so constructed vary between a lowest possible value of zero and highest possible value of one, with each country at some point on the scale. Longevity is measured by life expectancy at birth. Educational attainment is represented by two variables, adult literacy rate and combined primary, secondary and tertiary gross enrolment ratio. Each education variable is indexed separately and then combined into a weighted average to create an educational attainment index with two-thirds weight assigned to adult literacy and one-thirds to combined gross enrolment. Standard of living is measured by real GDP per capita in purchasing power dollar terms. HDI is computed as a simple average of the life expectancy index, educational attainment index and the real GDP per capita index.

The methodology of constructing the HDI has undergone many changes over the years. The methodology was altered quite substantially in 1994, leading to fixed goalposts for maximum and minimum values (discussed above) as well as new data definitions. In that year, mean years of schooling was replaced by combined school enrolment in generating the educational attainment index because the formula for calculating mean years of schooling was complex and had enormous data requirements. The minimum value of the income variable was lowered from PPP$200 to PPP$100 in order to make it comparable with the minimum value used in the construction of the Gender Development Index.

The treatment of the income index was also altered in 1999. The basic assumption in the construction of the income index in the HDI is that achieving a decent level of human development does not require unlimited income. On the assumption that income above a threshold level provides diminishing returns for human development, real per capita GDP above a pre-set threshold level was discounted using Atkinson's formula for the utility of income (Human Development Report, UNDP, 1999). The world average income was taken as the threshold income on the premise that each person should have access to at least average world income. The main disadvantage with the above procedure was that it discounted income above the threshold income very heavily, to the extent that for some high income countries income was found to

lose its relevance as an additional input into the HDI. In order to rectify this problem the treatment of income was changed in 1999 to conform to the treatment of other components of the index. Currently, the procedure used is to adjust the logarithm of real per capita GDP (in PPP$) is to generate a GDP index. The advantage of this method of indexing income is that it does not discount income as severely as the previous method. Further, it discounts all income, not just income above a threshold level.

In view of the changes in the variables used in the index and the methodology of constructing the index a time-series of HDI from 1992 onwards is not likely to generate a comparable set of human development indices. Comparability is also affected by significant revision in the data for some indicators over time.

Figure 1 shows the HDI for India from various issues of the HDR. It can be seen that for some periods there appears to be no improvement though we know that during this period at least one component, income, grew significantly. Thus as is obvious from the figure, and as indeed accepted by the UNDP, these do not form a data series that may be looked at to analyse improvements over time.

The Human Development Report, 1995 (UNDP, 1995) widened the scope of its development reporting by focusing on gender disparities in development. Two gender-sensitive indices were constructed to examine disparities between men and women in availing of basic amenities as well as using their capabilities to improve their choices in life. The first and more basic of the two, the Gender Development Index (GDI) concentrates on the same variables as the Human Development Index, but measures the inequality of achievement between men and women. The computation of the Gender Development Index requires the calculation of equally distributed indices of life expectancy, educational attainment and income, each of which is defined as the reciprocal of the population-weighted arithmetic mean of the male and female achievement levels. This method imposes a penalty for inequality, such that the GDI falls when the achievement levels of both men and women in a country go down or when the disparity between their achievements increases. The greater the gender disparity, the lower a country's GDI compared with its HDI (UNDP, 1995). In addition, a Gender Empowerment Measure (GEM) was computed

to measure the level of economic participation and decision-making by women. The GEM concentrates on three broad classes of variables: power over economic resources, measured by per capita PPP income; access to professional opportunities, measured by share of professional, technical, managerial and administrative jobs; and participation in political decision making, represented by share of parliamentary seats.

The Human Development Report 1997 introduced the Human Poverty Index (HPI) in order to provide an aggregate measure of the prevalence of poverty in a country. While the HDI measures progress in a country, the HPI measures the extent of deprivation by quantifying the proportion of people who have been left out of progress (UNDP, 1998). Thus the HPI concentrates on deprivation in the basic amenities of life already captured by the HDI, namely, longevity, knowledge and a decent standard of living. For developing countries, the HPI is generated on the basis of vulnerability to death at a young age, adult illiteracy and poor living standards, as measured by access to safe water, access to health services and undernourishment of children (UNDP, 1997). For industrialised countries, an additional dimension: non-participation or exclusion, as measured by the rate of long-term unemployment of the labour force is included in computation of the HPI.

2. Empirical Evidence for India

The UNDP (1990) methodology was applied to Indian data by Tilak (1991) and Kumar (1991) to construct human development indices for seventeen major Indian states. The development indicators used in the index included literacy rate, expectancy of life at birth and per capita state domestic product. Data was drawn from the 1981 and 1991 census estimates. Shah, Rao and Kumar (1993) constructed two sets of human development indices for 16 Indian states. The first index was closely modelled on the HDI and was computed on the basis of real per capita state domestic product, life expectancy and the literacy rate for the years 1960-61, 1970-71, 1980-81 and 1986-87. The second index refined the educational attainment indicator by combining literacy rate with average years of schooling. Owing to data constraints the expanded index was computed only for the years for which census data was available: 1960-61, 1970-71 and 1980-81. For both the HDI indices, minimum values for each indicator of human development were taken to be the value prevailing in 1960-61 and maximum values were targets for each indicator to be achieved by India by 2010.

Pal and Pant (1993) modified the UNDP methodology considerably to generate alternative human development indices for fifteen major Indian states. They argued that in view of the poverty in developing countries poverty alleviation should be an explicit social goal. Consequently, their modified human development index included the percentage of people above the poverty line as an indicator of development. Since the UNDP technique of measuring deprivation within a "relative framework" was considered to be unsuitable for an intra-country analysis, the computational method was also altered to generate more meaningful indices. In computing the indices, maximum values attained by developed countries were not used and the concept of dividing by the range between maximum and minimum values was done away with. This modification clearly identifies the least developed states by sharply reducing their index value relative to their value using the UNDP methodology.

Efforts have been made to construct gender-sensitive development indices for Indian states, notably by Prabhu, Sarker and Radha (1996) and Kumar (1996). Both studies modified the UNDP methodology in keeping the availability of data and its relevance in the Indian situation. Rustagi (2000) used disaggregated indicator analysis to identify gender backward districts among 15 major Indian states. Mehta (1996) closely followed the UNDP methodology to construct a measure of gender empowerment for 16 Indian states, though the components of the index were altered to reflect the Indian situation. Sinha (quoted in Mehta, 1996) proposed a framework for women's empowerment that was broadly based on women's access to resources and their exposure to the outside work. Prabhu and Kamdar (1998) constructed a modified HPI for 15 major Indian states. They constructed the HPI using only outcome indicators, namely, illiteracy, percentage of population not expected to live up to 40 years of age, and child undernutrition. They argued that all additional indicators used by UNDP were superfluous because they were captured by including the proportion of people vulnerable to die before the age of forty years.

A common feature of Indian literature on development indices is their cross-sectional framework: they measure intra-country levels of human development at a point in time or for a few non-contiguous years. One of the reasons for this is the use of census or NSSO data that is not available on an annual basis. While providing a cogent

picture of relative levels of socio-economic development within India, these studies fail to capture the pattern of national or sub-national development over time. Even the UNDP's Human Development Index is available only for the years 1990-1998. Therefore, none of these indices are suitable for directly measuring long term trends in human development in India.

3. Index of Economic Development

Since it is not possible to use existing indices of human development for intertemporal comparisons, we propose a similar but simpler index that comprises of health, education and income indicators. The index includes only those indicators for which data is generated annually and is publicly available (as opposed to being based on undertaking a survey).

Index of health attainment

The level of health standards attained by a country are measured by overall fertility levels; indicators of mortality, morbidity and immunization, state of maternal and reproductive health, nutrition levels and availability and quality of health care services. Of these, the most widely used indicator of health attainment is life expectancy, or expectation of number of years of life at birth. The importance of life expectancy lies in the common belief that a long life is valuable in itself and in the fact that various indirect benefits such as adequate nutrition and good health are closely associated with higher life expectancy (UNDP, 1990). Life expectancy can be used as a proxy for the health of the workforce, even though they measure mortality rates rather than morbidity. Higher life expectancy is generally associated with better health status and lower morbidity (Bloom, Canning and Sevilla, 2001). Unfortunately Indian data on life expectancy is derived from census estimates, which means that data is available at intervals of ten years. But it has been argued that mortality estimates closely proxy for expectation of life at birth. Since life expectancy is explained by income and infant mortality, if income is included in an indicator of human development then infant mortality gives the extra information (UNDP, 1993). Infant mortality can therefore be considered as a possible alternative to life expectancy, especially when used in conjunction with income.

In addition to infant mortality, associated measures of mortality at a young age (say, under-five mortality) are also considered to be good indicators of the quality of public health in developing countries. The UNICEF has recommended the under-five mortality rate as the single most important indicator of the state of a nation's children (UNICEF, 1989). Since actual data on extent of vaccination and immunization are not available as a continuous time-series, the under-five mortality rate effectively captures the impact of immunization programmes on child health.

At the national level, the National Sample Survey Organisation (NSSO) is the only source of periodic morbidity data, but so far only four surveys have been carried out on morbidity. As a result time series data on prevalence of illness is not available. Measures of fertility quantify several aspects related to female and reproductive health. Lower fertility is likely to ensure that children are healthier and better looked after by the family. Lower fertility rates also translate into better maternal health. In some sense, fertility choices reflect the overall quality of health: in countries with high incidence of disease, poor health care facilities and consequent high mortality rates, there is a greater incentive to have more children. Together, fertility and mortality indicators measure the overall level of attainment of health standards.

We propose an index of health attainment as an equally weighted index comprising of infant mortality rate, child mortality rate (under-five mortality) and total fertility rate. Infant mortality rate (IMR) measures the number of infant deaths under one year of age per thousand live births. More specifically, the infant mortality rate represents the probability of dying between birth and one year of age. The child mortality rate (CMR) represents the probability of dying between 0-4 years of age, or before attaining the age of five. IMR captures the impact of health facilities like pre-natal and post-natal medical care and nutrition available to mother and child. CMR can be associated with other health services like spread of immunisation, since vaccinations are largely completed before the age of five. The total fertility rate (TFR) is a measure of the number of children a woman would bear during her reproductive years.

IMR, CMR and TFR are 'negatively' related to the quality of health status of the population. A decline implies an improvement in health standards. Each of the above

measures of health attainment is indexed and a simple arithmetic mean is obtained to generate an index of the health status.

Data on the infant mortality rate, child mortality rate and the total fertility rate was obtained from the Sample Registration System (SRS), Registrar General, New Delhi (Table 1).

Index of education attainment

The access to education available to a population is often measured on the basis of resources available for acquiring knowledge, through measures such as expenditure on textbooks and other pedagogical material, school infrastructure, overall educational budgets, pupil-teacher ratios and average teacher salaries. These do not, however, directly measure the attainment of education in the manner of development indicators like literacy levels, enrolment and drop-out rates at different stages of education and number of years of schooling. Literacy figures are only a rough measure of access to education. But literacy is a first-step to learning and knowledge-building, so literacy figures are essential in any measurement of human development (UNDP, 1990). However, adult literacy is not considered a good indicator of educational advances made by developing countries. In most developing countries, the majority of the population is usually below the age of 25, and measures relating to adults or those over 25 cannot capture the flow of educational attainment. In India, literacy data of any kind is sourced from the Census, which is collected only once in ten years. Data on number of years of schooling and drop-out rates are also not available as a continuous time series. Consequently, figures of enrolment in different stages of education are used to capture advances made in educational attainment.

The index of education attainment is an equally weighted index consisting of gross enrolment in middle or upper-primary schools and total university enrolment in graduate courses. The Gross Enrolment Ratio (GER) is used to measure enrolment in middle school. Though enrolment in a school does not imply attendance and dropout rates are high, these numbers can still be illustrative. However the gross enrolment ratio (GER) for primary schools is often a very strange number. It rises to above 100 in many years as over age children are enrolled in primary schools. It is difficult to interpret an increase in enrolment from say 104 to 106 as an improvement. Thus we include the GER

for upper primary and middle schools defined as the percentage of enrolment in classes VI-VIII to the estimated child population in the age group 11-14 years. There are two main shortcomings with GER data. First, enrolment at each class includes over-age and under-age children, so GER may be overestimated. Second, all the students who enrol in a class might not graduate to the next class; some may dropout of the school system altogether. It follows that our measure of GER may not correctly estimate the number of people actually getting the benefits of middle school education. Despite these shortcomings GER remains one of the most widely used proxies for educational attainment due to ease of availability of time series data. Indeed, when compared, trends in secondary school enrolment is highly correlated with trends in literacy (we cannot use literacy as only census data is available every 10 years). This could be because gross enrolment in upper primary or middle school is contingent upon passing primary school, or attaining literacy. A GER time-series is constructed using data from Education in India, Vol.I(S), 1998, Department of Education, Ministry of Human Resource Development and Selected Education Statistics, 1998-99, Government of India (Table 2).

To take into account higher education in the country total enrolment in graduate courses in the faculties of arts, science, commerce, engineering and technical areas, medicine, agriculture, law, veterinary science, education and other courses is also incorporated into the educational attainment variable. The universities covered include university departments, university colleges and affiliated colleges under the University Grants Commission. Data on enrolment in graduate courses is obtained from (1) University development in India: Basic facts and figures Part I, University Grants Commission and (2) Annual reports of the University Grants Commission.

Each of the above measures of educational attainment is indexed and a simple arithmetic mean is obtained to generate an index of the quality of educational attainment.

Index of output

An index of output is constructed on the basis of per capita gross domestic product (GDP) at factor cost at 1993-94 prices. Per capita output is generated using GDP and population data, which are obtained from National Accounts Statistics, Central

Statistical Organisation. The series of per capita real output is indexed with 1970-71 as the base year.

Composite Index of Economic Development

In the construction of an index of economic development our choice of variables was driven by a simple consideration– statistics that reflect improvements in living standards of the population were included. As in the HDI, the indicators include health, education and income variables. But these are statistics that are published annually and easily available and allow intertemporal comparisons.

The index was constructed on the basis of health attainment, educational attainment and domestic output. The UNDP methodology is to assign equal weights to each indicator so that the HDI is an arithmetic average of the three indicators. The equal weighting has led to a great deal of debate. In an ideal world, the "meta production function" of human development would be specified, and the contribution of each variable to human development would be its weight (UNDP, 1993). In the absence of such production functions, the usual approach is to assign weights to index components on the basis of the pattern of correlation among variables. According, we carried out a principal component analysis (PCA) of the data. The PCA revealed that the factor loadings of each constituent of the index in the first principal component were more-or-less similar (Table 3). This suggests that the constituents contribute equally to the variation in the index.

Therefore, an index of economic development was computed as an arithmetic average of the index of health attainment, index of educational attainment and per capita gross domestic product (at factor cost and constant prices). A simple arithmetic average index implies that each component is given equal weights in the index (Table 4). Each of these constituents was indexed to equal 100 in 1970-71, the first year of the sample.

Trends in the Economic Development Index

Figure 2 plots the Economic Development Index. The economic development index rises consistently and its movement is relatively smooth. Figure 3 shows annual growth rates in EDI and GDP. A comparison of growth rates shows that in the 1980s,

EDI grew at a faster rate than GDP, but in the 1970s and the 1990s, the rate of growth of EDI was much slower than GDP.

In the last three decades in per capita terms GDP grew the fastest in the 1990s. Its growth improved steadily from the 1970s when it was only 0.4 per cent to 3.56 per cent in the 1980s and to 3.75 per cent in the 1990s (Table 5). However, health and education standards which were improving relatively sharply over the 1980s saw a deceleraion in the 1990s. Thus looking at GDP alone would make it appear that the 1990s performed much better than the 1980s. Yet the Economic Development Index comprising of all three indicators shows that improvement in living standards was actually slower over the 1990s compared to the 1980s.

Data reveals that the 1990s experienced a deceleration in the improvement in statistics such as the infant mortality rate and the child mortality rate (age 0-5). For instance, in the 1980s, the infant mortality rate declined at an annual average rate of 2.71 per cent per annum. This was a sharp improvement over the 1970s figure of 0.62 per cent. In the 1990s the rate at which the infant mortality rate was declining fell to 2.48 per cent. Similarly, the rate of decline of the child mortality rate sharply improved in the 1980s. It accelerated from an annual rate of decline of 1.40 in the 1970s to 4.02 per cent in the 1980s. But then it fell dramatically to 2.70 per cent in the 1990s.

Improvement in education levels also slowed down in the 1990s. While in the 1980s the annual average rate of increase in the gross enrolment ratio was 3.91 per cent, in the 1990s the rate of increase fell to 0.18 per cent.

Among one of the most important factors affecting health and education standards in developing countries, apart from income, is public spending. Prabhu and Chatterjee (1993), using a cross section data for 15 major Indian states, show that real per capita government revenue expenditure influenced educational attainment substantially. Purohit and Siddiqui (1994) point to a higher utilisation of government health facilities in states incurring higher per capita government expenditure on health. Dutta et. al (1997) indicate that per capita government expenditure on social sectors influences attainment levels to a considerable extent even after controlling for levels of per capita income.

The commitment to cut the fiscal deficit in the 1990s resulted in a deceleration in growth in public spending on health and education (Table 6). To analyse trends in spending we examine a broad definition of spending on health that includes expenditure on water, sanitation etc. and on education that includes primary, secondary and higher education by both central and state governments. The annual average increase in real per capita health spending grew at a rate of 5.48 per cent in the 1980s but only at the rate of 3.59 per cent in the 1990s. Similarly education expenditures in real per capita terms grew at 3.25 per cent in the 1990s compared to a much higher rate of growth of 5.67 per cent in the 1980s. These are, of course, aggregate numbers that ignore distribution across programs, regions and recipients as well as issues relating to the efficacy of public expenditure. Here the figures are in nominal terms. Though the rate of inflation was lower in the 1990s but if these were to be deflated by public sector wages then it is likely that the growth was even slower.

Conclusions

The development indices constructed by the UNDP have helped to measure human development as opposed to mere income growth in a county. The main shortcoming of these indices, however, is that they are not comparable over time and they tend to be based on indicators for which data is not in the public domain. In this paper we propose an index of economic development for India following the UNDP philosophy using published data on an annual basis. The index permits a comparison of human development in India over a period of three decades.

Trends in the index suggest that the rate of improvement in living conditions decelarated in the post reform period. Part of the responsibility for this lies in the declining growth of public expenditures due to budgetary constraints. This indicates towards a need for better prioritisation and allocation of public expenditure. While it may be possible to improve social services without increasing expenditure, it is clear that cutting expenditure without improving services will have an adverse impact.

The economic development index presented above is an average measure of attainment, and does not capture differences in human development between men and women, or inter-state and inter-region inequalities in income and social welfare. It is an attempt to measure trends in living conditions at the national level. Further disaggregation at state and regional-level will be required to obtain a clearer picture of human development in India over time.

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22. Table 1: Health Attainment Data

	IMR	CMR	TFR
1970	129	52.9	5.2
1971	129	51.9	5.2
1972	139	57.3	5.2
1973	134	52.3	4.9
1974	126	50.0	4.9
1975	140	55.0	4.9
1976	129	51.0	4.7
1977	130	50.9	4.5
1978	127	48.3	4.5
1979	120	45.7	4.4
1980	114	41.8	4.4
1981	110	41.2	4.5
1982	105	39.1	4.5
1983	105	37.6	4.5
1984	104	41.2	4.5
1985	97	38.4	4.3
1986	96	36.6	4.2
1987	95	35.2	4.1
1988	94	33.3	4
1989	91	29.9	3.9
1990	80	26.3	3.8
1991	80	26.5	3.6
1992	79	26.5	3.6
1993	74	23.7	3.5
1994	74	23.9	3.5
1995	74	24.2	3.5
1996	72	23.9	3.4
1997	71	23.1	3.3
1998	72	23.1	3.3

Source: Sample Registration System, Registrar General, New Delhi

Table 2: Education Attainment Data

	Gross Enrolment Ratio in Secondary Schools	University Enrolment
1970	33.4	1953640
1971	33.7	2065041
1972	34.4	2168107
1973	34.3	2234385
1974	35.8	2366541
1975	36.7	2426109
1976	36.3	2431563
1977	36.9	2564972
1978	38.0	2618228
1979	39.6	2648579
1980	41.9	2752437
1981	43.3	2952066
1982	45.5	3133093
1983	47.3	3307390
1984	48.1	3404096
1985	49	3605029
1986	48.2	3757158
1987	50.2	4020159
1988	48.9	4285489
1989	57.4	4602680
1990	62.1	4924868
1991	61.35	5265886
1992	67.5	5534966
1993	67.35	5817249
1994	67.2	6113919
1995	67.6	6425634
1996	62.4	6755455
1997	58.5	7078214
1998	57.58	7417968

Source: Selected education statistics, Ministry of HRD, GOI

Table 3: Principal Component Analysis

Eigenvalue: 2.9712 Cumulative R-Squared: 0.9904

	Component Loading for 1st Principal Component
Education Index	0.99762
Health Index	0.99032
Per Capita Income	0.99762

Table 4: Index of Economic Development (EDI)

Year	Health Index	Education Index	GDP Index	EDI
1970	100	100	100	100
1971	100.63	103.30	98.64	100.86
1972	94.92	106.99	96.07	99.32
1973	101.02	108.53	98.19	102.58
1974	104.74	114.16	97.15	105.35
1975	97.81	117.03	103.46	106.10
1976	104.61	116.57	102.56	107.91
1977	105.81	120.89	107.78	111.49
1978	108.58	123.90	111.26	114.58
1979	113.62	127.07	102.93	114.54
1980	119.05	133.17	107.87	120.03
1981	120.15	140.37	112.16	124.23
1982	124.05	148.30	112.98	128.44
1983	125.52	155.46	119.14	133.37
1984	122.43	159.13	121.59	134.38
1985	130.17	165.62	124.31	140.03
1986	133.70	168.31	127.00	143.01
1987	136.97	178.04	129.02	148.01
1988	141.02	182.88	139.52	154.47
1989	148.47	203.73	145.80	166.00
1990	162.33	219.01	150.80	177.38
1991	165.43	226.61	149.72	180.59
1992	166.14	242.71	154.50	187.78
1993	177.02	249.71	160.13	195.62
1994	176.62	257.07	168.53	200.74
1995	176.04	265.65	177.19	206.29
1996	180.31	266.31	187.84	211.49
1997	184.99	268.73	193.50	215.74
1998	184.11	276.05	202.83	221.00

Table 5 : Decadal Growth Rates (per cent)

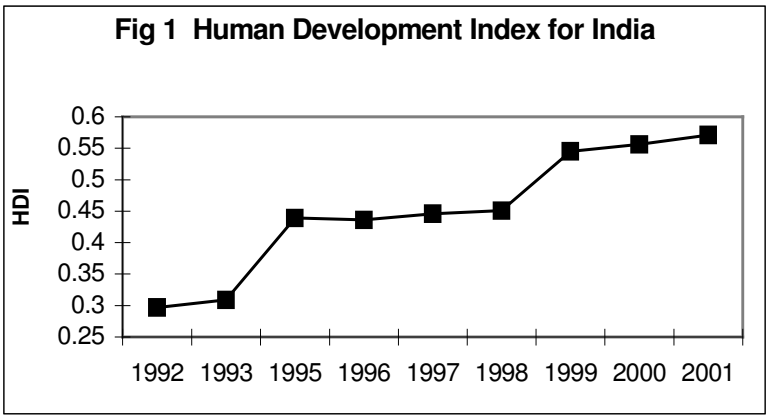
Variable	1970s	1980s	1990s*
IMR	-0.62	-2.71	-2.48
CMR	-1.40	-4.02	-2.70
TFR	-1.81	-1.18	-1.82
Health Index	1.53	2.74	2.47
GER	1.93	3.91	0.18
University Enrolment	3.46	5.69	5.45
Education Index	2.71	4.86	3.46
GDP	2.94	5.86	5.77
Per capita GDP	0.4	3.56	3.75
EDI	1.53	3.79	3.24
Health Expenditure	6.81	5.48	3.59
Education Expenditure	3.29	5.67	3.25

** Data upto last available year: 1998-99*

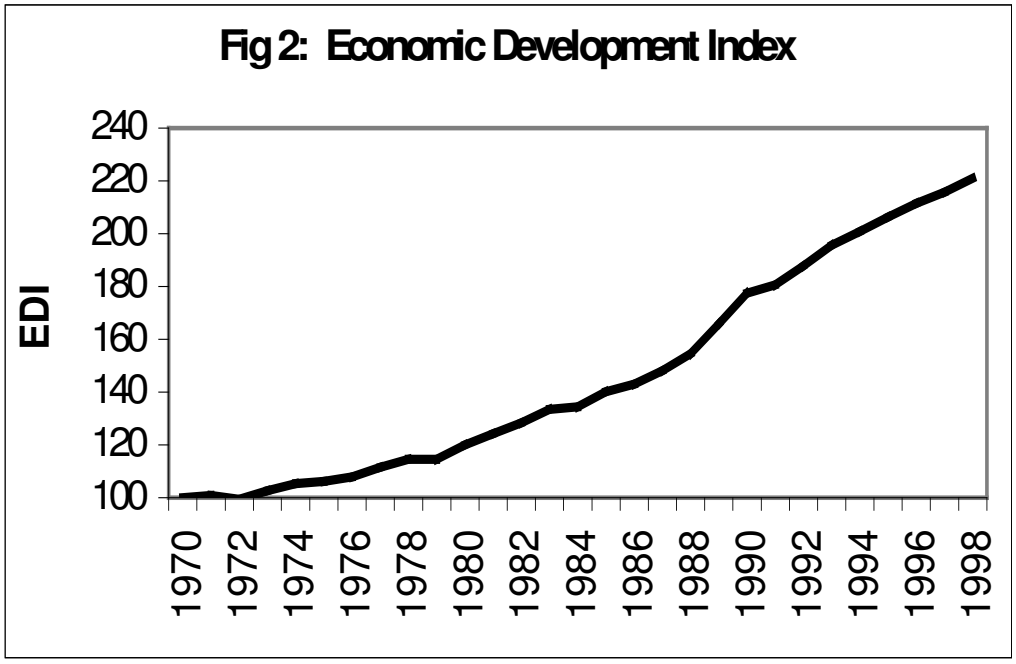
Table 6: Real Per Capita Expenditure

Years	Health	Education
1970	42.41	123.56
1971	46.45	128.02
1972	57.66	153.05
1973	53.68	141.01
1974	50.44	124.55
1975	58.54	146.52
1976	67.46	149.60
1977	65.08	155.69
1978	72.92	168.52
1979	73.46	158.28
1980	78.26	166.31
1981	84.29	173.37
1982	91.08	189.59
1983	99.14	195.37
1984	101.44	209.10
1985	110.83	203.55
1986	121.47	216.26
1987	126.08	227.12
1988	125.33	247.00
1989	124.43	273.14
1990	126.81	276.24
1991	122.79	260.71
1992	123.63	264.75
1993	128.77	266.57
1994	135.21	280.08
1995	147.19	292.48
1996	147.56	325.64
1997	157.79	321.30
1998	169.90	359.76

Source: Central and State Budget Documents
Nominal expenditure is deflated by GDP deflator to generate real expenditure



Source: Human Development Report, UNDP, Various Issues.



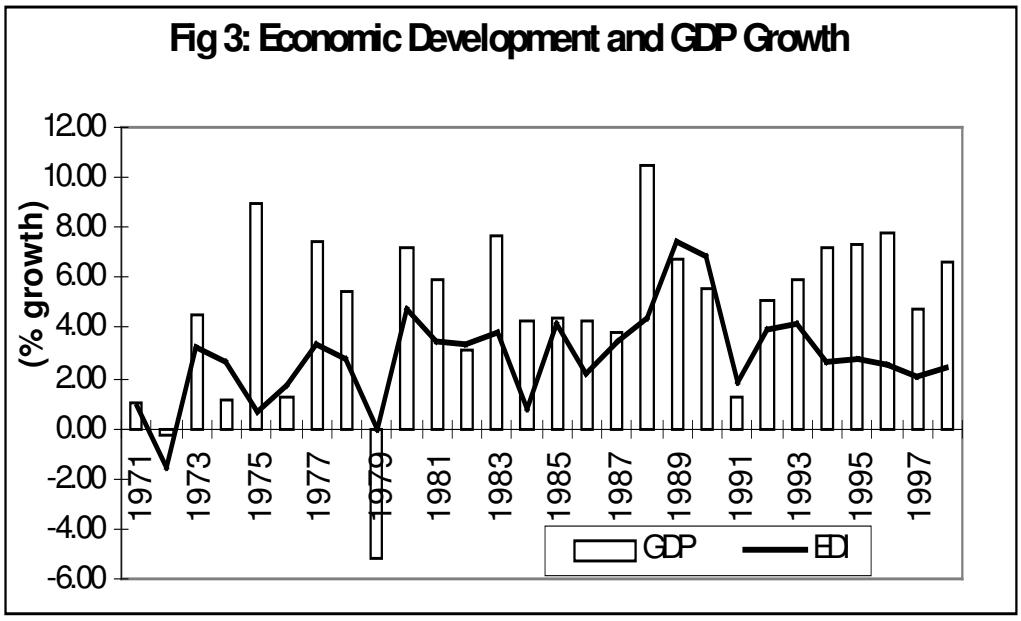


Fig 3: Economic Development and GDP Growth
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
(% growth)
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
GDP
FDI