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Approaches to Development: A Critique and Relevance

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Development is a comprehensive concept meaning not only economic development but also social, cultural, equitable development and sustainable development. Diverse approaches to development have emerged based on different assumptions of reality. The present note makes a critique of the different development approaches and examines the relevance of these approaches to a developing country like India. It is held here that though economic development is the basic approach to development that is not all. Structural approach to development is also important along with development of human qualities.

1. Introduction

Development is a buzzword in recent discourse of any discipline - be it social science or science or technology. This is because development is a dynamic concept meaning change and change is a key word in theoretical and empirical exercises and discussion. Development being a comprehensive and multi-dimensional concept meaning all types of change that occur in an economy, society and country it needs inter-disciplinary approach for its adequate and meaningful study.

Historically, the concept of development has changed comprehensively. In the ancient age of India development was mainly conceived to be spiritual in nature and worldly development was thought to be secondary. Industrial revolution brought about the fundamental change in the concept of development while ushering in material progress of human beings. Economic development became the dominant concept. To facilitate economic growth development of an appropriate institution like free market was emphasized along with physical development in the form of increase of investment in physical capital and human capital that stimulate economic development. To accelerate economic development the development of technology ushered in, which did have its impact felt on environment. Technology makes its impact felt on not only economic growth but also employment and inequality. This gives rise to the vital need of development for an inter-disciplinary approach. To remedy adverse impact of development ethics and justice emerge as important concepts to collaborate with the concept of development. Thus not only economics but also philosophy, sociology and politics emerged as important disciplines. Rural development has also emerged as a separate discipline in the event of non-percolation of benefits of economic growth to the unprivileged sections of the society and persistence of poverty, hunger, malnutrition and inequality in the rural areas. Rural development comprehends all social science disciplines like economics, political science, history, sociology and philosophy, library and information science.

Development, to be self-sustaining, necessitates the generation of surplus, a pre-condition for accumulation of capital for industrialization and growth. During the early phase of Industrial Revolution primitive accumulation played the vital role in economic development and in the later phases surplus was generated in the capitalist process of development. While surplus generation is important for growth, distribution issue also becomes important for development as it helps generate demand for commodities. How to promote development then? To comprehend and analyse the relevant process of development, different approaches have emerged, which needs to be examined. The diverse approaches to development like economic development approach, structural approach, target group approach, system approach, human

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development approach, integrated development approach, decentralized planning and participatory development approach and micro finance approach which have recently developed emphasise upon the need for an inter-disciplinary approach to development in general and rural development in particular.

In recent years World Bank, UNDP and other international institutions have put accent on decentralized planning and development which is participatory in nature and inter-disciplinary in approach based on the logic of efficiency in resource utilisation and effectiveness of development programmes for delivery of public goods and services to the people, particularly the socially disadvantaged groups. In India, the Constitution 73rd and 74th Amendments institutionalize decentralised planning at the rural and urban levels for economic development and social justice. This has occasioned the need for inter-disciplinary approach to development quite illuminating.

Against this brief backdrop the present note examines different approaches to development. Section 2 presents different concepts of development and section 3 makes a critique and relevance of general economic development approach. Section 4 discusses other major approaches to development. Section 5 makes concluding observations.

2. Concepts of Development:

Economic development: In the modern era the most prominent concept of development is economic development starting with the great classical text of Adam Smith (1776) titled *An Enquiry into the Nature and Causes of Wealth of Nations* where economic factors like capital accumulation, technical factor like division of labour and institutional factor like government policy play crucial role in promoting economic development. Smith observed that division of labour is more extensive in manufacturing than that in agriculture and hence manufacturing contributes to economic development much more than agriculture. The question of equity, however, remains to be resolved in this concept of development.

Equitable development: Equitable development reflects growth with equity. Economic reforms with accent on liberalization, privatization and globalization have achievements on economic growth but inequalities have widened as in India. Hence stress is made on growth with equity, i.e., equitable development. It is synonymous with inclusive growth. The 11th Five Year Plan of India is designed to reduce poverty and focus on bridging the various divides that continue to fragment Indian society. In the 1996 World Development Report the World Bank concedes that reducing inequality is necessary for greater economic prosperity in the long run. It is observed that the measures that raise equity also promote economic growth.

Sustainable development: Environmental problems can jeopardize - indeed do jeopardize the objectives of development. The concerns of sustainable development dominate development thinking since the eighties of the 20th century.

Human development: In view of the UNDP experts, human development is simply the development 'of" the people, "by" the people and "for" the people. The concept of human development is much broader and economic growth is only one component of it.

Integrated development: It is the holistic concept of development encompassing sectoral, sectional and environmental integration of the economy and society.

Social development: It is the concept of development that focuses upon development of all social classes, namely male, female, children, scheduled castes and scheduled tribes.

Rural development: It refers to change in rural societies, not all of which involve action by government.

Participatory and decentralized development: Participatory development is an emerging concept of discourse on decentralised planning. It always paves the path for successful implementation of any development programme. The application of participation is rooted in the logic "that people should have an opportunity

for controlling their own fate as much as possible" (Dore and Mars 1981:30). From the lesson of experience of developing countries, Picciotto(1992) made following observation : "At the micro level, project evaluation studies have unearthed high failure rates, where beneficiary involvement is lacking and organizational capacities are overestimated. The importance of appropriate policy environments in determining project outcomes is well established. Project preparation, appraisal and implementation techniques are being retooled to incorporate up-to-date participatory techniques". The decentralized decision making enhances efficiency of resource use. Social scientists and international institutions like the World Bank and United Nations in its UNDP emphasise decentralised planning , which would, it is held, achieve efficiency along with social equity. Decentralisation with local accountability not only improves the quality of public goods but also leads to better management of the common property resources on which is dependent the livelihoods of a vast section of the rural population. The principle of participation is in consonance with the concept of development viewed from capability perspective. The concept considers people as the end and the agency of development. It has an important role to play in human development which stresses the need to invest in human capabilities and then ensures that these capabilities are used for the benefits of all. It helps to maximize the use of human capabilities and thus to increase the levels of social and economic development. Decentralised planning tends to maximize welfare with minimum damage to the eco-system.

Self development: It focuses on self-development of families, particularly poor families and thus their poverty alleviation.

3. Econoimic Development Approach, Its Critique and Relevance

Adam Smith, Ricardo and Malthus were the main economists of the classical school who, in the late eighteenth and early nineteenth centuries, attempted to discover the causes of economic progress. The classical school believed that the problem of growth centered on the ability to accumulate capital. Economic development propelled by capital accumulation and stimulated by technological progress (division of labour in Smithian sense), they opined, extends its benefits to all sections of the people.

In the work of Adam Smith we get some hints of the percolation theory. To quote from his work, 'The Wealth of Nations' Book1, Chapter 1

"It is the great multiplication of production of all the different arts, in consequence of the division of labour, which occasions in a well-governed society, that universal opulence which extends itself to the lowest rank of the people."

Adam Smith here seems to propagate two things. First, economic growth caused by capital accumulation and technological improvements trickles down to the poorest. Second, he alludes to 'the great inequalities of poverty' in the modern civilized societies.

General economic development approach to development is based on the assumption that there is initial even distribution of assets and there is no structural imbalance of the economy. But this assumption is not valid when we come across uneven distribution of land and other productive resources across families and there are other structural rigidities in the economy. Therefore, comprehensive development is not an automatic fall-out of economic development in general. Economic principles are necessary but not sufficient condition for overall development.

It is pertinent to make a review of the neo-classical decision making model. Neo-classical economists believe in the efficiency of unrestricted free enterprise based on the market mechanism. They argue that a properly functioning market system will stimulate both economic efficiency and economic growth. They also maintain that the market does this automatically, since it requires no central decision-making or administrative

apparatus. Johnson (1970) stated the case for the market mechanism. The free market will be responsible for economic growth. It will 'release the energies of million of able, active and vigorous people who have been chained by the ignorance, custom and tradition.' This is also the reason why the North countries have developed so rapidly following the destruction of the despotic rule of the kings and queens in the seventeenth and eighteenth centuries.

Hence the government shouldn't intervene and the free market should not suffer the 'tyranny of controls'. In their book, *Free to Choose*, the Friedmans argue that the tyranny of controls by the government is responsible for India's underdevelopment, while the absence of such controls in the post-Meiji Japan delivered economic development. They argue that the 'resource' differences should have favoured India rather than Japan.

"The explanation is the same as for the differences between West and East Germany, Israel and Egypt, Taiwan and Red China. Japan relied primarily on voluntary cooperation and free-markets - on the model of Britain of its time. India relied on central economic planning - on the model of the Britain of its time".(p. 82)

This approach emphasizes upon the question of efficiency in the internal micro-economic framework. It concentrates on the micro issues underlying the development process (and of course to a marketist stand in this micro discussion). It emphasises that in perfect competition there shall be efficient allocation of resources and increase in investment will lead to rapid economic growth whose benefit should percolate even to the lowest rank of the society. This approach is illuminating, particularly in view of the fact that in the large private sector of agriculture, manufacturing and tertiary activities, decisions are taken at the individual level. This approach has a great merit in being an academic, analytical, and growth-oriented approach. This neo-classical position has been echoed in the IMF and World Bank documents of recent years.

Neo-classical economics is concerned with economic growth and its approach is ahistoric and based on the concept of aggregate production function at a logical time. A complete set of markets for the purchase or sale of goods contingent on each possible combination of time, space and the state of nature together with the concept of rationality is assumed to exist.

This approach suffers from several limitations in the rural economies and societies of developing countries. First, in a large subsistence sector of a rural society this approach is hardly applicable and in a semi-capitalist production relation (as is observed) in the rural industrial sector, this approach has almost no relevance. Secondly, neo-classical writers in general, and the Fund Bank economists in particular habitually and wholly illegitimately ignored the demand constraints because to them a capitalist market economy spontaneously overcomes any possible deficiency of aggregate demand. Thirdly, this approach faces the problem of market failure which ought to be corrected through institutional mechanisms which are completely ignored in the neo-classical approach. Fourthly, the pattern of relationship of the individual with the society is not brought out here. Neo-classical economists tend to ignore social complexities and stratifications, simplifying their analysis by concentrating on the behaviour of automistic individuals in a class-less universe. Given the economic and social stratification in the LDCs, market imperfection is the natural outcome which tends to erode the vital basis of the neo-classical approach in the form of the assumption of perfect competition. But the distributional and structural aspects are completely ignored in the neo-classical approach. Lastly, in this approach the system which is external to micro approach and the rural society is left out in the analysis. As Apthorpe (1977) puts it, these kinds of social science studies have become quite good at explaining 'the success or failure of the individual within the system' – but in this case 'the system' itself is left out of the analysis.

The main stream strategies of development had mainly focused on economic growth and top down diffusion of development impulses. It has been assumed that Growth is treated as the function of investment, and the benefits of development are expected to trickle down to the neediest sectors of society. Popular participation is confined to the ratification meetings in which outside experts used to brief the local people. By the end of 1960s, it was identified that growth was not necessarily correlated with other development objectives such as rapid employment creation, reduction of poverty and inequality and provision of basic human needs. Severe mal development problems were found to be appearing in some countries like Brazil, Iran, Kenya, Mexico, Nicaragua, Pakistan and South Africa. It was found that mere economic growth failed in readicating poverty or providing jobs or reducing inequalities as it was expected. There has been accumulating evidences for growing unemployment, increasing inequalities (Adelman and Morris 1973) and it has been argued that growth is followed by increased inequalities (Griffin 1979).

The experience of 1950s and 1960s have taught that mere growth was quite insufficient to induce broad based development and more than a decade of rapid development in underdeveloped countries has been of little or no benefits to perhaps a third of their population (Chenery et, al 1974). Economic growth had simply failed to filter down and the argument that top down development as well as trickle down strategies will alleviate widespread impoverishment was found baseless. A growing number of theorists and experts began to argue that the focus of macro economic growth had been misplaced, as the focus has been on the inanimate instead of animate. Even the measurement of development has to be redefined in terms of people oriented criteria. It was the wide consensus on the fact that new development approaches should be oriented towards the satisfaction of basic human needs and desires particularly at the local community level that had made Huq to observe that development should be built around people rather than make people roam around development.

While orthodox economic theories reigned supreme in the 1950s and 1960s, Marxists and Neo-Marxists theories have challenged the validity of those theories in developing countries.

In the 1970s economic experts like Mahabubul Haq (1976), V.M. Dandekar and N. Rath (1971), David Lehman (1974), R.S.McNamara (1972) and M.L. Dantwala (1973) in their studies of the late sixties and early seventies observed that whereas economic growth might be able to raise per capita income in developing countries it might not be accompanied by a reduction in poverty as well as of unemployment and underemployment. Rather the process of economic growth in third world countries has benefited relatively developed areas and better off people. In other words, the percolation of benefits of economic growth to backward areas and the poor people has not taken place or the percolation of the increased income to the poor who were largely resourceless and unskilled wage-earners was a thin trickle, if at all.

It may be recapitulated that the industrial revolution in England in the nineteenth century and its spread to continental Europe and the Americas paved the way for the emergence of conventional or received paradigms of modern development. The present day status of development of most of the countries in the world owes to the development strategies based on these paradigms, which they accepted and followed all these years. These strategies led to enormous possibilities of industrial production, of markets, of capital mobility, colonization of other countries and so on, resulting in spectacular growth in many countries, which are now known as' developed' or ' industrialized' countries. Several countries remained under the colonial rule of these developed European countries till the World War II, after which they became free from the clutch of colonial rule and institutions through a series of national freedom movements. With this, these countries saw the end of the empire and the rise of an era of independence and self-rule. However, even after independence, by and large, they also followed the received paradigms of development originated with the

industrial revolution, the basic focus of which was on 'growth at any cost'. This was mostly because of their colonial legacy and colonized minds. The state and the market were considered to be the two dominant institutions in the economy playing the development role. In fact, the forces of empire reemerged in these countries in the form of development, with a strong, but false promise, to bring prosperity to all. Development that occurred in these countries, however betrayed the common people and totally failed in keeping up the promises. The illusion created among the people that economic growth would bring progress, benefit the people and increase the wellbeing of all has disappeared. More than one billion people in the developing countries to day live in slums, 88 million go hungry, 27 million adults are slaves and 245 million children are forced to work. The 'Millennium Development Goals' agreed to Heads of State at the UN Millennium Summit in 2000 stand testimony to this. The increasing global inequality in the second half of the 20th century is obvious from the facts that the world's richest 1 % of people receive as much income as the poorest 57 %, the income of the world's richest 5% is 114 time that of the poorest 55 and the richest 10 % of the U.S. population has an income equal to that of the poorest 43 % of the world. There is evidence to believe that income inequality is increasing and is greater in the United States than in most European nations and Japan. As Franklin D. Roosevelt said in 1937, "The test of our progress is not whether we add more to the abundance of those who have much: it is whether we provide enough for those who have too little." The UN World Food Program (WFP) reports, the number of hungry people will pass 1 billion this year for the first time.

Most of the developed countries have now reached the peak of their material progress. The relentless pursuits of the developed as well as some of the developing socities to produce and consume maximum to satisfy its unending greed beyond limit have led to rapid resource depletion, making development unsustainable from ecological, environmental and resource point of view. This has landed them not in a world of peace, prosperity, happiness, but on a turbulent volcano of hatred, conflicts, disputes, ethnic and communal wars, distrust and dissatisfaction, tension and cross-country terrorism. Still we are bogged down to the received theories of economic development though we started taking earnest effort recently to consider the issue of sustainability from the natural resources and environmental or ecological point of view. We are not able to go beyond this. The concept of 'sustainability' is based on a narrow definition of ecological and environmental degradation. This is a total mistake being made by the scientific community and development personnel. There is nothing unusual or surprising in this. The modern education does not take man beyond material world and that which is not comprehensible to his five physical senses. Naturally, therefore, the concept of development he can conceive of also is confined to the production and consumption of material goods and services, the subject matter of 'Economics'. When the concept of development and the issue of its sustainability are approached and discussed within the narrow framework of theories of economic development, it is but natural that we miss the wood for the trees.

The drawback in the present concept is that the society, for whom the whole development is meant for, is completely ignored. It is necessary to internalize the issue of sustainability of human society within the models of sustainable development. Another drawback is that they also ignore the quality of growth itself, or the rapid depletion of human values. The erosion of human values and culture is much more dangerous than the erosion of soil or depletion of natural resource from the point of sustainable development, because human survival on earth is a pre-requisite for development (Pillai 2006).

4. Other Major Approaches to Development: A Review

In this section we make review of some other major approaches to development, namely structural approach, structural internationalist approach, target group approach, system approach, human development approach, integrated development approach, decentralized and participatory development approach and

micro finance approach.

Structural Approach

This approach is concerned with the relationships of people in the process of production. It places the ownership and control of resources at the center of relationships. The structures of social relationships and conflict – of the social classes – which are based upon differences in the ownership and control of resources by different groups of people, are critically important in studies of this kind, and may be seen as one of the major source of change (Harriss 1986:22). This approach emphasises the existing mode of production and power relations, structural, organizational and institutional factors, taking cognizance of the question of equity. This is a political-economic-historical and ideological approach and is inter-disciplinary. The great merit of this approach is that it gives accent on the question of equity. Institutional reforms including land reforms and credit reforms emanate from this approach.

One school of thought, which has some grounding in parts of Marx's writing, holds that it is of the very nature of capitalism to absorb or abolish other forms of production. Other scholars argue that there are often circumstances in which capitalism does not destroy other forms or modes of production, and they speak of the 'articulation' of capitalism with other modes of production, 'Articulation' here means rather more than simply 'linkage', and it implies that there is some intervention by the social practices of capitalism within those of the other mode or modes of production, and vice versa. Sometimes the relationship has been seen purely in functional terms – and the persistence of pre-capitalist forms has been explained in terms of the functional requirements of capitalism (such as the supply of cheap labour, of cheap raw materials). But there are serious logical and theoretical objections to this way of conceptualizing the relationship (see Bernstein 1986); and it should be seen rather in terms of processes of struggle between conflicting classes.

But this approach also considers exchange and the sales of inputs and marketing of products within the agrarian economy, and a strong historical theme is that of the 'commoditization' of production and of the incorporation of small-scale producers into markets (whereby instead of producing mainly for their own use or to satisfy the requirements of those with political authority, small producers begin to produce for exchange, and come to depend upon purchases for at least some of the things that they require). The process of commoditization and the development of capitalism, or the linking up of rural household producers with capitalist production in various ways is perhaps the dominant process of change in contemporary agrarian societies.

'Structural / historical' studies include Hill (1977) on Nigeria; Hopkins (1973) on West Africa in general; and Washbrook (1976, ch. 1) on South India, on Africa, Bundy (1979); Heyer, Roberts and Williams (eds.) (1981), Palme and Parsons (eds) (1977).

Structural Internationalist Approach

This approach emphasises upon international factors for the promotion of development. In recent years globalization has become a buzz world in the development discourse. Globalization implies opening and liberalizing trade in capital and technology and is emphasized as a strategy of development, even in the rural areas while we come across the concept of global village. This approach emphasizes the functioning of the market and positive gains from trade which may be shared by all sections of the society.

The limitation of this approach is that there are uneven initial distribution of resources, market imperfection, power asymmetry and uneven distribution of benefits of development. For the maximization of economic gains and welfare from trade this approach also results in ecological problems all over the globe, particularly in the developing countries. While orthodox trade theory demonstrates that the liberalization of trade is beneficial to all trading partners, the realities of the world economy belie this free trade ideal.

Target Group Approach

There are failures of trickle down effects in most developing countries though the orthodox theorists argue that there is no crisis in developing countries. The rate of growth has been respectable in these countries during the last two decades, especially by historical standards. Both the low and middle-income developing countries have achieved significant rates of growth. Viewed in historical perspective, these rates of growth for developing countries may be considered respectable and represent an improvement upon the economic stagnation that characterized the colonial periods. Nevertheless, they fall far short of the objectives of economic development as well as the aspirations and needs of the masses in developing countries. They have not made any serious dent on the problems of mass poverty, malnutrition, disease, illiteracy and lack of medical care. The basic problem is poverty which needs to be alleviated. The poor form the target group.

The target group is defined as a group of persons or households who constitute the target for poverty alleviation programme of the Government. The target group approach emphasises that the Government should take special measures for the alleviation of poverty of the target group people. This approach has developed on recognition of the fact that general economic development may bypass the poor and the benefits of economic growth may not percolate to the poverty stricken people. The great merit of the approach is that it involves direct attack on poverty. World Bank advocates this approach to rural development.

This approach assumes that there is no problem of implementation of measures for poverty alleviation. The limitation of this approach is that there is Government failure in implementation of poverty alleviation programmes. Another limitation of this approach is that there is lack of adequate planning of poverty alleviation programmes.

Systems Approach

Amongst the 'system' approaches we may include studies which emphasize environmental, technological and demographic factors and which seek to explain their inter-relationships within farming systems. A notable example of such an approach is Boserup's *The Conditions of Agricultural Growth* (1965) which presents the bold thesis that increasing population density explains the development of increasingly intensive systems of cultivation, involving also changes in technology and in social institutions. This has been found to be a powerful model, even though it was originally built up on the basis of quite flimsy evidence, and it has influenced a good deal of subsequent research. In a modest way, for example, Chambers and Harriss (1977) sought to explain variations between villages in a small region of South India in terms of the inter-relations of environment (especially the availability of irrigation water) and ?population density, and found creation fairly distinct patterns of variation of wage rates, labour relationships and rural livelihoods that could be related to the basic dynamic of environment and population. Geertz argues that the physical conditions of Java have allowed production to be increased so as to keep pace with the rapidly growing population, though at constant levels of output per head. This has required the use of more and more labour-intensive cultivation practices and also some 'sharing of poverty' – as in the sharing out of access to land or of opportunities for wage work. He describes this whole pattern as one of 'involution' – in the sense that there has been increasing elaboration of existing social and economic structures – in contrast with the kind of transformation of older structures, and increasing inequality, which has occurred in pars of the Outer Island.

Kjekshus has developed the ecological / demographic approach with reference to East Africa (Kjekshus, 1977); while the relationships of environment, technology and population have long interested geographers, and some of the best geographical writing seeks to explain agrarian change in terms of the relationships of the natural environment of the natural environment and economic and social factors.

'Systems' approaches include those concentrating on socio-technical systems, or on the social systems

of agrarian communities, and which imply a form of holistic analysis.

Djurfeldt and Lindberg (1975) describe land-use problems in South India. In Africa, studies of the Sahel draw out the theme of the relationships between forms of ownership and environmental damage (Meillassoux 1974).

This approach emphasizes upon factors like environment, technology and demography It is basically techno-environmental demographic approach. In this approach the question of sustainable development is important. But the limitation of this approach is that the question of equity remains unanswered in this approach.

Integrated Development Approach

It is a holistic approach that emphasizesupon sectoral, sectional and environmental integration of the economy and the society. It also aims at bringing an integration among government, research ,academic and training institutions and the common people. It emphaises upon the need of people's cooperation and the appropriate application of science and technology. This would make possible the optimum utilization of available local resources. This calls for creation of an appropriate institution. Vertical integration for achieving coordination among central, state and local governments is also its aim. The great merit of this approach is that it emphasizes sectoral, sectional and environmental, political and technological development in the rural areas and thus the overall development of the rural society.

The limitation of this approach is that the questions of efficiency and equity remain to be addressed. This approach has won currency in recent years.

Participatory Decentralised Planning and Participatory Development Approach

It gives accent on accelerated development of rural and urban areas based on people's participation in the development process. Inspired by the revolutionary work of Paulo Freire (1968), participatory process have been 'in vogue' in the development discourse since the seventies and the literature on the subject has grown dramatically since. The concept is firmly established in the social, developmental and political lexicon of our time. Used enthusiastically by academics, social workers, aid agencies and politicians alike, and applied to a number of public issues since the nineties, participation has evolved into a panacea for a range of human maladies by ostensibly allowing development processes to become more inclusive, more transparent, more equitable, and more responsible. The interest of national governments and multilateral institutions such as the World Bank and the United Nations agencies in applying the concept is telling, and vouches for its mass appeal despite the fact that this attention has also given rise to claims that such agencies have 'de-politicized' participation. Even though discourse on participation has been generally positive in mainstream analysis, the rapid proliferation of the term and its myriad applications have sparked a great deal of debate and controversy and served as an impetus for more critical analyses of the concept in recent times. Despite the lack of consensus on the importance of, and a conceptual framework for, participation it has remained a key theme in development dialogue for the last few decades.

According to John Kurian (1997) participatory development, its emergence and evolution have been a movement of development debate from its focus on goods and services to highlight the prime role that public participation plays in the process. Participation has been added as a fresh ingredient of development. A sharp sense of distrust and skepticism about the all top down process of development, particularly that by the State has been the common thread with this new approach to development. It also hardly spares the bureaucracy, which is being viewed with strong suspicion, and western knowledgeand technology. Truly it is a strategy working through non-government organizations or micro level interventions to empower people, which is expected to effect a macro change in the economy (Muraleedharan 2006). Sen (1989) in this context

has rightly observed that public action and popular participation has pressured the State and the interest which dominated it to provide facilities which contributed to a reasonable level of well being for the people and the opportunities for advancement.

It may be recalled that development, according to traditional economic theories, emerged after the industrial revolution and was reckoned as mere growth of income or Gross Domestic Product of the country. The debate remained to be one about 'growth' versus 'non-growth'. The argument was that growth is imperative for the alleviation of poverty and the well-being of the society. When the countries under colonial rule became independent, they also took it for granted that the post-industrial revolution development model would ensure growth of their economies and that all sections of the people would benefit out of such a growth. More than half a decade of experiment with these development paradigms in these countries, however, did not guarantee any promising future for the vast majority of their people. Moreover, in the present context, the developed societies globalization agenda is directed towards securing and serving the needs of the ruling elites, at the cost of well-being of the common mass. The elite globalization has created an unstable and ultimately self-destructive system We forget to realize that" the more globalized the economy, the greater the level of system interdependence and the greater is the inherent instability" and that " the more powerful, centralized and interdependent a society's technologies, the more vulnerable it becomes to terrorist acts" (*Global Civil Society: The Path Ahed*). The development discontent in these developing countries precipitated during these decades and a search for alternative development paradigms and strategies for development received top priority among the politicians, academics and policy makers. 'Participatory Development' is the most vehemently suggested alternative paradigm.

The participatory decentralized planning approach gives adequate emphasis on efficiency in utilization of resources and also equity in distribution of gains from economic growth. There are, however, several issues to be addressed in this approach, namely level and pattern of people's participation, planning unit, database, finance, integration and co-ordination in planning and also the issue of impact assessment. There is also the limitation of this approach in the form of 'community failure' (Bardhan 2002), i.e, failure of the community (Gram Sansad, Gram Sabha etc.) in arriving at proper decision making in respect of selection of beneficiaries.

Micro-Finance / Self-Help Group Approach

This approach emphasizes upon self-development of families, particularly poor families and thus their poverty alleviation. The role of micro credit in the eradication of poverty was stressed by the United Nations in agreed conclusions 1997/1 adopted by the Economic and Social Council on 25th July 1997, in which the Council called for strengthening the institutions supportive of micro-credit and recognized the importance of access of micro credit of people living in poverty to enable them to undertake micro enterprises to generate self-employment and to contribute to achieving empowerment, specially women. Micro-finance through SHFs for the poor and women has received extensive recognition as a strategy for poverty reduction and economic development. In this approach Government, panchayat and municipality and non-government organization play the role of facilitator and thus the role of the state in poverty alleviation is minimized. It emphasizes upon holisticism to achieve rural development and poverty alleviation. But the limitation of this approach is that the questions of market power, particularly of oligopoly market and uneven power relations and human development are ignored in this approach

4. Conclusions

Various approaches to development have been developed based on a variety of assumptions. Relevance of these approaches to overall development of a country or a region depends on socio-economic conditions of a developing country. Economic growth is the dominant approach to development and it is justified. But the questions are: By whom? For whom? Of whom? By 'growth of whom' we mean growth output/benefits belong to whom? In other words, it means growth of whose resources? All these questions are tricky for which no readymade answers are available or relying on growth alone these questions can not be answered. Every country and every region, according to their socio-economic context, would develop and engineer its growth process and pattern according to its social engineering. For this to attain, along with economic development paradigm decentralized and participatory development paradigm with accent on both man and ecology is essential. This again would be meaninglessunless people are entitled and empowered and made capable of performing the development role. The role of education (both quantity and level) and role of health care as well as role of institutional reforms in the form of land reforms and credit reforms are essential and for this to be realized the role of the truly democratic, federal and strong government is indispensable, particularly in the context of elite and aggressive globalisation. The local institutions are important but those are to be so fashioned that the march to a modern democratic and egalitarian society is facilitated, rather than impeded by them. The decentralization and participatory development are important but the degree of devolution of resources and powers to the local bodies has to be so determined that the process of social transformation is completed without retrogressions. The local bodies need not be an instrument for weakening the State structure for the pursuit of some "communitarian" objective but should be a means of strengthening the democratic state as a whole, of which these local institutions are also a part, through whose intervention alone can the task of social transformation be carried out in a country like India. The strengthened State structure must have the dual task of both overcoming millennia-old oppression and exploitation within the country, and resisting the hegemony of imperialism in order to preserve freedom of the country (Patnaik 2009). Besides, we need not only development or sustainable development in the conventional sense, but also 'Holistic Development' with an essential 'Spiritual' component, which addresses, along with others, the problem of depletion of human qualities, the goodness or virtues in human being (Pillai 2006).

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District Planning in West Bengal*

Buddhadeb Ghosh**

The concepts of panchayat/municipal plans and district plans are now not merely ideas, but something that has to be put into practice. Unfortunately, practice falls short of expectations. The case study of West Bengal presented in this paper shows that all is not well in the state in respect of local planning. A modest attempt has been made in this paper to indicate a broad framework of reform that may be of relevance to West Bengal as well as to other states.

Past experience

The first attempt to introduce decentralized planning in West Bengal was made in 1985[1]. The objective of this initiative was integration and convergence of the development schemes being implemented at the district and sub-district levels by the various line departments of the state government and the panchayati raj bodies. In order to make this planning exercise participative, the elected representatives of the PRIs were involved in a significant manner. District planning committees (DPC) and Block planning committees (BPC) were set up – each headed by the chairperson of the zilla parishad and the intermediate panchayat respectively. Besides, the chairpersons of standing committees of the two levels of panchayats were made members of the planning committees at the appropriate levels, apart from the relevant officials of the line departments.

The district plan documents prepared by the DPCs contained scheme-wise distribution of outlays of individual departments together with physical targets of such schemes. The disaggregated outlays and physical targets of a district constituted the Block plans. In fact the Block plans were building blocks of district plans. There were separate plans for individual municipalities. Thus a system was introduced under which a district plan and plans of the individual Blocks and municipalities would be prepared every year. It was basically an exercise in systematizing the investments under the on-going centrally sponsored or state government schemes. Some untied funds used to be given to each DPC, but the quantity of such fund was very small. The strong points in favour of the experiment were as follows.

- It was one of the pioneering attempts in the country in translating the concepts of district and Block plans into practice.
- It could bring some kind of transparency in the functioning of different line departments who are traditionally used to work in isolated manner.
- It provided a scope to bring about inter-departmental coordination and inter-sectoral convergence at the implementation level.
- The involvement of PRIs in plan preparation facilitated participation of people's representatives in the decision making, particularly in respect of priority fixation and reviewing the functioning of the line

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departments and in bringing coordination between different plan implementing agencies.

Problems of the 1985 model of decentralized planning

The expectations raised over the experiment, however, remained unfulfilled and very soon it turned into a ritual having no practical utility. After 5 or 6 years even this ritual ceased to be performed in most districts. By early 1990s the experiment folded up. It is instructive to make an evaluation of this pioneering experiment in holistic district and Block planning.

There were some laudable features of the 1985 model of decentralized planning. First, it was a convenient entry point for achieving inter-departmental coordination in implementation of development programmes. It was also a powerful tool for achieving convergence of schemes of different implementing agencies for realizing the common goals of development. Secondly, it had the potential of bringing some transparency in the functioning of different implementing agencies. Last but notleast, it gave an opportunity to the PRIs to gain experience in preparing holistic plans for their areas.

As against these favourable aspects, the whole experiment had certain glaring deficiencies. First, the quantum of untied funds at the disposal of the local bodies was insignificant restricting the options available to them to address the urgent local needs in the plans. As a result, the plans became an exercise in merely disaggregating allocations made for the district against different schemes of the state or central government. There was little scope for local level innovations. Secondly, since the local bodies were functioning under severe restrictions of schematic funding regime, they failed to produce district visions of development. Third, the gram panchayats were excluded from the planning process, their role being limited to produce only 'need statements'. Since there was no plan below the block plan, the scope for common peoples' participation in planning also got severely restricted. This was one of the major reasons for turning the whole exercise into a kind of bureaucratic exercise. Lastly, the mechanism was not developed by which block and district plans could become plans of action of the respective implementing agencies. As a result, planning became an end in itself, not an aid to action.

Present scenario

After the discontinuance of the 1985 model and until recently, no serious attempts were made to introduce panchayat planning or district planning in West Bengal. Presently two types of initiatives are in progress in the state in respect of decentralized planning. .

Gram Panchayat Planning:

Under the DFID assisted 'Strengthening Rural Decentralization' (SRD) programme, a system of bottom-up process of gram panchayat planning had been introduced in 2006-07 in selected gram panchayats. Presently this system is in operation in about 921 gram panchayats. (There are a little more than 3300 GPs in the state). Under this system each ward of a gram panchayat (known as gram sansad) prepares a plan after holding discussions with common people at the levels of neighourhoods. In order to enable the gram sansads (ward level gram sabhas) to prepare plans, each gram sansad elects its executive committee known as gram unnayan samiti. The gram unnayan samiti (Village development committee) prepares the draft plan after collecting necessary data about the households and the state of various public services and after holding consultations with people in neighbourhood meetings. The draft plan is then approved by the gram sansad. Based on such sansad plans, gram panchayat prepares its own plan. A very intensive programme of capacity building of and hand-holding support to the gram unnayan samiti members and gram panchayat members have been taken up by the Panchayat and Rural Development Department of the state government. Besides, some untied funds are given to each gram sansad to choose their own development projects independent of the gram panchayat. Detailed methodology of participatory village level planning process has been developed to help

the gram unnayan samitis and gram panchayats to prepare gram sansad based gram panchayat plans.

District Planning:

At the district level, DPCs have been preparing district plans. As per Planning commission guidelines, a 5 year plan was prepared for each district covering 11th 5-year plan period and thereafter the annual plans of districts are prepared every year. However there is no system of plan preparation at the levels of any tier of panchayats, except the select gram panchayats under the SRD project, as mentioned above. The annual district plan is presented in the following manner.

1. The plan investments are shown first against 11 major heads specified by the planning commission (such as agriculture and allied activities, rural development etc) and then disaggregated into minor heads under each major heads (such as crop husbandry, horticulture, soil conservation, animal husbandry, dairy development etc under the major head agriculture and allied activities.).
2. The above statement is followed by 5 other statements – each indicating funds proposed to be spent by the line departments, urban local bodies and three-tier panchayat bodies (GP, PS and ZP). In these statements proposed financial allocations are shown against specific schemes/activities (such as farm mechanization, cotton development mission etc) falling under the minor head (such as crop husbandry) of a major head (such as agriculture and allied activities).

Before we go into the review of the features of district planning of the state, it will be appropriate to investigate as to how West Bengal has tackled some problems embedded in the constitutional provisions on district plan (Article 243 ZD).

The constitution has not clarified the nature of the district plan, as a result of which there are confusions about its role and its features[2]. For example, it is not clear whether the district plan is only local sector plan in the sense that it presents in a consolidated form the plans of the rural and urban local bodies in the district prepared within the limits of the available financial and other resources. Or, whether in addition to the plans of the rural and urban local bodies, the district plan should also take care of the state sector activities within the district by including the plans for the activities being discharged by the line departments of the state government.

Another set of confusion relates to the role of the DPC as regards its own contribution in the planning process, apart from the task of consolidation. It has to be remembered that the DPC is not an implementing agency. It cannot implement any part of the district plan. In this context, DPC can earn its legitimacy in the eyes of the implementing agencies, if it can take care of some problems or issues concerning the development of the district, which cannot be addressed properly at the individual levels of any other agency. In that case, its task goes beyond the consolidation of the plans of the implementing agencies of the district, including those of the rural and urban local bodies. It will then have an important role to play in providing a framework and also in ensuring revision of the sub-district plans, so that the concerns not addressed in such plans are taken care of. The Constitution has identified 'matters of common interest between panchayats and municipalities' as one item that falls within the category of such problem or issue on which DPC has the right to intervene. Are there other problems/issues, which also should be addressed by the DPC in its district planning process?

As regards the first question about the nature of the district plan, West Bengal seems to have visualized it as a document that consolidates the local sector and state sector plans within a district. The schemes executed by the line departments are supposed to be divided in two parts, namely district sector schemes and state sector schemes. Among these two types of schemes of the line departments, the district plan has to include only the district sector schemes. Thus, ideally the district plans of West Bengal should present the

consolidated plans of the gram panchayats, panchayat samitis, zilla parishads, municipalities and the activities related to the district sector schemes executed by the various line departments of the state government[3].

As regards the other question about identification of the fields of 'value addition' to district plans by the DPC, West Bengal seems to have left it unanswered. It is difficult to discern from the existing district plan documents how the constitutional requirement of addressing the 'matters of common interest between panchayats and municipalities' has been fulfilled by the DPC There is no evidence also that the DPC has addressed some other issues to ensure coordinated approach to the plans of the local bodies and line departments for meeting the district's urgent developmental problems. It is true that DPCs develop development vision documents of the individual districts. But, as we shall see later, these documents hardly present coherent frameworks within which planning at the departmental or sub-district levels can be done. In sum, no hard thinking seems to have been made on the question of enabling DPCs to add value to the district planning exercise, except consolidating the plans of the local bodies and the line departments.

Deficiencies of district planning exercises

Even a cursory glance at the district plans of West Bengal would reveal several deficiencies, which may be summarized as follows.

- According to the constitution, the district plan prepared by the DPC is a draft plan. Accordingly, DPCs also submit their plans to the state government through the State Planning Board (SPB). But a system has not yet developed under which these plans will be considered by the SPB on a routine basis and then approved with or without modification. As a result, the status of the plans prepared by the DPCs is not known. There is no clear evidence that the annual plans of the districts form the basis of preparation of state's annual plans. It is quite possible that the state would prepare its own annual plan before the district plans are prepared.
- Coordination between different development agencies and convergence of various activities/projects performed or implemented by them have remained a constant prblem of development administration at the district and sub-district levels. District planning process provides a unique opportunity to address this problem. But it seems that this opportunity has not been properly utilized. There are reasons to believe that the district plan has become a ritual to be performed by the DPC, the task of implementing agencies being limited to the supply of data to the DPC in specified formats. It does not seem to be the case that the district plan is owned by the individual implementing agencies. As such, the annual plans of DPCs remain just paper plans, and are not used as guides to action.
- According to the Planning Commission guidelines, each district should prepare a vision statement after taking stock of the ground realities in respect of different development sectors. Following the guidelines, each district prepared a vision statement as well as a 5 year plan of the district at the beginning of the 11th plan in 2007. Neither the vision statement nor the 5 year plan has been a reference point for subsequent planning activities of the local bodies or others in the district. For, vision statement is written in a vague manner. There is no indication as to how this envisioning process has been done. Between one district and another there is hardly any difference in vision statement. There is no analysis of special problems of a district, or opportunity that exists in particular areas of the district which can be exploited. A vision statement should prioritize the goals of development, identify the problems in achieving them after taking stock of the present situation and then envision the mileposts to be achieved within a definite time period. This is not to be found in the vision statements of the district plans. There is also no evidence as to whether such statements were prepared after due consultation with different

panchayati raj bodies and the municipalities.

- West Bengal's district plan documents suffer from some inter-related deficiencies. There is no clarity on the specific goals of development that are to be pursued. Hence, strategies of development to be adopted for achieving the goals are not worked out. Inter and intra-sectoral convergence could have been one of the important development strategies. These objectives are not pursued. In the absence of the goals and the development strategies in respect of different goals, there is no evidence to fix targets of outputs and outcome. Since such targets are not there, there is also no necessity to indicate outputs from each individual item of plan expenditure. All this combines together to make the plan somewhat directionless.
- The constitutional vision is that the panchayat and municipal level plans will form the building blocks of the draft development plan of the district. In West Bengal, district planning process began without corresponding introduction of panchayat planning. As mentioned, participatory planning process is in progress in 921 selected gram panchayats under a DFID assisted programme. Even though the gram panchayats under this project are preparing plans, in the absence of the panchayat samiti and zilla parishad level planning, there is no linkage between these plans and the district plan. In other gram panchayats or for that matter in all the intermediate and district panchayats, there is no attempt to prepare plans that could take a holistic view of development in their respective areas. It was only in April 2009 that the state government issued instructions to all the panchayats of all the tiers to introduce planning. Along with this instruction, a guideline for formulating plans at the panchayat level has been issued[4]. In this guideline an attempt has been made for the first time to develop an integrated planning process at all the level of panchayts and then to link these plans with the district plan. This order has been issued only a few months ago and it is too early to comment on its effect.
- District planning needs technical inputs, including human resources and hardware support for collection and processing of both quantitative and qualitative data. This means that the DPC should have a technical secretariat attached to it. At present there is none. There is the lone district planning officer functioning practically without any technical support. If the district planning is taken as a serious business, it would be necessary to plan for the organization of the DPC.

A framework for reform

The West Bengal experience shows that the DPC in the present form is not serving any useful purpose[5]. District planning appears to be a ritualistic exercise having little practical value. That is the experience of most states of the country as well.

On the other hand, the very logic behind creating a separate constitutional authority 'independent of the structures of governance for undertaking the exercise of development planning' has been questioned by the Second Administrative Reforms Commission (ARC). Accordingly the ARC has recommended district tier of local government representing both rural and urban people of a district and abolition of the independent status of the DPC. This was the recommendation of the National Advisory Council also. If the Constitution is amended to give shape to the district tier of local government having jurisdiction over both the rural and urban areas of the district, district planning exercise may be taken up by that government. If need is felt for a DPC-like body, it can serve under the district government.

Whatever institutional reform takes place in future, the district planning exercises will have to be continued in order to coordinate and review and to give a definite direction to the development activities of the local bodies and other implementing agencies in the district. It would accordingly be necessary to develop, within the existing institutional arrangements, methods for preparing district plan, which work and

also add value to the process of local level development planning. In that context, an attempt is made, in the remaining part of this paper, to discuss some broad issues relevant for the development of such a method not only for West Bengal, but also for other states.

Contents of the district plan:

Even though PRIs of West Bengal handle substantial amount of schematic funds, the status of devolution to these bodies is not satisfactory. As a result, the line departments are retaining many activities and implementing many schemes which should have been devolved to the local bodies. These are particularly those schemes or activities the impact of which remains confined within the local area. Such schemes are called district sector schemes. Such activities/schemes qualify for being devolved to the local bodies.

Even if such activities/schemes are not devolved, they should come under the purview of district planning. Even though West Bengal has accepted this in principle, procedures have not been developed to put this into practice, resulting in lack of convergence between schemes and activities of different implementing agencies. Workable procedures will have to be developed to put the principle in practice.

Planning units within a district:

District planning is not a one-way exercise. Plans of the local bodies and those of the line departments in respect of the district sector activities/schemes are the building blocks of the district plan. Hence there would be large number of planning and implementing units within a district – all the gram panchayats, intermediate panchayats, zilla parishad, municipalities, various line departments and parastatals like DRDA or FFDA. Planning process has to be started in all these units, particularly in the rural and urban local bodies. It has to be remembered that without corresponding panchayat and municipal planning, the stand-alone exercise of district planning will not be successful. District planning is the culminating point of decentralized planning process. The district planning process cannot sustain itself without corresponding planning activities in other planning and implementing units.

Nature of the district plan

There can be two types of plan – one in the nature of indicative plan and the other in the nature of action plan. Generally, the medium-term (5 years) plans and long term (15-20 years) plans are indicative plans and annual plans are action plans. According to the planning commission guidelines, the medium or long term plan preparation for the district shall be a major responsibility of the DPC[6]. They will contain statements on the development vision for the district, strategy for achieving the vision within a time frame, location and sector/sub-sector wise broad programmes of development (not specific schemes) to be pursued in the medium or long term after making an assessment of the availability of financial or other resources. Policies to be pursued on matters of common interest between the rural and urban areas and any other crucial issue relevant for the development of the district will be laid down in the above statements.

The annual plans, on the other hand, will contain lists of specific schemes to be implemented or activities to be performed under different sectors/sub-sectors in one year. Such plans will be prepared by the respective planning and/or implementing agencies within the framework of development vision and development strategy developed by DPC through participatory process. Major task of DPC in respect of annual district plans would be to consolidate the plans of all the planning and/or implementing agencies and to ensure that such plans are in tune with the development vision of the district.

Decentralized planning process

The constitutional mandate has created a multi-level planning process within a district. Under this arrangement, planning exercises are to be conducted by different agencies. Plans would be prepared by the municipalities and the panchayats at different levels. But these plans should not be stand-alone plans. There

is need for integration. Hence, plans made by the GPs have to be integrated in the plans of the intermediate panchayats and plans made by the latter require to be integrated in the plan of ZP. Methods of doing this have to be evolved.

Apart from the panchayats, there are numerous line departments operating at the district and sub-district levels. There may be several municipal bodies within a district, making plans for delivery of various urban services. The projects and programmes of the line departments need to be integrated with those of the rural and urban local bodies. The Constitution envisages that such integration will be done through district plan. Not much thought has yet been given to evolve an effective mechanism for making such integration possible. It is only through integration of plans and programmes of different planning and/ or implementing agencies that the district plan would acquire the character of a 'plan' and not just a catalogue of schemes/ activities having no inter-connections between them.

It is in the preparation of district plans that all the planning and/ or implementing agencies get the opportunity to work jointly. Districts are large and, hence, to make the district plans workable and realistic, it is necessary to prepare such holistic plans at the Block level also. Like district plan, the Block plan will integrate the plans of the GPs and intermediate panchayat with the development schemes and prgrammes executed by the line departments within the Block area. The idea of the Block plan was embedded in West

Bengal's 1985 model of district planning. This idea needs to be revived to make the district plan a workable document.

Development sectors

It is useful to conceive development vision first in terms of sectors and then to ensure convergence of the sectoral visions into a holistic vision aimed at expanding capabilities of people. Taking major national goals of development into consideration, the development sectors to be addressed by the district plan and other local plans may be as follows.

- Education
- Health care
- Women and child development
- Social security and food security
- Infrastructure
- Farm sector improvement and employment generation
- Non-farm sector improvement and employment generation
- Environmental improvement

Each such sector may have several sub-sectors. The national Planning Commission has an eleven-fold classification. The above sectors may be accommodated within that classification.

Technical support for planning

Planning at the district and sub-district levels must integrate people's perceptions about local problems and local needs with the demands of optimizing utilization of scarce resources for reaching agreed development goals within a time-frame. Without technical support it will not be possible for the local government representatives or members of the DPC to prepare such plans.

At the level of DPC, there has to be a secretariat staffed by a group of technical and administrative personnel. This group should be an inter-disciplinary group of professionals. Similarly, at the level of intermediate panchayat or at the Block level, there should be a team of professionals for plan preparation. This team may be constituted with the personnel drawn from the Block and the line departments. If possible, there may be a permanent Block Planning Officer.

In the states where gram panchayats are strong, as in West Bengal, a team may be constituted with GP officials and other government officers working in the gram panchayat area. Wherethis is not possible, the technical team at the Block level or intermediate panchayat level will help the GPs in preparing their plans.

Working groups

At the district level, sectoral working groups may be formed with members of DPC and district level line department officials. There may be 3 or 4 working groups to address the planning issues of 8 sectors mentioned above. The technical secretariat of DPC will interact with the working groups for preparing plans or monitoring implementation.

Monitoring

Planning is not an end in itself. Unless plans are implemented, they have no value. Accordingly, plan implementation should be monitored closely both at the district level and at the Block level.

Concluding remarks

With constitutional mandate behind them, the concepts of panchayat/municipal plans and district plans are now not merely ideas, but something that has to be put into practice. Unfortunately, practice falls short of expectations. The case study of West Bengal presented in this paper shows that all is not well in the state in respect of local planning. With the existence of a strong panchayati raj system, it should, however, not be difficult to fulfil the constitutional obligations of introducing effectively the local planning process in this state. In this context, a modest attempt has been made in this paper to indicate a broad framework of reform that may be of relevance to West Bengal as well as to other states.

Notes and References

[1] On this, see Arun Ghosh, "Decentralized Planning: West Bengal experience", *Economic and Political Weekly*, 26 March, 1988 and Asim Dasgupta, "Panchayati Raj and decentralised planning in West Bengal" in Malcom Adisheshaiya et al. , *Decentralised Planning and Panchayati Raj,* ISS and Concept, New Delhi, 1999.

[2] The Second Administrative Reforms Commission (ARC) also observed that there were confusions regarding the provisions of Article 243 ZD of the Constitution. See 6th Report of the ARC on Local governance.

[3] Conceptually the district sector schemes should be those, which are implemented within the district and the benefits of which remain confined within the district. Even though the line departments of the state government were asked to identify such schemes and share the information with the DPCs, till now the exercise remains incomplete. The 3rd State Finance Commission reports that no DPC has such list of schemes. Even the Commission could not get the information from the departments (See 3rd SFC report, P 131). Thus, the concept of dividing the line department schemes in district sector and state sector schemes still remains on paper.

[4] See the order bearing no 2634/RD/O/DPF/1E-1/2008 dated 16.4.2009 of the Panchayat and Rural development department, Government of west Bengal.

[5] The 3rd State Finance Commission of West Bengal also observed: 'DPCs in West Bengal have failed in the mandatory responsibility of preparing district plans scientifically. A disparate set of schemes stitched together without proper integration have been put into volumes and labeled .. as district plans in all the districts'. See the Commission report P 131.

[6] See *Manual for integrated District Planning,* Planning Commission, Government of India, 2008

Growth, Break and Instability : Towards A Unified Methodology

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In any economic time series, growth and its breaks in different policy regimes, and fluctuations around the growth path constitute the deterministic parts of its variation over time. Although the methodology for evaluating the deterministic growth of a time series is well established, those for determining breaks and fluctuations around the growth path are based on seemingly different aspects of breaks and fluctuations, and so are diverse in nature. This article tries to develop a unified methodology in these three aspects for any time series.

1. Introduction

Growth (or trend) and instability (or fluctuation) have been two common elements of economic time series probably from the introduction of the concept of time series in economics. Where growth (or trend) in macroeconomic series of production, income or expenditure occurs mainly from the economic policies pursued by the government or by the planning authority, instability (or fluctuation) is mainly the result of inherent cyclical behaviour of the individuals in a market-based economy. Break in trend (or growth) results from changes in policy regimes and thus it has also now been treated as a common element in long-run economic (especially macroeconomic) series. The methodology used in the existing literature for estimating the rate of growth in a time series is well established but the methodologies used in the estimation of fluctuation or of break in the growth path are not so established and are needed to be modified and tuned. This article seeks to serve that purpose and to illustrate the methodologies developed in terms of some macroeconomic data from the Indian economy.

2. The Methodology

Growth of a time series Y_t is usually estimated by the semi-log-linear regression $\ln Y_t = a + bt$ with b as the assumedly constant rate of exponential growth (ln stands for natural logarithm). On the other hand, instability is frequently interpreted in terms of average fluctuation around the trend line measured by the deviations of observed values from the estimated values in the regression mentioned above and are denoted

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by e^{A} relative (relative to average log value of Y_t average measure of absolute fluctuation is normally obtained by

$\sqrt{\frac{1}{T}\sum_{t=1}^{T} e_t^{\,2}} \Big/ \overline{\ln Y_t}$ For interpretational convenience it is expressed in percentage terms.

Under the assumption of constant rate of growth and with the above measure of instability, the latter is constituted by variability of growth, cyclical fluctuations, irregular fluctuations including spikes due to sudden and massive changes, breaks in growth paths due to policy changes and all sorts of other disturbances in Y_t If the period under consideration consists of more than one policy regime it has become conventional to fit a kink linear trend line for $\ln Y_t$ with kinks at the points of policy changes. (For the pioneering work in this area Boyce [1987] may be consulted.) Fluctuations are then constituted by other elements mentioned above.

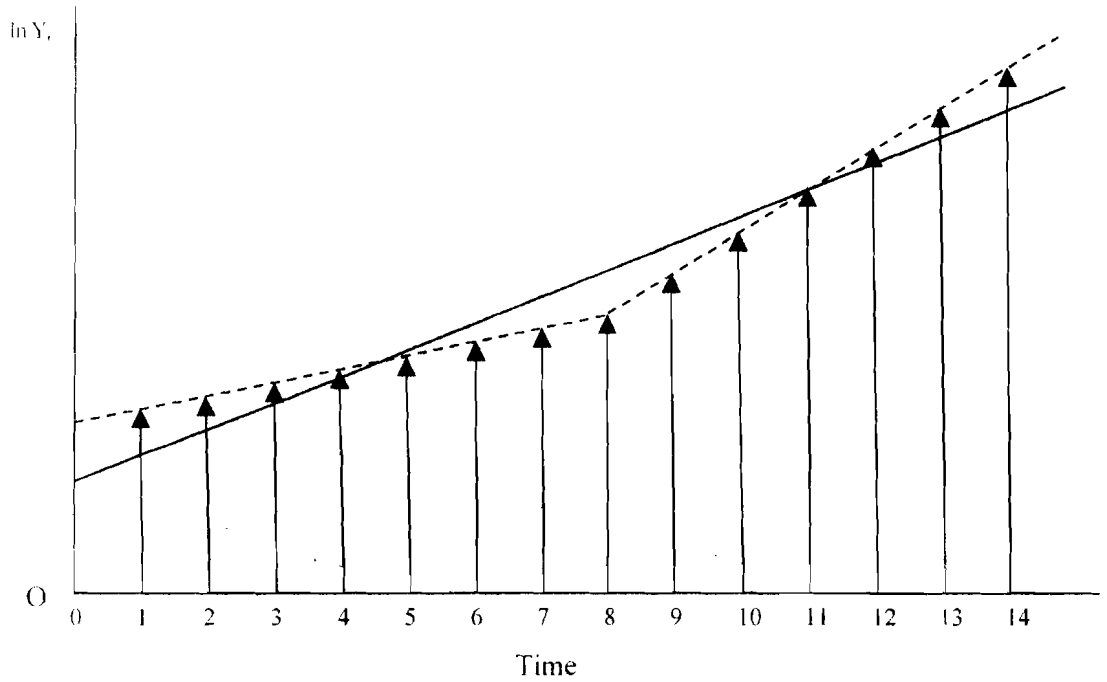
Growth and its variations in different policy regimes, and fluctuations around the growth path constitute variation in Y_t observed over time. If this variation in Y_t is caused by k explanatory variables $X_{1t}, X_{2t}, X_{3t}, \ldots\ldots, X_{kt}$ then some of the variables may be growth stimulating and some other may be fluctuation generating; some of them may be growth stimulating as well as fluctuation generating, some of them may be growth stimulating but fluctuation reducing and some of them may be fluctuation generating but growth reducing.

Breaks or kinks in growth path are also sources of variation in Y_t. Breaks or kinks may occur for changes in policy regimes. If there exist some breaks or kinks in the growth path but are ignored and a constant growth is estimated, growth rates will be underestimated for some regimes and overestimated for others, and fluctuation will be unduly large. Decomposition of the explanatory variables in the categories mentioned above will not also be appropriate. This is illustrated in diagram-1. Observed values of in Y_t for different t = 1, 2, 3, ..., 14 are shown with the help of vertical arrows. The series consists of two policy regimes: the first regime consists of the period 1 to 7 and the second regime consists of the period 8 to 14. Growth rates, though constant in each regime, are different in these two regimes, and create a kink or a break in the growth path at t = 8.

As the dashed path with a kink at T = 8 shows, there is no fluctuation from the trend in both the regimes. But if the kink or the break is ignored and a single linear line is estimated it would be like that shown by the solid straight line. The estimated growth will be an average of the two true growth rates. Observed values would fluctuate around the trend line, though these are not true fluctuations. Therefore, if the series consists of more than one policy regimes, for estimating growths and fluctuations from the series methodologies should be developed with special care as are discussed below.

Diagram-1

The relevance of kink linear regression-I



2.a. Growth:

As mentioned earlier, growth of a time series in Y_t is usually estimated by the following semi-log-linear regression line if there exist strong reason to assume a constant rate of growth throughout the period

$$\ln Y_t = a + bt \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1).$$

Here b represents constant exponential growth rate. If the period under consideration consists of more than one policy regime it has become conventional to fit a kink linear trend line for $\ln Y_t$ with kinks at the points of policy changes. This is done under the assumption that policy changes create a change in the growth path and thereby create a kink at the point of policy change. Many empirical works use separate regressions for different sub-periods. Many of them use single regression with dummies for different sub-periods without any restriction for kink and the rest use kink linear regression. The problem with separate regression for different sub-periods or single regression with dummies for different sub-periods without any restriction for kink is that the estimated value of the dependent variable becomes different for the same year because of the discontinuities in the estimated regression lines.

For example, consider the time series Y_t with $t = 1, 2, 3, \ldots, T$ and also consider that it consists of two

policy regimes t = 1, 2, 3, ..., k-1 and t = k, k+1, k+2, ..., T with policy changing at t = k. For such a series many empirical works, to analyse the pattern of growth and fluctuation, fit separate regression for two sub-periods or single regression with dummies in the following form

$$\ln Y_t = a + b_1 D_1 t + a_2 D_2 + b_2 D_2 t \ldots \ldots \quad \ldots \quad \ldots \quad (2),$$

$$\text{or } \ln Y_t = a + b_1 t + a_2 D_2 + b_2' D_2 t \ldots \ldots \quad \ldots \quad \ldots \quad (3).$$

Here D_1 is the dummy variable for the first sub-period that takes values 1 for t = 1, 2, 3, ..., k-1 and 0 for t = k, k+1, k+2, ..., T and D_2 is the dummy variable for the second sub-period that takes values) for t = 1,2,3, ..., k-1 and 1 for t = k, k + 1, k + 2, ... , t. In the first sub- period, where $D_1 = 1$ and $D_2 = 0$, both of these equations give $\ln Y_t = (a + a_2) + b_2 t$ indicating that b_2 is the exponential rate of growth in the first sub-period. In the second sub-period, where $D_1 = 0$ and $D_2 = 1$, the first equation gives in $Y_t = (a + a_2) + b_2 t$ indicating that b_2 is the exponential rate of growth in the second sub-period and the second equation gives $\ln Y_t = (a + a_2) + (b_1 + b_2')t$ indicating that b_2' is the difference in the exponential rate of growth in the second sub-period over the first sub-period. However, both these equations give identical estimates of the exponential rate of growth. That is, $b_1 + b_2'$ is equal to b_2 Thus the first model helps us estimate the growth rates in two sub-periods separately and test whether they are significant or not, whereas the second model helps us estimate, in addition to the growth rate in the first sub-period, the difference in the growth rate in the second sub-period over the first sub-period and test whether this difference is significant or not.

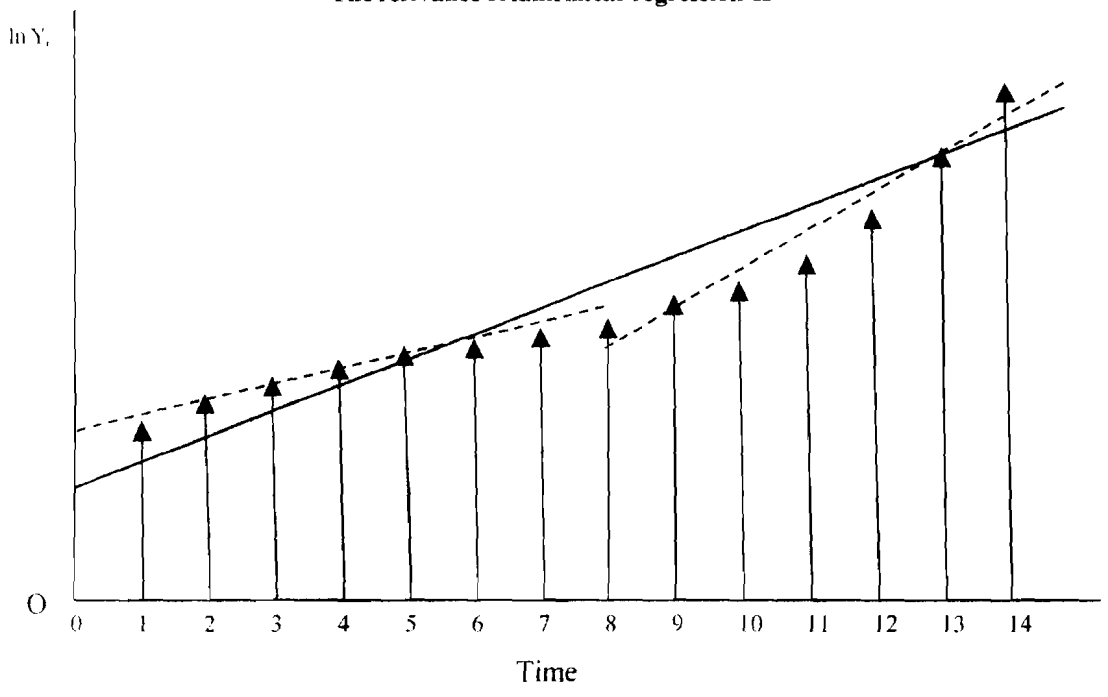
The main problem with these equations is same as that in separate regression. The trend path becomes discontinuous in between k-1 and k. This is shown in diagram-2. Like diagram-1 we have two policy regimes with two different growth rates, but unlike diagram-1 we have some fluctuations from the growth path in both the regimes. This leads to the discontinuity in the estimated growth path or two different estimated values of the concerned variable at the point of change of policy if estimated by separate regression or by single regression with dummies for different sub-periods without any restriction for kink. This is shown in diagram-2 by the dashed lines. This second problem indicates the second relevance for the estimation of a kink linear regression line.

To tackle with these problems restrictions are imposed on the parameters to arrive at a kink at k. Now the first sub-period is given by t = 1, 2, 3, ..., k and the second by t = k, k+1, k+2, ..., T. For the first equation the restriction is $a + b_1 k = a + a_2 + b_2 k$ or, $a_2 = (b_1 - b_2)k$ Putting this restriction in equation (2) we have the kink linear trend path of log as

$$Y_t \ln Y_t = a + b_1(D_1 t + D_2 k) + b_2(D_2 t - D_2 k) \ldots \quad \ldots \quad \ldots \quad (4)$$

Diagram-2

The relevance of kink linear regression-II



For the second equation the restriction is $a + b_1 k = a + a_2 + (b_1 + b_2')k$ or, $a_2 = -b_2' k$.

Putting this restriction in equation (3) we have the kink linear trend path of log Y_t as

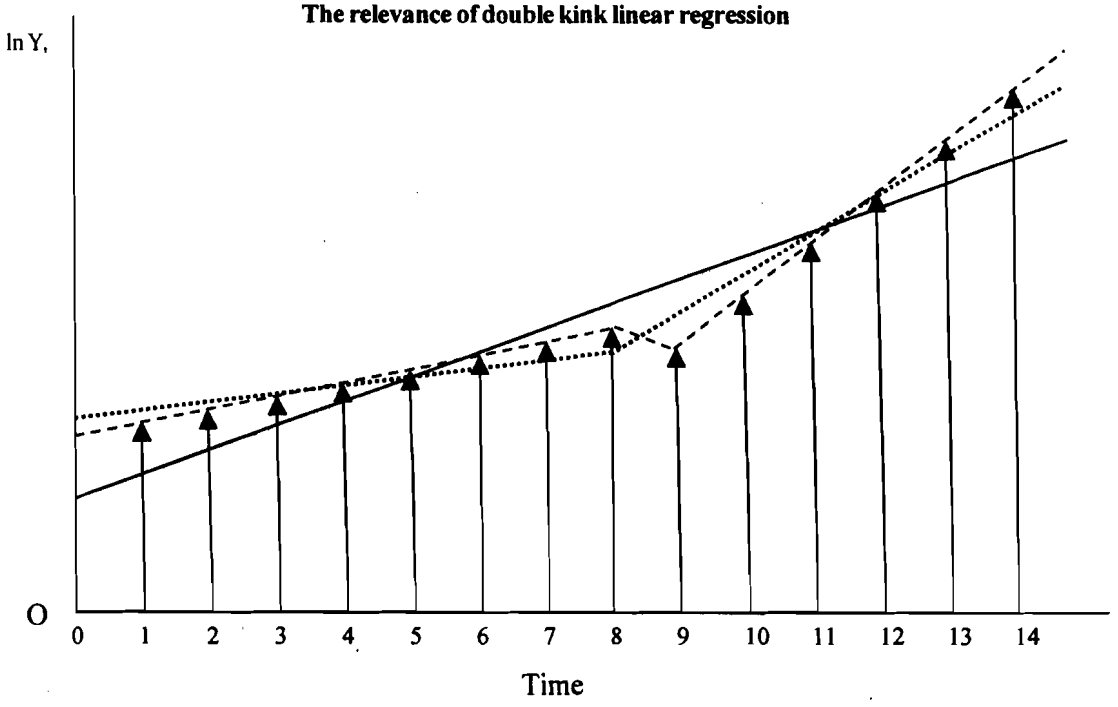
$$\ln Y_t = a + b_1 t + b_2'(D_2 t - D_2 k) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Expressions (4) and (5) are the estimable forms of regression in the analysis of time series consisting of two sub-periods. Where expression (4) consists of two dummies for two sub-periods, expression (5) consists of only one dummy for the second sub-period.

For more than two sub-periods dummy variables can be structured in a number of ways. Restrictions for arriving at kinks at the points of break can be suitably formed. For example, with three sub-periods, following three alternative structures are relevant: (i) the structure that measures and tests the significance of the growth rates in three sub-periods, (ii) the structure that measures and tests the significance of the growth rate in the first sub-period and finds the differences of growth rates in other two sub-periods from that in the first sub-period and (iii) the structure that measures and tests the significance of the growth rate in the first sub-period and finds the differences of growth rates in other two sub-periods from the respective previous sub-period.

Diagram-3

The relevance of double kink linear regression



Policy changes affect the growth rate of a time series. These also, in majority of the cases, create a shift (jump/jerk/slide) in the value at initial year(s) of policy change and the true growth path takes its shape after one or two years of gestation lag. Under these conditions, estimation of equations like (2) or (3) may be more meaningful than estimation of equations like (4) or (5), because discontinuity, under this condition and in a particular sense, is not totally irrelevant. However, this is not necessarily true. It all depends on the nature of growth paths in the two sub-periods and also on the nature of shift.

In diagram-3, the observed values show that in the first regime (t = 1 to 7) the series observes a constant rate of growth, but in the second regime (t = 8 to 14) the series experiences an initial slide down in the first year (t = 8 to 9) and then again a constant rate of growth during the remaining years in the second regime (t = 9 to 14). In this case a kink linear regression, shown by the dotted line, underestimates growth rates of the first regime as well as the true growth rate of the second regime. The initial slide down in the second period makes these two growth rates underestimated.

In this case, two kinks in place of one kink for each policy change (one at the starting year of the new policy regime and the second at a later year from which the true growth path in the new policy regime starts taking its shape) may be most relevant in comparison to (i) single regression without dummies, or (ii) separate regression, or (iii) single regression with dummies but without any restriction for kink(s), or (iv) single regression with dummies and with restrictions for a single kink at each change in policy regime. The regression used in such case can be named double kink linear regression in contrast to the name kink linear regression

used frequently in the time series analysis of growth and instability. The regression line in the case of diagram-3 will coincide with the dashed line leaving no fluctuation around the growth path with breaks properly designed and accommodated.

2.b. Instability:

Now we turn to the measurement of instability. Instability in a time series Y_t is frequently viewed in terms of fluctuation around the trend line. A coefficient measure of instability or an index of instability measured in terms of these fluctuations can be obtained by a number of methods depending upon the purpose. We shall consider here two such methods and by comparing them we shall also be able to infer about the nature of instability.

Method-1: Fluctuations around the trend line are generally measured by the deviations of observed values from the estimated values in the regression mentioned above and are denoted by e_t The instability index is obtained through the residual sum square (RSS = $\sum_{t=1}^{T} e_t^2$ in the following way:

$$I_{RSS} = \sqrt{\frac{1}{T}\sum_{t=1}^{T} e_t^2} \Big/ \overline{\ln Y_t} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

The numerator is the square root of the average residual sum of square (RSS) or the average absolute deviation (actually weighted average) and the denominator is the average value of lnY. It is normally expressed in percentage terms. It is a measure like the coefficient of variation, but here the standard deviation of residual is expressed as a proportion of mean value of lnY and not as the proportion of mean value of the residuals. This is done for two reasons: first, the mean value of the residuals is zero and second, the proportion (or percentage) of average fluctuation of the average value of lnY has a good economic interpretation. We denote this instability index based on RSS by I_{RSS}.

Method-2: Coppock (Coppock [1962]) has introduced an important way of measuring instability around the growth path of an economic time series. He has argued that if the series Y_t experiences a constant growth path then the ratios between Y_{t+1} and Y_t or the differences between $\ln Y_{t+1}$ and $\ln Y_t$ become constant and the standard deviation (S.D.) of these differences becomes zero, or the antilog of the standard deviation becomes one. Any fluctuation from the constant growth path makes the standard deviation greater than zero or its antilog greater than 1. Coppock has used this latter as the instability index. We denote this instability index by $I_{COPPOCK}$. Thus

$$I_{COPPOCK} = \text{Exp}\ (\text{S.D.}(\ln(\frac{Y_{t+1}}{Y_t}))) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

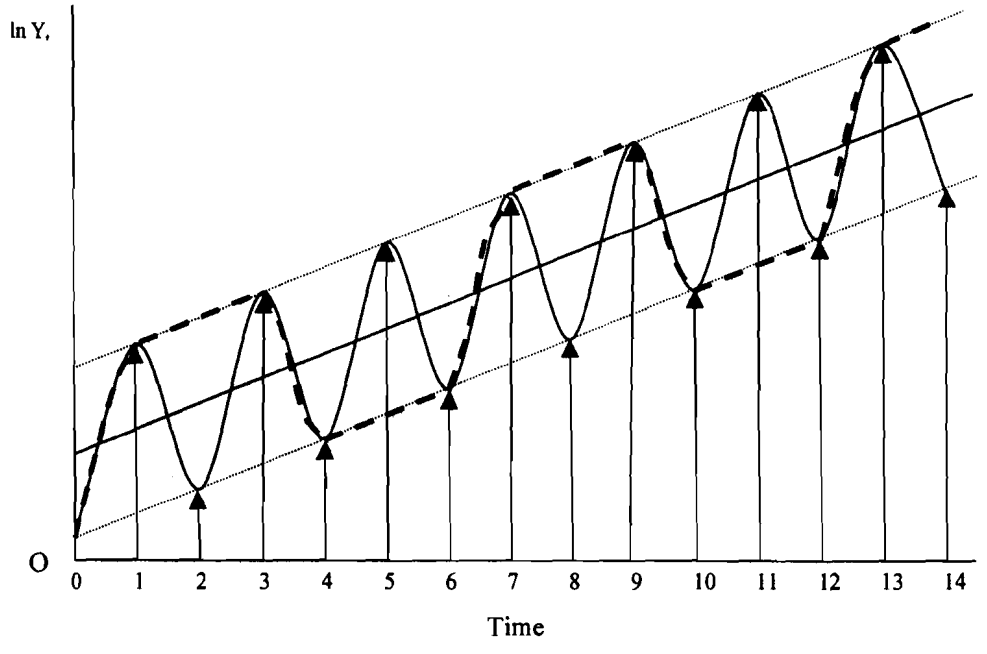
As is clear from the expression or from the conception about it, the measure is based on year to year fluctuation of $\ln Y_t$.

RSS based measure and Coppock's measure give different views of instability. Coppock's measure is based on year to year fluctuations in $\ln Y_t$ and their deviations from the constant year to year fluctuations in $\ln Y_t$ created by long run growth. On the other hand, RSS based measure is based on the extent of the fluctuations of $\ln Y_t$ from the long run growth path. Thus, if the values of $\ln Y_t$ experience year to year fluctuations around the trend line every year (or short cyclical fluctuation) both the RSS based index and the Coppock's index will be high; but if the values experience long cyclical fluctuation then Coppock's index will be low whereas the RSS based index may remain high. However, as these two indices are based on two separate principles, they are not readily comparable. The conceptual difference between these two indices can be very beautifully explained with the help of diagram-4.

In diagram-4 we have depicted two time series one with solid curvy path characterised by year to year fluctuation every year or by short cycles (it takes exactly two years to complete a full cycle) and the other with dashed curvy path characterised by relatively long cycles (it takes exactly six years to complete a full cycle). The bold solid line in the middle is the growth path around which fluctuations are taking place. When instability is viewed in terms of deviations from the long run growth path, the RSS based measure is relevant and in terms of this measure instability for both these curves is same.

Diagram-4

Conceptual difference between RSS based instability measure and Coppock's instability measure



On the other hand, when instability is viewed in terms of year to year fluctuations and their deviations from the year to year fluctuations implied in the growth path, the Coppock's measure seems relevant. In terms

of this measure, instability, for the path with relatively longer cycles, will be less than that with shorter cycles, because in the former year to year fluctuations in the series from t = 1 to t = 2 or that from t = 2 to t = 3 or that from t = 4 to t = 5 or that from t = 5 to t = 6 and so on are not different from that implied in the growth path though the series exhibits full deviation from the trend path (within the shown bands) in those years. This difference in Coppock's measure of instability for these two paths helps identify and measure the average length of the cycles experienced by the series.

However, there are some problems with the above two methods and with the comparison between them. First, none of these two measures is normalised properly. The RSS based measure has a lower limit at zero when the series experiences a constant growth path and no fluctuation. As fluctuation increases its value increases (provided that the average value of $\ln Y_t$ is positive) and can go beyond one – actually it has no upper limit. Thus the measure is not a true index measure and this fails comparing the instability of one series with that of another. On the other hand, the Coppock's measure has a lower limit at one when the series experiences a constant growth path and no instability. As instability increases its value increases and it has also no upper limit. Thus, this measure is also not a true index measure and this fails comparing the instability of one series with that of another. Moreover, as these two measures are normalised at different ranges (0 onwards for RSS based measure and 1 onwards for Coppock's measure) they are not readily comparable.

To overcome these problems we propose some adjustments to the above measures. The second problem is considered first. If the series experiences a constant growth, the series as well as the estimated line can be given by

$$Y_t = Ae^{bt} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

or $\ln Y_t = \ln A + bt = a + bt$ where $a = \ln A$ and b is the constant exponential rate of growth. In this case there is no deviation of the observed values from the growth path and $I_{RSS} = 0$

and as $\ln(\frac{Y_{t+1}}{Y_t}) = b$ or, as $S.D.(\ln(\frac{Y_{t+1}}{Y_t})) = 0$ $I_{COPPOCK} = Exp\ (S.D.(\ln(\frac{Y_{t+1}}{Y_t}))) = 1$

Thus, if $I_{COPPOCK}$ is measured by $S.D.(\ln(\frac{Y_{t+1}}{Y_t}))$ in place of $Exp\ (S.D.(\ln(\frac{Y_{t+1}}{Y_t})))$ then these two measures will be comparable at least when there is no deviation from the constant growth path.

On the other hand, if the series experiences an extreme year to year fluctuation with equal amplitude in log scale along with a constant growth rate b then the time path of $\ln Y_t$ will be given by

$$\ln Y_t = a + bt + (-1)^t \mu\ \overline{\ln Y_t} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

Here μ is the fraction of $\overline{\ln Y_t}$ and the series fluctuates with equal amplitude in log scale around the long run growth path and the amplitude is $\mu\ \overline{\ln Y_t}$ In this case $\sqrt{\frac{1}{T}\sum_{t=1}^{T} e_t^{\,2}}$ will be $\mu\ \overline{\ln Y_t}$ and when

rationalised by $\overline{\ln Y_t}$ we have $I_{RSS} = \mu$

Again in this case, , $\ln(Y_{t+1}/Y_t)$ $= b + 2\mu\ \overline{\ln Y_t}$ when t is odd

$= b - 2\mu\ \overline{\ln Y_t}$ when t is even

Thus if T is odd or (T-1) is even, mean of $\ln(\frac{Y_{t+1}}{Y_t}) = \overline{\ln(\frac{Y_{t+1}}{Y_t})} = b$, $S.D.(\ln(\frac{Y_{t+1}}{Y_t})) = 2\mu\overline{\ln Y_t}$ and

$I_{COPPOCK} = Exp\ (2\mu\overline{\ln Y_t})$. It will be slightly deviated from this value if T is even.

However, one thing is clear from the above diagram (diagram-4). If there is extreme year to year fluctuation the instability implied in the standard deviation of year to year deviations becomes double of the standard deviation of the deviations of the observed values from the trend values.

This is also clear from the above calculations that $\sqrt{\frac{1}{T}\sum_{t=1}^{T} e_t^{\,2}} = \mu\overline{\ln Y_t}$ and

$S.D.(\ln(\frac{Y_{t+1}}{Y_t})) = 2\mu\overline{\ln Y_t}$. Thus, to make these two measures comparable we propose some adjustment

in the Coppock's measure by rationalising the $S.D.(\ln(\frac{Y_{t+1}}{Y_t}))$ by $2\overline{\ln Y_t}$ so that both I_{RSS} and

$I_{COPPOCK}$ becomes μ in the case of extreme year to year fluctuation. The adjusted Coppock measure of instability is thus given by

$$I_{COPPOCK}' = \frac{SD(\ln(\frac{Y_{t+1}}{Y_t}))}{2(\overline{\ln Y_t})}$$

For long cycles like that shown by the dashed curve in diagram-4 the value of $I_{RSS} = \mu$ as before, but the value of $S.D.(\ln(\frac{Y_{t+1}}{Y_t}))$ will be $\sqrt{\frac{1}{3}}$ or $2\mu\overline{\ln Y_t}$ as $\frac{1}{3}$ of deviations of $\ln(\frac{Y_{t+1}}{Y_t})$ from the mean (which is still equal to b) are equal to $2\mu\overline{\ln Y_t}$ and rests are zero. Thus $I_{COPPOCK}'$ will be $\mu\sqrt{\frac{1}{3}}$ and the square of the ratio of I_{RSS} to $I_{COPPOCK}'$ will be 3 which is equal to the length of the half cycle. Thus, the average length of full cycle can be obtained by $2(I_{RSS}/I_{COPPOCK}')^2$.

Another adjustment seems necessary in the measurement of instability. Absolute instability, whether it is measured by the standard deviation of e_t or by the standard deviation of $\ln(\frac{Y_{t+1}}{Y_t})$ is rationalised by $\overline{\ln Y_t}$ to have a relative measure of instability (relative to mean value of $\ln Y_t$).

This leads to two problems. First, the mean value of $\ln Y_t$ may be zero or even negative and in that case the rationalisation will make little sense. Secondly, even if the mean value of $\ln Y_t$ is positive, the instability measure will not be fully comparable if rationalised in this way. If two series have same mean value of $\ln Y_t$ and same amount of fluctuation around the growth path measured as a percentage of mean value of $\ln Y_t$ their instability indices will be equal even if they have different rates of growth. Of these two series with equal absolute instability, the series with higher growth should have less relative instability. Thus, it is better to rationalise absolute instability by range of values of the variable and not simply by the mean value.

For a series without any growth the variation in the observations is found only for fluctuation.

With extreme year to year fluctuation the value of $\sqrt{\frac{1}{T}\sum_{t=1}^{T} e_t^2}$ will be $\frac{1}{2}\text{RANGE}(\ln Y_t)$ and that of $\text{S.D.}(\ln(\frac{Y_{t+1}}{Y_t}))$ will be $\text{RANGE}(\ln Y_t)$ Thus, we prescribe the modified RSS based instability index as

$$I_{RSS}' = \sqrt{\frac{1}{T}\sum_{t=1}^{T} e_t^2} \Big/ \frac{1}{2}\text{RANGE}(\ln Y_t)$$

and the modified adjusted Coppock index as

$$I_{COPPOCK}'' = \text{SD}(\ln(\frac{Y_{t+1}}{Y_t})) \Big/ \text{RANGE}(\ln Y_t).$$

For a series with both growth and instability, the variation in the series given by the range will be partially explained by growth and partially by instability. Extreme instability in this case, when rationalised by range, will give a value less than 1. Thus, both these index are now perfectly rationalised in the range 0 and 1 and are effectively comparable. As before, the average length of full cycle is given by the modified measure $2(I_{RSS}'/I_{COPPOCK}'')^2$. In the following simple illustration we shall use these two modified instability index and the corresponding modified measure of average length of full cycle.

2.c. Factors Affecting Growth, Break and Instability:

If we are interested in identifying the factors responsible for the growth, break (single kink or double

kink) and instability around growth, first of all, we have to identify significant breaks in the growth path and have to find out policy changes responsible for those breaks. In the second step, we have to hypothesise an exhaustive set of probable factors under some theoretical reasoning. In the third step, we have to examine the nature of dependence (statistical significance of dependence) of the variability of the explained variable on the variability of the proposed explanatory variables. This will help us identifying factors observed to be responsible. In the fourth and final step we may try to identify factors responsible mainly for growth and factors responsible mainly for fluctuation around growth and the residual responsible for both growth and fluctuations.

To classify the factors in these three categories we can proceed in the following way. To keep our model simple we are initially assuming that the growth path is simple and unbroken. We have already identified a set of k factors out of a larger set of proposed factors that explains the growth and fluctuation of $\ln Y_t$.

Now if $\ln Y_t$ is regressed on T along with the identified k factors we shall be able to observe the significance of de-trended k factors on the de-trended $\ln Y_t$. This will help us identifying those factors significant in the explanation of fluctuations around trend of $\ln Y_t$ Some of these factors may also be responsible for trend. But the factors which are now found insignificant orthopartially or joint orthopartially but were significant orthopartially or joint orthopartially in the 1st model without T have no significant contributions in the variation around trend and can be treated as factors responsible solely for trend. [For the concept of orthopartial significance see Mondal (2008).]

On the other hand, if trend values of $\ln Y_t$ are regressed on the k factors we shall be able to find out factors, turned out to be significant, responsible for trend. These factors may also be responsible for fluctuation around trend. But the factors which are now found insignificant orthopartially or joint orthopartially but were significant orthopartially or joint orthopartially in the 1st model without T have no significant contribution on trend and can be treated as factors responsible solely for fluctuation. Remaining factors will be said to be responsible for both trend and fluctuation.

3. A Simple Illustration with the Help of India's GNP Data

In this section we shall try to examine the nature of trend/growth, breaks in the trend/growth and the nature of fluctuation around the growth path of India's Gross National Product (GNP) during the period 1950-51 to 2006-07. This illustration is used to explain the necessity of the proposed methods vis-à-vis the existing ones.

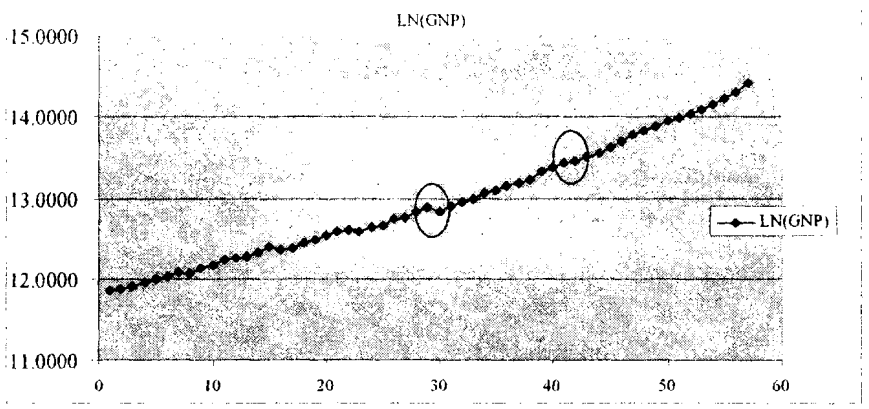
In Diagram-5 log (natural) values of the GNP of India (GNP figures are at factor cost and at 1993-94 prices, and measured in Rs. crores) for the period 1950-51 to 2006-07 are presented. These figures are obtained from different volumes of National Accounts Statistics published by the Central Statistical Organisation, Government of India.

The diagram shows that there exists a clear and almost linear trend in the log values of GNP indicating an almost constant growth at the rate of 4.36% per annum (R-square = 0.9836, Adjusted R-square = 0.9833, t-value = 57.37 with P-value = 9.26E-51 and RSS = 0.4900). A quadratic trend, however, gives a better fit with annual rate of growth starting from 2.37% and ending at 6.35% (R-square = 0.9977, Adjusted R-square = 0.9976 and RSS = 0.0693). A cubic trend, again, gives a further better fit indicating some cyclical fluctuation around the linear growth path with annual rate of growth starting from 3.77%, falling to 3.43% in 1962-63 and then increasing to end at 7.69% (R-square = 0.9989, Adjusted R-square = 0.9988 and RSS = 0.0331).

If we observe the diagram of scatter points very closely we find that fluctuations around the linear growth path indicated by the quadratic and cubic trends are mainly due to breaks and changes in linear trends observed in different years and very little due to cyclical fluctuations around the linear trends. Breaks in trends are also observed to create double kinks at different points of policy changes. Instability calculated through the modified RSS based instability index is $I_{RSS}^{'} = 0.0722$ and that through the modified adjusted Coppock index is $I_{COPPOCK}^{''} = 0.0118$ so that the average length of a full cycle is estimated at about 75 years. Actually, as the growth rate is mainly increasing, it creates a long cycle around the path of constant growth. Actual length of the business cycle can not be properly calculated without considering the non-linearity in the log values of GNP. The average length of short cycles can be estimated if we further modify our modified RSS based instability index and the modified adjusted Coppock index for the quadratic or for the cubic trend in the log values of GNP. But as we have already said and as is observed from the diagram, breaks in the series are so prominent that calculation of cyclical fluctuation without considering breaks also tends to give improper results. Consideration of breaks also helps explaining the observed quadratic or cubic trend in the log values of GNP.

Diagram-5

Log (natural) values of the GNP of India in the period 1950-51 to 2006-07



The diagram clearly shows that upto 1956-57 there was a clear positive trend but a major break in the trend after 1956-57 leading to a fall in the GNP. This was probably due to some major policy changes adopted in 1956-57. This initial set back in the GNP was come over in the next year and the economy began to follow a new trend path from 1957-58. The growth rate in this second period from 1957-58 was not very different from that in the first period. A similar set back was observed after 1964-65 and the revival in next two years, i.e., 1965-66 and 1966-67, a third minor set back in 1971-72 with the revival in 1972-73, a fourth set back in 1978-79 with the revival in 1979-80 and the final break in 1990-91 with a new trend from 1991-92. This break of 1990-91 to 1991-92 was not major in the sense that during this period of one year the economy did not experience any set back in its GNP but a fall in the growth rate. In the sense of growth differential, however, the economy experienced a major break because the growth rate in the period from 1991-92 became significantly greater than that in the previous period of 1979-80 to 1990-91.

The breaks in 1970-71 to 1971-72 are found to be statistically insignificant and are ignored. The equation fitted to the data with breaks at 1956-57, 1957-58, 1964-65, 1965-66, 1978-79, 1979-80, 1990-91 and 1991-92 gives us annual growth rates at 3.99% in the period 1950-51 to 1956-57, 4.33% in the period 1957-58 to 1964-65, 3.77% in the period 1965-66 to 1978-79, 5.24% in the period 1979-80 to 1990-91 and 6.24% in the period 1991-92 to 2006-07 (Table-1) (R-square = 0.9993, Adjusted R-square = 0.9992 and RSS = 0.0193). This line with double kinks at each of the policy changes gives a better fit than single kinks proposed by Boyce. This also explains a part of the fluctuations in the data around a single linear trend for the whole period which would seem otherwise to be due to cyclical or business fluctuations.

Table-1

Period wise growth rates of GNP of India, 1950-51 to 2006-07

Periods	*Growth rates*	*t-value*	*P-value*
1950-51 to 1956-57	3.99	10.40569	8.74E-14
1956-57 to 1957-58	0.73	0.38254	0.703785
1957-58 to 1964-65	4.33	13.83533	3.44E-18
1964-65 to 1965-66	-2.33	-1.40018	0.168025
1965-66 to 1978-79	3.77	28.0083	5.67E-31
1978-79 to 1979-80	-1.49	-0.99171	0.326417
1979-80 to 1990-91	5.24	30.91167	6.95E-33
1990-91 to 1991-92	2.27	1.549991	0.127852
1991-92 to 2006-07	6.24	56.75491	5.96E-45

Source: NAS (Different Issues), CSO, GOI.

Some other results derived in this context seem relevant. In the 9 periods mentioned in the table, change in the growth rate in any period over its previous period is significant (at 5% level) except in between the 7th and the 8th period. Moreover, the increase in the growth rate in the third period over the first period is not significant but the fall in the growth rate in the fifth period over the third period is significant, the increase in the growth rate in the seventh period over the fifth period is significant and the increase in the growth rate in the ninth period over the seventh period is also significant.

4. Concluding Remarks

Major macroeconomic series in majority of the countries follow a growth (or trend) path and in majority of the cases the path is not stable. Instability, in some cases, is due cyclical or business fluctuation inherent in any market based economy. In other cases it is due to breaks created by policy changes. This article proposes a particular type of breaks and illustrates that the proposed method works well for India's GNP data in post-Independence period. The nature of cyclical or business fluctuations can now be evaluated for each of the sub-periods created through breaks.

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Interpretation and Appraisal of Performance in Individual Energy Intensive Industries under Liberalized Trade Regime: A Case of Fertilizer Industry in India

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This paper tries to measure the economic performance of Indian fertilizer industry at aggregate level in terms of productive and financial parameters during the period from 1979-80 to 2003-04. Using Tran slog specification, our econometric analysis reveals a decelerating and negative trend in TFP growth in Indian fertilizer industry following economic reforms. The study also indicates that a declining trend of capacity utilization is also noticed after mid 1990's due to slow increase in actual output resulting from stagnated demand probably and rapid expansion of capacity output as a result of abolition of licensing rule consequent on economic reforms, Evidences are found to have adverse impact of liberalization on TFPG as well as on capacity utilization. Moreover, analysis of several financial indices shows dismal financial display during post- reform period.

1. Introduction:

India has undertaken a major economic reforms programme since 1991. By virtue of this programme, rigorous changes have been made in industrial policy of India Government. Relaxing of licensing rule, reduction of tariff rates, removal of restrictions on import etc. are among those which have been initiated at early stage. The policy reforms had the objectives to make Indian industries as well as entire economy more efficient, technologically up-to-date and competitive. This was done with the expectation that efficiency improvement, technological up-gradation and competitiveness would ensure Indian industry to achieve rapid growth.

With the abolition of the regime of 'Control Raj', waves of catastrophic changes have been sweeping the shores of the Indian economy of late, consequent to the overt drift in Government policy towards liberalization, decontrol, decentralization and globalization. The aftermath of WTO agreement on agriculture ushered in unprecedented policy changes pertaining to the fertilizer industry, basically aimed at liberating it from the shackles of the protective controls and subsidies it had enjoyed in the past. The fertilizer industry is now exposed directly to macro- economic vicissitudes of a partially free market. Since the long term fertilizer policy of the government lacks clarity, the fertilizer industry is now at the cross road, engulfed in shrouds of uncertainties regarding its very viability, existence and survival in the emerging scenarios.

Overview:

Nearly four decades ago, Nobel laureate, and the father of Green Revolution, Dr. Norman Borlaug, had stated that the Green Revolution was a victory in man's war against hunger and starvation which, if fully

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implemented, could yield sufficient food for human beings in the years to come . Agricultural science and the availability of chemical fertilizer have so far been able to meet the food production demand. Consumption of fertilizers(all nutrients) per hectare increased from 1 k.g in 1950-'51 to 96 k.g in 1999-2000, while production of foodgrains increased from a low level of 51 million tones to 209 million tones in the same period, making the economy fully self-sufficient . India ranks third in the world in terms of the production and consumption of fertilizers with a production of 10.63 million tonnes of nitrogen and 3.7 million tonnes of phosphate in 2004-2005. The total manpower directly employed in fertilizer industry is about 77,000 and manpower employed in fertilizer distribution is about one million, making it one of the largest industries in India. At present, there are 57 large -sized fertilizer plants engaged in the manufacture of a wide range of fertilizers. Of these, 29 units produce urea, 20 units produce DAP and complex fertilizers, 7 units produce low-analysis straight nitrogenous fertilizers and rest 9 manufacture ammonium sulphates as by-product. Besides, there is a total of 68 small and medium scale operating units manufacturing SSP (single super phosphate).

As a part and parcel of self-appraisal, each and every industry is constantly engaged in search of tools for assessing its own current performance. This performance can be judged suitably by comparing it with the various targets, past achievements and operative capacity and productivity growth. Business decision-making and policy formulation mostly depend on productive and economic indicators. In a capital scare economy like India's, manufacturing capacity utilization and total factor productivity growth and several financial indices and ratios are such key indicators of economic performance.

In this backdrop, the present study attempts to measure the performance of Indian fertilizer industry in the light of productive performance and financial performance. This paper also examines the impact of liberalization on capacity utilization as well as on TFPG.

In this paper, TFPG and capacity utilization (CU) estimates are presented for Indian fertilizer sector at aggregate level over the period from 1979-'80 to 2003-'04 with a view to comparing meaningfully the growth pattern in TFP and CU in the pre-reform period with that of the post-reform period assuming that all firms operating within an industry behave alike as well as industry level characteristics are equally attributable to all the firms in an industry and simultaneously financial performance is analyzed during post-liberalization period only.

The paper is organized as follows: section 2 provides data base and methodology, section 3 depicts and analyses estimation of TFPG at aggregate level, section 4 estimates and interprets economic CU. Financial performance is explained in section 5 and section 6 presents summary and conclusion.

2. Database and methodology:

This paper covers a period of 25 years from 1979-80 to 2003-04.The entire period is sub-divided into two phases as pre-reform period (1979 –80 to 1991-92) and post- reform period (1991-92 to 2003-04), sub-division of period being taken logically as such to assess conveniently the impact of liberalization on TFPG and CU. The split-up of the time range into two sub-periods (1979-91, 1991-04) is in accordance with structural and policy changes in the sector. Two major policy changes took place in 1977-'79 and 1991-'92 when first the retention price system for fertilizer was implemented and later liberalization measures including the withdrawal of all prices and distribution controls for phosphatic and potassic fertilizers were introduced. Financial performance is judged for the post-liberalized regime only.

2.1. Description of data and variables:

The present study is based on industry-level time series data taken from several issues of Annual

Survey of Industries, National Accounts Statistics, *CMIE* and economic survey, statistical abstracts (several issues), *RBI* bulletin, Whole sale price in India prepared by the Index no of office of Economic Advisor, Ministry of Industry etc covering a period of 25 years commencing from 1979-80 to 2003-04.Financial performance is judged for the post liberalization periods only. Selection of time period is largely guided by availability of data[1] In CU measurement, output is measured as real value added produced by manufacturers $(Y = P_L L + P_K K_{-1} + P_E . E)$ suitably deflated by WIP index for manufactured. In order to avoid over estimation due to ignoring contribution of material input on TFP, material including energy input [1] has been incorporated in the value-added function as such. Variable cost is the sum of the expenditure on variable inputs. Generally, TFP growth estimates based on value added terms are over estimated since they ignore the contribution of intermediate inputs on productivity growth (Sharma, 1999). Therefore, modified gross value of output so calculated has been used as a measure of output suitably deflated by wholesale price index of manufactured.

Total number of persons engaged in Indian fertilizer sector is used as a measure of labor inputs. Price of labor (P_L) is the total emolument divided by number of laborers which includes both production and non-production workers[2] (Goldar & others 2004).Deflated cost of fuel has been taken as measure of energy inputs. Due to unavailability of data regarding periodic price series of energy in India, some approximation becomes necessary. We have taken weighted aggregative average price index of fuel (considering coal, petroleum and electricity price index, suitably weighted, from statistical abstract) as proxy price of energy. [3] Deflated gross fixed capital stock at 1981-82 prices is taken as the measure of capital input. The estimates are based on perpetual inventory method. Following the same line as adopted in deflating energy input, the reported series on materials has been deflated to obtain material inputs at constant prices. Rental price of capital is assumed to be the price of capital (P_K) which can be estimated following Jorgenson and Griliches (1967):

$$P'_K = r_t + d_t - \frac{P^{\bullet}_k}{P_k}$$

where r_t is the rate of return on capital in year t ,d_t is the rate of depreciation of capital in the year t and $\frac{P^{\bullet}_k}{P_k}$ is the rate of appreciation of capital .Rate of return is taken as the rate of interest on long term government bonds and securities [1] which is collected from *RBI* bulletin(various issues). The rate of depreciation is estimated from the reported figures on depreciation and fixed capital as available in ASI which Murty (1986) had done earlier. However, we have not tried corrections for the appreciation of value of capital [2] in the estimates of price of capital services.

This paper covers a period of 25 years from 1979 -80 to 2003-04.The entire period is sub-divided into two phases as pre-reform period (1979 -80 to 1991-92) and post- reform period (1991-92 to 2003-04), sub-

1. Till 1988 – 89, the classification of industries followed in ASI was based on the National Industrial classification 1970 (NIC 1970). The switch to the NIC-1987 from 1989-90 and also switch to NIC1998 requires some matching. Considering NIC1987 as base and further NIC 1998 as base, cement industry has been merged accordingly. For price correction of variable, wholesale price indices taken from official publication of CMIE have been used to construct deflators.

division of period being taken logically as such to assess conveniently the impact of liberalization on TFPG and CU.

2.2. Total factor Productivity growth and Capacity utilization at industry level:

Productivity signifies composite efforts of all the factors contributing to production.. Hence it indicates overall efficiency of the industry. The study of productivity also becomes undoubtedly crucial in judging performance of an industry although it is not the mere yardstick in performance evaluation. Most of the productivity studies currently undertaken are based on the assumption of fuller utilization of capacity at all points of time for all inputs.

2.2.1. Model of TFPG:

In this paper, TFPG is estimated under three input framework applying Tran slog index of TFP as below: -

$$\Delta LnTFP(t) = \Delta LnQ(t) - \left[\frac{S_L(t)+S_L(t-1)}{2} x \Delta LnL(t)\right]$$

$$\left[\frac{S_K(t)+S_K(t-1)}{2} x \Delta LnK(t)\right] - \left[\frac{S_M(t)+S_M(t-1)}{2} x \Delta LnM(t)\right]$$

Q denotes gross value added, L Labour, K Capital, M material including energy input.

$$\Delta Ln\ Q(t) = Ln\ Q(t) - Ln\ Q(t-1)$$
$$\Delta Ln\ L(t) = Ln\ L(t) - Ln\ L(t-1)$$
$$\Delta Ln\ K(t) = Ln\ M(t) - Ln\ M(t-1)$$
$$\Delta Ln\ M(t) = Ln\ L(t) - Ln\ L(t-1)$$

S_K, S_L and S_M being income share of capital, labor and material respectively and these factors add up to unity. TFP is the rate of technological change.

2.2.2.. Model of Capacity utilization:

Simply, capacity output is defined as the maximum feasible level of output of the firm. An economically more meaningful definition of capacity output originated by Cassel (1937) is the level of production where the

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1 Earlier studies that have not treated material including energy as separate factor of production have failed to pick-up significant economies that are likely to generate in the use of such input. Jorgenson (1988) has observed that in a three input production framework, the contribution of intermediate inputs like material, energy etc. are significant sources of output growth.

2 One serious limitation of this assumption is that this does not take into account variations in quality and the composition of labour force.

3 To compute the price of energy inputs, some studies have aggregated quantities of different energy inputs using some conversion factors (say British Thermal units or coal replacement etc.) and then take the ratio of expenditure on energy to the aggregate quantity of energy. This method is criticized because it assumes different types of energy inputs to be perfect substitutes.

firms long run average cost curve reaches a minimum. As we consider the long run average cost, no input is held fixed. For a firm with the typical 'U' shaped average cost curve, at this capacity level of output, economies of scale have been exhausted but diseconomies have not set in. The physical limit defines the capacity of one or more quasi-fixed input. Klein defined capacity as the maximum sustainable level of output an industry can attain within a very short time, when not constrained by the demand for product and the industry is operating its existing stock of capital at its customary level of intensity. Klein (1960) argued that long run average cost curve may not have a minimum and proposed the output level where the short run average cost curve is tangent to the long run average cost curve as an alternative measure of capacity output. This is also the approach adopted by Berndt and Morrison (1981).

In view of variations in CU as a short-run phenomenon caused by the quasi-fixed nature of capital, an econometrically tractable short-run variable cost function that assumes capital as a quasi-fixed input has been used to estimate CU.

Considering a single output and three input framework (K, L, E) in estimating CU, we assume that firms produce output within the technological constraint of a well-behaved production function.

$Y = f(K, L, E)$ where K, L and E are capital, labor and energy respectively.

Since capacity output is a short run notion, the fundamental concept behind it is that firm faces short run constraint like stock of capital. Firms operate at full capacity where their existing capital stock is at the long run optimal level. Capacity output is that level of output, which would make existing short run capital stock optimal.

Rate of CU is given as

$$CU = Y/Y^* \ldots\ldots\ldots (1)$$

Y is actual output and Y^* is capacity output.

In association with variable profit function, there exists a variable cost function, which can be expressed as

$$VC = f(P_L, P_E, K, Y) \ldots (2)$$

Short run total cost function is expressed as

$$STC = f(P_L, P_E, K, Y) + P_K.K \ldots\ldots\ldots\ldots (3)$$

P_K is the rental price of Capital.

Variable cost equation [1] which is variant of general quadratic form for (2) that provides a closed form expression for Y^* is specified as

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6 Prime lending rate is generally viewed as an opportunity cost of capital, but problem is that there is no unique lending rate available for use. So, we have used rate of interest on long term government bond and securities as rate of return on capital [as previously used by Jha, Murty and Paul (1991)].Alternatively, one can use the gross yield on preferential industrial shares, if available, as Murty(1986) has done.

7 As Jorgenson and Griliches note capital gains should be deducted from ($r_t + d_t$) but several studies have not done so and adjustment for capital gains does not seem to make such difference to the result.

$$VC = \alpha_0 + K_{-1}\left(\alpha_K + \tfrac{1}{2}\beta_{KK}\left[\frac{K_{-1}}{Y}\right] + \beta_{KL}P_L + \beta_{KE}P_E\right)$$

$$+ P_L(\alpha_L + \tfrac{1}{2}\beta_{LL}P_L + \beta_{LE}P_E + \beta_{LY}Y)$$
$$+ P_E(\alpha_E + \tfrac{1}{2}\beta_{EE}P_E + \beta_{EY}Y) + Y(\alpha_Y + \tfrac{1}{2}\beta_{YY}Y) \ldots\ldots\ldots (4)$$

K_{-1} is the capital stock at the beginning of the year, which implies that a firm makes output decisions constrained by the capital stock at the beginning of the year.

Capacity output (Y*) for a given level of quasi-fixed factor is defined as that level of output, which minimizes STC. So, the optimal capacity output level, for a given level of quasi-fixed factors, is defined as that level of output, which minimizes STC. So, at the optimal capacity output level, the envelop theorem implies that the following relation must exist.

$$\frac{\partial STC}{\partial K} = \frac{\partial VC}{\partial K} + P_K = 0 \ldots\ldots\ldots (5)$$

In estimating Y*, we differentiate VC equation (4) w.r.t K_{-1} and substitute expression in equation (5)

$$Y^* = \frac{-\beta_{kkK-1}}{\left(\alpha_k + \beta_{kL}P_L + \beta_{KE}P_E + P_k\right)} \ldots\ldots\ldots\ldots (6)$$

The estimates of CU can be obtained by combining equation (6) and (1).

3. Empirical result of TFP growth:

Estimates of annual TFP growth rate of Indian fertilizer Industry at aggregate level are presented in Tab

Table 1

Trend in growth rate of TFP at aggregate level, 1979-80 to 2003 – 04

Pre- reform Period (1979-'80to 1991-92)			Post -reform Period (1991-'92 to 2003-04)		
Year	TFP Indices	Growth rate in TFP (%)	Year	TFP Indices	Growth rate in TFP (%)
1979-80	1	-	1991-92	0.9739	-8.05
80-81	1.0344	3.44	92-93	1.0643	9.28
81-82	0.9648	-6.73	93-94	0.9581	-9.98
82-83	1.0063	4.30	94-95	0.9388	-2.01
83-84	1.0154	0.90	95-96	1.0348	10.23
84-85	1.0213	0.59	96-97	1.0392	0.43
85-86	0.9784	-4.20	97-98	0.9356	-9.97
86-87	1.0081	3.04	98-99	0.999	6.78
87-88	1.0149	0.67	99-'00	1.0457	4.67
88-89	0.8796	-13.33	00-01	1.0208	-2.38
89-90	1.2	36.43	01-02	0.9735	-4.63
90-91	1.0592	-11.73	02-03	1.0518	8.04
91-92	0.9739	-8.05	03-04	0.8729	-17.01
average		**0.44**			**-1.12**

Source: estimated by authors.

The present exercise exhibits an overall negative growth rate in TFP. It is evident from Table 1 that the estimated growth rate of TFP for the period 1980-'81 to 1991-'92 is 0.44% p.a of which 1980-'85 period showing average growth of 0.50% and1985-'91 period exhibiting 0.33% TFP growth which signifies an overall positive rate of growth in TFP whereas post-reform period covering 1991-'92 to 2003-'04 in our study witnessed a sharp negative growth of -1.12% p.a., a steeper fall from growth rate as revealed in pre-reform period. This decline is due to reduced capacity utilization caused by downfall in production rather than being a consequence of lack of technical progress. The growth rate of TFP in Indian fertilizer sector is assessed to be –0.055% p.a.(estimated from semi log trend) implying average overall annual deceleration for the entire period 1980-'81 to 2003-'04. On the whole, impact of economic reforms on TFPG at aggregate level was poor as the positive average rate of TFPG estimated in the pre-reform period declined to negative growth in post-reform period. More over, difference between mean TFPG of two periods is statistically significant at 0.05 levels thereby indicating that average TFPG between two periods are statistically different.

The process of liberalization can be linked to the manufacturing productivity. With the initiation of a wide range of economic reforms by the India Government on various fronts to make domestic industries more efficient and internationally competitive, Indian firms were expected to respond positively these measures. The liberalization process was to expose firms to international competition and force them to introduce new methods of production, import quality inputs, capital equipment or technology and compel them to improve their efficiency. Trade liberalization is captured by either an explicit measure of liberalization or by a dummy variable capturing a change in the economic policies. The use of dummy variable to demarcate the post-reform period from pre-reform period (as had done earlier by Ahluwalia, 1991; Harrison, 1994; Krishna and Mitra, 1998) is subject to criticism. Dummy variable technique assumes that trade reform was one time phenomenon and it was complete and at the same time it fails to capture that reform has been gradual over time, rather an on-going process.

Nevertheless, we have assessed the magnitude of effect of liberalization on TFPG by using spline function which is depicted as follows.

$$LnTFP_t = A + Bt + B'(t - t_0)\,Dt$$

Result of the regression equation is as follows:

$$LnTFP_t = -0.009 + 0.003t - 0.007\,Dt$$

$$(-0.58) \qquad (-2.89)$$

$$R^2 = 0.54,$$

Figures in the parenthesis are t values. As the coefficient of the difference between two time periods is statistically significant at 0.05 level and negative (coefficient being – 0.007), conclusive inference can be drawn in that liberalization has its significant negative impact on TFPG during post-reform period.

4. Economic measure of capacity utilization:

In table 2 below, in view of overriding importance of capacity utilization as one of the determinants of productivity, we present economic CU estimation and its trend during the study period by adopting OLS technique.

8 Similar functional form has been previously estimated by Denny et al (1981). The variable cost function is based on the assumption that some input like capital cannot be adjusted to their equilibrium level. Therefore, the firm minimizes variable cost given the output and the quasi-fixed inputs

Table – 2 Trend in capacity utilization, 1979-80 to 2003 – 04

Year	Economic CU = Y/Y*	Capacity Growth (%)	Output Growth (%)	Growth in CU (%)	Year	Economic CU = Y/Y*	Capacity Growth (%)	Output Growth (%)	Growth in CU (%)
79-80	**0.5425**	-	-	-	**1991-92**	1.005	9.15	11.12	1.81
80-81	**0.6270**	4.82	21.15	15.57	**92-93**	0.9447	28.25	20.54	-6.01
81-82	**0.5604**	2.40	-8.47	-10.61	**93-94**	0.7767	11.78	-8.10	-17.78
82-83	**0.5458**	2.31	-0.36	-2.61	**94-95**	0.8319	15.16	23.34	7.10
83-84	0.5972	4.54	14.40	9.42	**95-96**	0.7863	30.40	23.25	-5.48
84-85	0.6267	5.27	10.46	4.93	**96-97**	0.7417	7.68	1.57	-5.67
85-86	0.6854	1.39	10.89	9.37	**97-98**	0.6831	5.13	-3.18	-7.90
86-87	0.8609	9.34	37.34	25.61	**98-99**	0.6052	12.68	-0.18	-11.41
87-88	0.7121	6.05	-12.28	-17.28	**99-00**	0.7269	5.07	26.21	20.12
88-89	**0.8372**	8.27	21.33	17.56	**00-01**	0.6719	11.73	3.27	-7.57
89-90	**0.7963**	6.46	20.01	-4.89	**01-02**	0.6017	1.98	-8.68	-10.45
90-91	**0.9873**	16.23	17.01	23.99	**02-03**	0.5597	2.01	-5.10	-6.97
91-92	**1.005**	9.15	11.12	1.81	**03-04**	0.5859	-6.61	-2.25	4.67
Average	**0.7218**	**6.35**	**11.88**	**5.61**		0.7324	**10.34**	**6.29**	**-3.50**

Source: estimated by authors.

It has been noticed that if capacity output is taken to be the economic capacity derived from optimization process, the CU could exceed one in some cases. This implies that production is to the right of minimum point of short-run average total cost curve which induces cost reducing net investment. The estimate in Table 3 shows that industry's average CU ratio rose from 0.7218 to 0.7324 during post-reform period and similar trends have been noticed in the average growth rate of capacity and actual output during these two time frames shows declining trend. Wide variations in the magnitude of CU are found in the estimation, which ranges from about 0.5425 to 1.005 within these two-time periods. But, average growth rate of CU declined from 5.61% in pre reform period to -3.5 % in post reform period.

In investigating the issue of whether there exist any impact of economic reforms on CU or not, piecewise linear regression (Spline function) is used again which is as follows.

$$\text{Ln } CU_t = \alpha + \beta t + \beta'(t - t_0) D t$$

Result of the regression equation is as follows: -

$$\text{Ln } CU_t = \underset{(-14.96)}{-0.719} \quad \underset{(9.54)}{+0.054} \; \underset{(-9.98)}{-0.0925 D t}$$

Adjusted $R^2 = 0.804$, Durbin-Watson value = 1.96

Here, β gives the slope of the regression line in pre-reform period which is positive and significant implying that growth in CU shows positive trend immediately before liberalization starts. But as coefficient of the difference between two time periods is significant at 0.01 level and negative (coefficient being - 0.0925), it can be concluded that liberalization has its significant negative impact on CU during post- reform period. It is also evidently supported by our empirical estimation of average growth rate in capacity utilization as shown in table3 that there is a significant drop in average growth rate of capacity utilization from 5.61% in pre-reform period to -3.50 % in post- reform period.

Trend is capacity expansion reflects that capacity expanded more rapidly in post-reform period than pre-reform period due to abolition of licensing rules which might have encouraged entrepreneurs to invest more

and expand plant capacity. Gross output at 1981-'82 prices had grown constantly during 1980s and its growth rate accelerated in the first half of 1990s.Output growth may take place because the size of the overall market is expanding. A rapid growth of gross output in an industry generates expectation that the industry will grow in future, investment in industry might increase. Abolition of industrial licensing might have encouraged investment. It is noteworthy that growth rate of output of Indian fertilizer sector stagnated or slowed down after 1995-'96. The slow growth rate of gross output might be due to deficient demand which is supported from declining sales growth rate after1995-'96 as shown in Table-4, increase of import probably (5.75% import growth during'95-'04period) affecting domestic production, high cost of capital over-burdening manufacturers which resulted due to tight monetary policy of Reserve Bank of India adopted in 1995-'96. Apart from this, withdrawal of price and distribution control for potassic, phosphatic and nitrogenous fertilizers coupled with introduction of dual pricing, probability of further decrease in subsidies reflected immediate effect on production. But capacity expanded rapidly as a result of abolition of licensing restriction consequent on economic reforms. It results in decline in growth rate of capacity utilization.

Table – 3 Growth of real sales and cost of capital (%)

Year	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04
Real Growth in sales %	10.5	6.9	22.9	12.1	13.7	1.6	-2.1	1.2	5.4
Growth of cost of capital %(interest etc.)	22.12	20.82	17.62	19.04	18.66	17.96	16.31	8.01	14.79

Source: ASI & CMIE data (several issues). (Compiled)

5. Financial performance: The financial performance of Indian fertilizer industry has been analyzed in the long term from 1991-'92 to 2006-'07.Important performance indices like liquidity, leverage ratio, efficiency ratio and profitability ratios are calculated and depicted in table-4.

Table-4

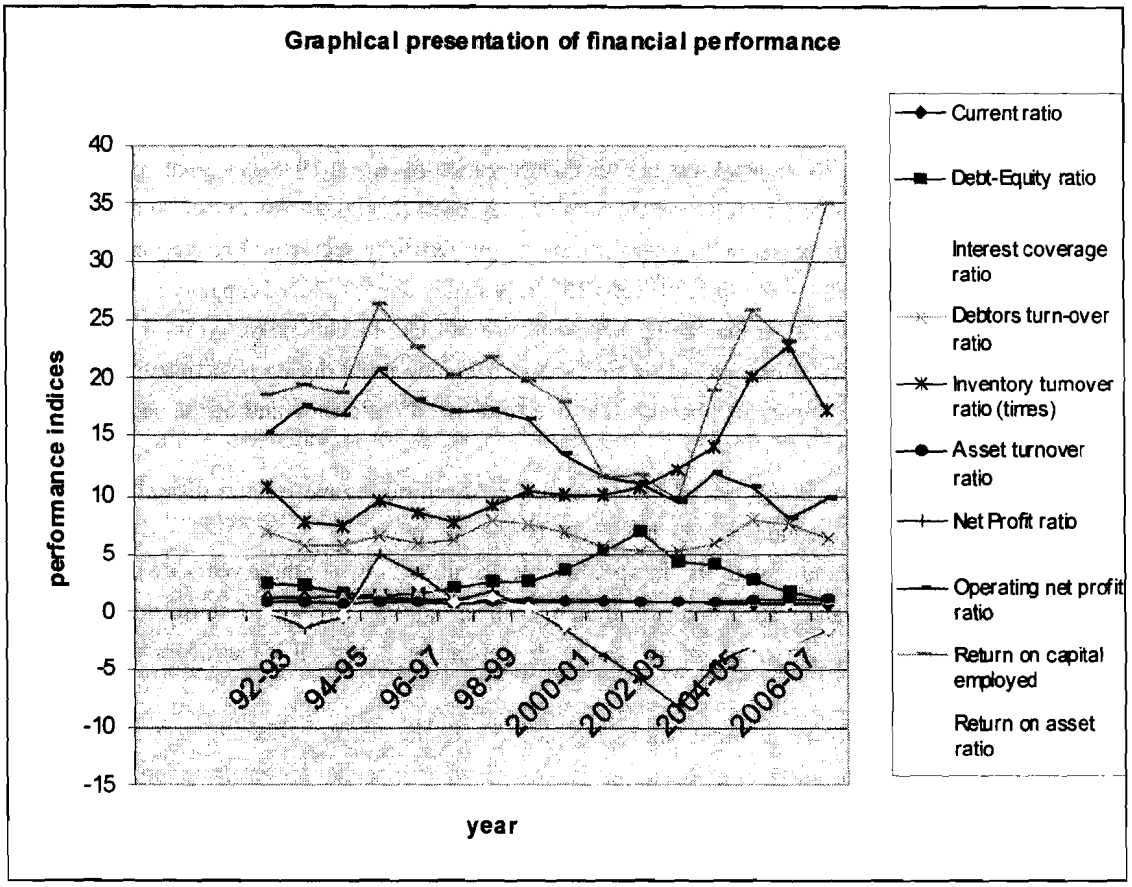
Financial Performance Indices

Year	Liquidity	Leverage ratio		Efficiency ratio			Profitability (%)			
	Current ratio	Debt-Equity ratio	Interest coverage ratio=PBIT/Fixed interest	Debtors turn-over ratio=credit sale/Average debtors	Inventory turnover ratio (times)	Asset turnover ratio	Net Profit ratio=PAT/sale	Operating net profit ratio=PBIT/sales	Return on capital employed (ROCE)= PBIT/capital employed	Return on asset ratio= PAT/total assets
91-92	1.19	2.31	1.1	6.89	10.73	0.78	-0.2	15.3	18.6	-0.2
92-93	1.22	2.17	1.08	5.7	7.6	0.7	-1.3	17.6	19.4	-0.9
93-94	1.24	1.57	1.31	5.79	7.3	0.65	-0.5	16.9	18.7	-0.3
94-95	1.21	1.37	1.85	6.52	9.6	0.75	4.9	20.9	26.4	3.8
95-96	1.06	1.63	1.5	5.98	8.49	0.74	3.1	18.1	22.6	2.3
96-97	1.01	2.11	1.25	6.29	7.6	0.66	1	17.2	20.3	0.7
97-98	1	2.56	1.33	7.77	9.13	0.72	1.8	17.4	21.9	1.3
98-99	0.99	2.59	1.49	7.45	10.42	0.69	0.2	16.5	19.7	0.2
99-00	0.93	3.49	0.86	6.87	10.14	0.75	-1.5	13.4	18	-1.1
2000-01	0.89	5.24	0.69	5.62	10.14	0.76	-3.9	11.6	11.5	-2.9
2001-02	0.79	6.89	0.58	5.21	10.73	0.77	-5.9	11	11.7	-4.4
2002-03	0.72	4.17	0.42	5.29	12.17	0.77	-8.3	9.5	9.7	-6.1
2003-04	0.67	4	0.75	5.89	14.04	0.82	-4.5	11.8	18.9	-3.6
2004-05	0.64	2.69	0.88	7.76	20.28	0.97	-3	10.7	25.8	-2.8
2005-06	0.63	1.8	0.84	7.45	22.81	1.05	-2.9	8	23.1	-2.8
2006-07	0.66	0.95	1.1	6.4	17.38	1.02	-1.5	9.7	34.9	-1.4

Source: Own estimate from data collected from CMIE (Financial aggregates ratios) (several issues)

* PAT and PBIT means profit after tax and profit before Interest & tax respectively.

Figure-1



The rising trend of average Debt-Equity ratio from 2.2 during1991-2000 to 3.68 in 2001-2007 shows that the industry is shouldering an increasing debt burden and becoming more leveraged. Interest-coverage ratio declines from 1.31 in 91-2000 0.75 which is an indication that profit earned is not sufficient to meet the fixed interest bearing borrowings. The average ratio of net profit/ net sales exhibits the decreasing profit level from 0.83% to -4.29% during these two time periods which indicates losses and heightening competition in the industry. Liquidity ratio (current asset/current liability) being indicator of financial soundness shows dismal declining trend during these two time span indicating liquidity crunch. Slight increase in asset-turnover (Net sales/ Total assets) indicates that the industry tries to utilize and shed its assets efficiently. Quicker inventory turnover and debtors turnover indicate efficient utilization of working capital as well as good collection policy. Return on capital employed is exhibiting declining trend which signifies that the industry in general is eroding its net worth, losing money and thus, becoming unattractive to the investors.

6. Summary and findings:

In this paper, we investigate performance of India's fertilizer sector from various perspectives. We develop economic indicators for productivity growth and capacity utilization and discuss our findings within a broader context of structural and policy changes in the sector. The economic analysis showed that roductivity growth was increasing over time. The increase took place during the era of total control when the retention price system and distribution control was in effect. During the sub-period 1979-'91, total control and high subsidization through the retention price system coupled with relatively high growth rate of capacity utilization supported productivity increase. With liberalization of the fertilizer sector and reduction of subsidies, productivity declined substantially since the early 1990s, probably due to reduced capacity utilization caused by downfall in production, rather than being a consequence of lack of technical progress.

Second, growth rate of capacity utilization shows declining trend during post liberalized decontrol period showing negative impact of liberalization due to demand deficiency and at the same time, rapid expansion of capacity.

Third, analysis of several financial indices during post-reform regime reflects dismal display of the financial performance of the industry which is beyond our expectation.

Therefore, from the above analysis , it is predictable that the next two or three years are unquestionably going to be a rough ride and testing times for Indian fertilizer industry. Breaking free from the shackles of controlled regime, the industry's future will definitely depend on how well it can adapt to the changed scenario.

The government definitely has an important role to play to keep the industry afloat, to keep it viable and to save it from sinking as the survival of this sector is fundamentally essential for ensuring food sufficiency.

In conclusion, it is also suggested that while making policy decisions on the basis of aggregate, the consideration of intra-sectoral analysis may be attempted in order to have more valuable results because generalization based on aggregative analysis sometimes fails to pave the way for improved decision making.

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Appendix: A -1:- Energy intensity is defined as energy consumption in physical units of 'j'th industry per crore rupees of value added in that industry.

E_{jkt} = Energy consumed in physical units in time't' by sector 'j' for energy type 'k'.

P_{jt} = 'j'th industry's value added.

Energy intensity (of energy type 'k') of 'j'th industry is given by

$e_{jkt} = E_{jkt/Pjt}$ (Energy intensity for non-energy sector = '000 mtoe (million tonne of oil equivalent) /crore Rs. where mtoe / Rs is the mtoe required to produce one unit of output measured in value term , this coefficient is the measure

of direct energy intensity).

Of the four types of fertilizers- nitrogen, phosphate, potash, and complex- the production of nitrogenous fertilizers is highly energy – intensive. The basic chemical that is used to produce nitrogenous fertilizer is ammonia. Natural gas , naphtha , fuel oil and coal are used as feedstock for ammonia production. Thus, production of ammonia itself involves almost 80% of the energy consumption in the manufacturing process of a variety of final fertilizer products. The average energy consumption in urea production was recorded at 6.49 Gcal/ tonne during the same period. The specific energy consumption of ammonia is given in Table-5.

Table -5 Specific Energy consumption (gigacalories per tonne) of ammonia : 1988-98 to 2002-03.

Feedstock	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1997-98	2002-03
Gas	10.00	9.60	9.60	9.60	9.50	9.41	8.86	8.65
Naphtha	12.23	12.35	11.92	11.74	11.73	11.70	10.95	9.40
Fuel Oil	14.32	14.36	15.08	13.53	13.90	-	13.31	12.78
Coal	33.84	38.85	39.13	39.65	42.69	-	48.13	-

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Table -6 Total Energy Intensity in Fertilizer Industry

Year	Coal Intensity(000 mtoe/Rs crores)	Electricity Intensity (000 mtoe/Rs crores)	Petroleum Intensity(000 mtoe/Rs crores)	Total Intensity
1996-97	0.48403	0.09282	0.36791	0.94476
1997-98	0.42044	0.07430	0.26315	0.75789
1998-99	0.55369	0.06434	0.19273	0.81076
1999-2000	0.55577	0.05526	0.26515	0.87618
2000-2001	0.51135	0.04718	0.46727	1.0258
2001-2002	0.59221	0.04396	0.17157	0.80774
2002-2003	0.49925	0.02920	0.16738	0.69583
2003-2004	0.66869	0.03759	0.37982	1.0861
2004-2005	0.64162	0.03124	0.32025	0.99311

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Analysis of Growth Rates of 2-digit Indian Industry and Its Determinants for the Time Period-1956-1995

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This paper seeks to find the growth rates of Indian industries in various variables to study the inter-linkages and important determinants so as to help in understanding a possible integrated industrial development scenario in India. This is a part of a larger work that studies various regional dispersal measures and then interlinks growth variables, productivity variables and dispersal variables for purpose of developing a framework of integrated industrial development that can study the whole of industrial development in an efficiency equity frame. Here we eschew dispersal and linkage measures for purposes of limitation of space.

1 Introduction

This paper analyzes (1) growth rates of 2-digit (Standars Idustrial Classification) industries over a 40-year period from 1956 to 1995 and ranking the industries; (2) Total Factor Productivity Growth (TFPG) of the 2-digit industries by Kendrick, Domar and Solow measures with relevant weights to labor and capital growth rates, for which purpose Cobb Douglas (CD) production function (p f) was estimated to find out output elasticities (exponents) of labor and capital. The estimated Cobb Douglas production function exponents sum provides to check for returns to scale (increasing, decreasing, constant) for each 2-digit group of Indian industries for 40 year period of 1956-95 and 10 year time periods each covering in sequence a total period of 1956-95.

It brings out causal factors as determinants of growth rates linking with partial productivities of factors, similarly with Capital Intensity (K/L) and with TFPG so as to show whether growth in output is propelled by growth in partial productivities of factors, Capital Intensity (K/L) ratio and TFPG in each of the industries in the relevant periods of study.

The analysis of growth rates and of their causal factors indicates relative importance of industries so *that policy-guidelines can be better inferred. Growth rates are the estimated regression coefficients of Semi-log form: log* $Y = a + bt$.

2. Analysis of Growth Rates of Variables and Structural Ratios

2.1 Analysis of Growth Rates of Factories

Food Products (Industry No 21=20+21) grew at 33.1% p.a. (maximum) over the years 1956-95, which is a non- durable essential for high growth and base population with their high daily consumption norm of MPC (APC) and Engel Elasticity. Then followed the many User and Intermediate (Input) Industries whose growth rates were: 19.2%growth rate in case of Leather Products (IN29), 18.9% in Metal Products (IN34), 17.5% for Textiles in Silk, Woolen, Cotton and Jute (IN25=23+24+25), 14.5 % in Rubber, Petroleum and Coal (IN31) and 12.6% in of Beverages (IN22).

Paper Products (IN28) grew at 10.1% and Non-Metallic Mineral Products (IN32) at 10.4%. They serve as material inputs to economic and social overhead sectors and in services like construction, education, electronics

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and software development in the country. In turn many sunrise industries get developed for government consumption and investment goods industries.

Wood and Wood Products (IN27) is an intermediate good serving the housing activity and its growth at 9.2% is due to high wage rate. Chemical and Chemical Products (IN30) at9.2%, a sunrise industry since 1970s and 1980s, had little/no growth in 1950s and 1960s, Pharmaceuticals grew in 1990s as new sector capable of further growth.

Similarly noted is Growth of Transport Equipment and Parts (IN37) at 9.4%, a key infrastructure and capital goods industry.

But Intermediate Industry like Basic Metals and Alloys (IN33), growing at a relatively low of 8.7% and a User Industry like Textile Products (IN26) at 7.7% growth lagged behind due to lack of production planning though in the latter context, growth of material of textile products for garments was high.

Capital goods industries like Electrical and Non-Electrical Machinery other than transport comprising IN35 and IN36, a key sector for enhancing industrial growth in an economy planned on basis of heavy industry strategy, grew at 7.9%, showed a slowdown in the later 3 decades.

Other Manufacturing Industry (IN38) at 5.8% revealed the second lowest growth rates while Electricity, Gas and Steam (IN41=40+41) at 1.2% shows the lowest growth rate (Table 2.1).

Table: 2.1: Growth Rates of Factories of 2-digit Industries in 1956-95 (in order of ranking)

Ind. Name	Ind. No.	Gr. rt.(descend. order)	Ind. Name	Ind. No.	Gr. rt.(descend. order)
Food Prd.	21	33.1%	Trans. Eq.	37	9.4%
Leath Prds	29	19.2%	Wood Prd.	27	9.2%
Met.Prd	34	18.9%	Chem.	30	9.2%
Tex	25	17.5%	Basic MA	33	8.8%
Ru-Pet-Co	31	14.5%	M. o. t. T.	36	7.9%
Bever'g	22	12.6%	Tex Prd.	26	7.7%
NmMp	32	10.4%	OMI	38	5.8%
Paper	28	10.1%	EGS	41	1.2%

The long-term trends in this comparative study of growth rates & factories of 2-digit industries in India speak of likely weak forward and backward linkages and non-conformity of industrial units in numbers with lack of planning to raise the requisite number (s) of units that generate materials, capital, infrastructures and industrial output growth rates needed for final consumption goods, investment goods and exports of Indian economy. However, the earlier analysis should take into account the differential scale of operation of the units. These two together is reflected in their final result of net Value Added of industries.

2.2 Analysis of Growth Rates in Net Value Added (NVA) of Individual Industries for 1956-95

Table 2.2 shows growth in NVA being the highest in case of Electricity, Gas and Steam (IN41) at 18.1% followed by 17.2% growth rate in Textile Products (IN26) and 17.1% in Leather and Leather Products (IN29). This was followed with growth rates ranging between 12.6% in case of Food Products (IN21) to 15.9% growth rate in case of Chemical and Chemical Products (IN31). The second lowest is seen in Wood and Wood Products (IN27) at 11.1% and the lowest NVA growth rate has been recorded by Textiles (IN25) at 10.1%. However, Textile Products grew at one of the highest rates at 17.2% but textiles showed the lowest growth at 10.1%. This indicates lack of production planning possibly due to shortages, bottlenecks, lack of demand and weak linkage.

Table: 2.2 Net Value Added (NVA) Growth Rates (in descending order)

Ind. Name	Ind. No.	gr. rt (in descending order)	Ind. Name	Ind. No.	gr. rt (in descending order)
EGS	41	18.1	Ba MA	33	13.7
Tex Prd	26	17.2	Paper	28	13.3
Lea.Prd	29	17.1	NmMp	32	13.2
Ru-P-Co	31	15.9	Chem.	30	13.2
Bever'g	22	15.9	OMI	38	13.1
TransEq	37	14.9	Food Prd	21	12.6
MotT	36	14.9	Wood Prd	27	11.1
Met.Prd	34	13.7	Tex	25	10.1

2.3 Analysis in Growth Rates in Gross Value Added (GVA)

Compared to NVA growth rates, the GVA growth rates were usually higher or marginally lower or the same. For example, in case of Textile Products (IN26) GVA growth rate was lower at 16.5% compared to NVA growth rate of 17.2%. Electricity, Gas and Steam (IN41) GVA growth at 18% was similar to 18.1% of NVA growth in that industry. In Textiles of Cotton, Woolen, Silk and Jute (IN25), lowest GVA as well as lowest NVA is recorded. Rubber, Petroleum and Coal (IN31) had the highest growth rate in GVA at 18.2% while NVA growth rate in IN31 was moderately high at 15.9%. Leather and Leather Products (IN29) GVA growth rate was 18.1% while NVA growth rate showed 17.1%. Wood and Wood Products (IN27) GVA growth was 12.9% but growth in NVA was 11.1%, though both values were on lower in their respective categories. So is the case with Electrical and Non Electrical Machinery other than transport (IN36) where NVA recorded 14.9% growth but GVA showed 16.4%. Paper showed NVA growth at 13.3% but GVA at15.3%. While wider differences in growth rates in GVA and NVA of a few industries like Paper, Wood, Manf. other than transport (MotT) could be due to growth of capital depreciation or capital replacement or both, in all other industry groups shown above, growth in capital depreciation and replacement may not be too high to be accounted for.

Table: 2.3 Growth Rates of GVA of 2-digit Industries in 1956-95 (in their order of rankings)

Ind Name	Ind No.	Gr. Rt. (in descend. Order)	Ind Name	Ind No.	Gr. Rt. (in descend. Order)
Ru-P-Co	31	18.2	Paper	28	15.3
Lea..Prd	29	18.1	Met.Prd	34	15.3
EGS	41	18	Bas. MA	33	15.2
Tex Prd	26	16.5	NmMp	32	14.8
Bever'g	22	16.4	OMI	38	13.9
MotT	36	16.4	Fod Prd	21	13.2
Chem.	30	16.3	Wood Prd	27	12.9
Tran.Eq	37	15.6	Tex	25	11.8

2.4: Analysis of growth rates in Employment or number of workers (NW) absorbed in respective industries

In the following subsection, growth analysis of employment or number of workers (NW) absorbed in industries is done (Table 4.2.4) because the employment growth variable may differ from the result of output growth.

The low growth rates in employment of number of workers (NW) in most of the 2-digit manufacturing industries confirms that industries except Food Products (14.7% growth rate) are in general low labor-intensive ones in large scale, medium scale industries and in some small scale industries too. Employment growth rates ranged from 5.1% in Textile Products (IN26) to 7.7% in Rubber, Petroleum and Coal (IN31). Beverages (IN22) grows at 7.7% is followed by Leather and Leather Products (IN29) at 6.9% and Electricity, Gas and Steam (IN41) at 6.7%, while Paper and Paper Products (IN28), Chemical and Chemical Products (IN30), Non-Metallic Mineral Products (IN32), Basic Metals and Alloys (IN33), Metal Products (IN34), Machinery Other than Transport (IN36) and Transport Equipment and Parts (IN37) ranged in employment growth rates between 3.1% and 4.3%. It also reflects heavy industry strategy from 1956 to 1980s and no employment planning motivations on the part of industries (both large scale and small scale) and even to date. But influence of globalization and import liberalizations of capital inflows during the last two decades and Economic reforms of Industry, Trade, etc., New Economic Policies or Structural Adjustment and Stabilization Policies all addressed to emergence of capital Markets, Stock Markets with lower interest rates for financial, and physical fixed, working capital use, capital intensive speculative activities of real Estates, Five Star Elite Culture. No skilled, unskilled employment planning for implementation is envisaged in practice to employ them, particularly due to the last two decades brain drain of the trained and technically and professionally educated at huge costs in Indian Higher and Vocational courses, Learning Centers, financed, encouraged and helped by Globalization, Import Liberalization of Capital Inflows, Unutilization and Underutilization of capital/ capacities.

Low employment growth rate figures in Beverages (2.2%), textiles (2.3%) and other manufacturing industries (1.8%) point to lacunae in employment planning, and if properly it planned can reveal far more substantive employment absorption capacity.

Table 2.4 Growth Rates of NW of 2-digit Industries in 1956-95 (in the order of their rankings)

Ind. Name	Ind. No.	(Gr. rt. Descend. Order)	Ind. Name	Ind. No.	(Gr. rt. Descend. Order)
Food Prd	21	14.7	Tex	25	2.3
Ru-Pe-Co	31	7.7	Met.Prd	34	3.1
Bever'g	22	7.1	Wood Prd	27	2.2
Leath.Prd	29	6.9	Paper	28	3.8
EGS	41	6.7	Chem.	30	3.8
Tex Prd	26	5.1	Basic MA	33	3.9
NmMp	32	4.3	MotT	36	3.9
TransEq	37	4.3	OMI	38	1.8

2.5 Analysis of growth rates in another employment variable, i.e. WF defined as number of workers per factory in each industry NW/FACT.

The results of growth rates of work force per factory is the least in Textile Products while the rest are co-terminus with employment of workers growth rates in many cases, i.e. Machinery other than Transport (IN36), Transport Equipment and Parts (IN37), Electricity, Gas and Steam (IN41), Basic Metals and Alloys (IN33), Rubber, Petroleum and Coal (IN31), Leather and Leather Products (IN29) and Wood and Wood Products (IN27). However, employment of workers per factory (WF) growth rates were higher compared to growth in Number of Workers (NW) of Beverages (IN22), Textiles (IN25), Textile Products (IN26), Paper (IN28), Chemicals (IN30), Non-metallic mineral (IN32), Metal Products (IN34) and Other Manufacturing Industries (38). Labor Intensity is expected to be better in daily use household necessities like Food Products and Textile Products Industries but is found to be the least with respect to .criteria of number of workers per factory growth in Textile Products (IN26).

Table: 2.5 Growth Rates in Employment Per Factory in 2-digit Industries for 1956-95

(in descending Order)

Ind Name	Ind No.	Growth Rates (in descend. Order)	Ind Name	Ind No.	Growth Rates (in descend. Order)
Tex	25	7.2	Bever'g	22	5.5
Wood Prd	27	6.9	EGS	41	5.4
Ru-Pet-Co	31	6.7	Chem.	30	5.3
Leath.Prd	29	6.2	TransEq	37	5.1
Paper	28	6.2	OMI	38	4.9
NmMp	32	6.1	Basic MA	33	4.8
Food Prd	21	5.8	MotT	36	4.1
Met.Prd	34	5.7	Tex Prd	26	2.6

2.6 Analysis of growth rates in Fixed Capital (FC)

The growth rate of FC is the highest in Electricity, Gas and Steam (IN41) at 14.4%, it being a capital and fuel-intensive or their infrastructure intensive industry followed by higher growth rates of Basic Metal and Alloys (IN33), Chemical Products (IN30), Metal Products (IN34), Leather (IN29) and Non-Metallic Mineral Products (IN32) at 12.7% and 12.4%, 11.8%, 11.4% and 11.2% respectively. These are all capital intensive intermediate input based industries. This is followed by similar intermediates like Rubber, Petroleum and Coal (IN31) and further followed by consumer goods industries like Beverages (IN22), Paper (IN28), Textiles (IN25) and Capital Good like Transport Equipment and Parts (IN37) with growth rates of 10.9%, 10.7%, 10.4%, 10.1% and 10.4% respectively.

This was followed by Metal Products (34), Textile Products (IN26), Other Manufacturing Industries (IN38) and Wood Products (IN27) recording low growth rates in FC at 8.3%, 7.6%, 5.1% and 4.4% respectively. These are consumer goods and intermediates due to low intensity of fixed capital that resulted in low growth in fixed capital stock and low pace of fixed capital formation.

Table 2.6 Growth Rates of FC of 2-digit Industries in 1956 -95(in the order of their rankings)

Ind Name	Ind No.	Gr. Rt (descending order)%	Ind Name	Ind No.	Gr. Rt (descending order)%
EGS	41	14.4	Paper	28	10.4
Basic MA	33	12. 7	TransEq	37	10.4
Chem.	30	12.4	Food Prd	21	9.7
MotT	36	11. 8	Met.Prd	34	8.3
Leath.Prd	29	11 .4	Tex Prd	26	7.6
NmMp	32	11.2	Tex	25	10.2
Ru-Pet-Co	31	10 .9	OMI	38	5.1
Bever'g	22	10.7	Wood Prd	27	4.4

2.7 Analysis of Growth Rates in Capital Per Factory (KF):

All Industries growth rates in KF were admittedly low because Factories growth rates were better than fixed capital growth rates which were facing shackles of license permit economic set-up. This is seen in case of Wood Products (IN27) at 4.9% (FC growth rate was less at 4.4%), this being a labor-intensive industry. Similar Labor Intensive Textile Products (IN26) KF growth rate was at 4.7% (FC growth rate was at 7.6%). Electricity, Gas and Steam (IN41) had the highest growth rate in KF at 13.3% (as 14.4% in FC growth rate), being a high capital intensive fuel input, less in number of plants/ factories but a key to infrastructure and end use industries sectors.

Table: 2.7Growth Rates of KF of 2-digit Industries in 1956-95 (in the order of their rankings)

Ind Name	Ind No.	gr.rt (des)%	Ind Name	Ind No.	gr.rt (des)%
EGS	41	13.3	Leath.Prd	29	2.9
Met.Prd	34	5	Tex Prd	26	2.6
Wood Prd	27	4.9	Tex	25	2.6
Basic MA	33	3.6	Bever'g	22	1.9
MotT	36	3.8	Paper	28	1.8
Ru-Pet-Co	31	3.5	OMI	38	1.7
Food Prd	21	3.5	TransEq	37	0.9
Chem.	30	3.2	NmMp	32	0.7

2.8 Analysis of Growth Rates in Capital Intensity (KI2=FC/NW)

The growth rates in capital intensity of industry (KI2=FC/NW) was 9.8% in Textiles, followed by Basic Metals (IN33) at 8.7% and Chemicals (IN30) at 8.6%, all being Intermediates. Machinery Other Than Transport (IN36) at 7.8% and Electricity, Gas and Steam (IN41) at 7.8% are the other higher growth industries, both being Capital intensive. Textile Products (IN26) follow next at 8.5%. High capital intensity took place for Textiles and Textile Products due to forward linkage. Chemicals and Basic Metals' high capital intensities growth resulted due to heavy industry strategy, especially in these two, and for overall growth due to both

forward and backward linkages for the new sunrise industries of pharmaceuticals, Electrical and Electronics Machinery other than transport (36) that are capital goods industries.

The medium growth industries are Non-Metallic Mineral Products (IN32) at 6.8% growth, Paper Products (IN28) at 6.5%, Food Products (IN21) at 6.4%, Transport Equipment and Parts (IN37) at 6.1% and Metal Products (IN34) at 5.3%. In Food Products same capital intensity is due to increasing use of agricultural machinery, tractors, HYV seeds, fertilizers, irrigation pump-sets of new technology.

The low growth industries are Leather Products (IN29) at 4.5%, Other Manufacturing Industries (IN38) at 4.2%, Beverages (IN22) at3.6%, Rubber, Petroleum and Coal (IN 31) at 3.2% and Wood Industries at 2.2% for both Intermediate and Consumer Goods.

Table: 2.8 Growth Rates in KI2 for 2-digit Industries for 1956-95

Ind Name	Ind. No.	Gr.rt. (descend)%	Ind Name	Ind. No.	Gr.rt. (descend)%
Tex	25	9.8	Food Prd	21	6.4
Basic MA	33	8.7	TransEq	37	6.1
Chem.	30	8.6	Met.Prd	34	5.3
Tex Prd	26	8.5	Leath.Prd	29	4.5
MotT	36	7.8	OMI	38	4.2
EGS	41	7.8	Bever'g	22	3.6
NmMp	32	6.8	Ru-Pet-Co	31	3.2
Paper	28	6.5	Wood Prd	27	2.2

2.9 Analysis of Growth Rates of Output measured in terms of GVA/FACT and NVA/FACT

Textile Products (IN26) alone is a specific single industry group as capital intensity grew at a high of 8.5% similar to employment per factory growth but unlike low employment growth in terms of NW. This indicates growth in skilled, technical and professional category with unskilled labor being replaced or substituted by capital intensification and concomitant technology advancements.

Exceptions apart, growth rates in NVA seen to be sound for purpose of analysis of comparative growth rates of Industries in India were contributed by capital, labor and factory growth rates [as in the above pages]. Growth rates of factories in Beverages, Food, Non-Metallic, Wood and Textiles were all on the higher side which gave lower NVA per factory growth rates over the long term because of lower commensurate gains in outputs.

Table: 2.9 Growth Rates of Output Measured in terms of GVA/FACT and NVA/FACT

O1F	O1F	O1F	O2F	O2F	O2F
Ind Name	Ind No.	gr.rt(des)%	Ind Name	Ind No.	gr.rt(des)%
EGS	41	16.8	EGS	41	16.9
OMI	38	9.1	Tex Prd	26	9.8
Leath.Prd	29	8.8	OMI	38	8.2
Tex Prd	26	8.8	Leather	29	7.4
MotT	36	8.8	MotT	36	7.0
Chem.	30	7.2	Food Prd	21	6.3
Food Prd	21	7.0	TransEq	37	5.5
Basic MA	33	6.4	Ru-Pet-Co	31	5.2
Met.Prd	34	6.4	Basic MA	33	5.1
TransEq	37	6.2	Met.Prd	34	4.8
Paper	28	5.8	Chem.	30	4.1
Tex	25	4.4	Bever'g	22	3.3
NmMp	32	4.4	Paper	28	3.2
Wood Prd	27	3.7	Tex	25	3.0
Ru-Pet-Co	31	3.7	NmMp	32	2.7
Bever'g	22	3.7	Wood Prd	27	1.9

3 Partial Productivity Measures:

This section deals with analysis of growth rates in Labor productivity and capital productivity of 2-digit Indian Industries over 1956-95.

3.1 This sub-section deals with growth rates in capital productivity measures.

Growth Rates of K1P (=GVA/FC) and K2P (=NVA/FC) of 2-digit Industries in 1956-95

Both K1P and K2P give similar results in respect of growth rates and ordering of industries, though differing marginally. Capital Productivity growth of Textile Products (IN26) influenced positively its NVA and GVA growth rates. Similar inferences of positive impact of capital productivity growth rates on NVA and GVA growth rates can be drawn for OMI (IN38), EGS (IN41), Leather (IN29), Wood (IN27), Rubber, Petroleum and Coal (IN31), Beverages (IN22), Transport (IN37), Metal Products (IN34), Chemicals (IN30), Machinery other than transport (IN36), Basic Metals and Alloys (IN33), Paper (IN28), NmMP (IN32), Textiles (IN25) all nearly but not strictly in that order of industries.

This finding signifies the role of Fixed Capital, its intensity and its Productivity in all registered large, medium and small industries, while increasing scale of operation might influence positively each other's capital, its intensity and productivity, also due to upgraded technology absorption, modernization, forward and backward linkages improved over time of planning and markets for capital (physical and financial) and commodity trade, globalization, liberalization, economic reforms applicable to All Industries without distinctions of process, input or end use bases.

Table: 3.1 Growth Rates of K1P and K2P of 2-digit Industries in 1956-95 (in the order of their rankings)

K1P	K1P	K1P	K2P	K2P	K2P
Ind Name	Ind No.	gr.rt(des)	Ind Name	Ind No.	gr.rt(des)
OMI	38	9.8	Tex Prd	26	9.600
Tex Prd	26	8.9	OMI	38	8.900
Wood Prd	27	8.6	Wood Prd	27	6.700
Ru-Pet-Co	31	7.4	Tex	25	5.600
Leath.Prd	29	6.5	Leath.Prd	29	5.600
Bever'g	22	5.8	Met.Prd	34	5.400
Met.Prd	34	5.2	Ru-Pet-Co	31	4.900
TransEq	37	5.2	TransEq	37	4.600
Paper	28	4.8	Bever'g	22	5.300
Tex	25	4.8	EGS	41	3.500
MotT	36	4.7	MotT	36	3.100
Chem.	30	3.9	Food Prd	21	2.900
NmMp	32	3.7	Paper	28	2.900
EGS	41	3.6	NmMp	32	1.900
Food Prd	21	3.5	Chem.	30	1.800
Basic MA	33	2.4	Basic MA	33	1.100

3.2 Growth rate of Labor Productivity measured in terms of L1P (=NVA/NW) and L2P (=GVA/NW) for 2-digit Indian Industries in the period 1956-95

Labor Productivity (L1P and L2P) contributed to NVA and GVA growth in Other Manufacturing Industries (IN38), Electrical and Non-Electrical Machinery other than Transport (IN36), Metal Products (IN34), Transport Equipment (IN37), Textile Products (IN26) etc. This contributed to work force growth, these in turn to labor intensity, irrespective of their being distinctive in input base and market base character. This finding is also due to economies of increasing scale of operation of all Registered Industries labor absorption intensity (both skilled and unskilled) and influenced positively by their capital intensity. This analysis leads to the conclusion that scale of operation might lead to both factor intensification and to both factor productivities and in turn to NVA and GVA growth rates in all industries as experienced in India since 1948-50 that includes 35 years of centralized (direct and Indirect) planning regime and two decades of liberalization, globalization, privatization, economic reforms New Economic Policies (Structural Adjustment and Stabilization), market friendly regime that caused for capital intensification complementary to labor absorption of skilled category.

It is learnt from the earlier analysis of growth rates of industries' size variables, factor intensity and factor productivities in Indian Industries during 1956-95 that all are complementary and reinforcing each other without enabling a major distinction between process based or input based industries and market based industries (end-Use) based industries and /or for a choice between centralized planning regulated regime (1950-80) and /or recent two decades of market friendly, liberalization, globalization, privatization. However, all the results of growth rates analysis envisage the significant role and impact of technical progress or TFP in many sectors associated with all industries, sub-sectors during 55 years. Accordingly, analysis is extended to trace growth differentials in TFP measures of Kendrick, Domar and Solow for 2-digit industries in

40 years period, i.e., 1956-95.

Table: 3.2 Growth rate of Labor Productivity measured in terms of L1P (= NVA/NW) and L2P (=GVA/NW) in 2-digit Indian Industries in 1956-95 (in the order of their rankings)

L1P	L1P	L1P	L2P	L2P	L2P
Ind Name	Ind No.	gr.rt(des)%	Ind Name	Ind No.	gr.rt(des)%
OMI	38	19.1	OMI	38	14.4
Tex Prd	26	12.2	Chem.	30	12.5
EGS	41	11.5	MotT	36	12.5
MotT	36	11	Met.Prd	34	12.3
Met.Prd	34	10.6	Tex	25	11.6
TransEq	37	10.5	Tex Prd	26	11.5
Leath.Prd	29	10.1	Paper	28	11.5
Basic MA	33	9.9	GEGS	41	11.4
Tex	25	9.7	TransEq	37	11.3
Paper	28	9.4	Basic MA	33	11.3
Chem.	30	9.4	Leath.Prd	29	11.1
Food Prd	21	9.2	Wood Prd	27	10.8
Bever'g	22	9	NmMp	32	10.5
Wood Prd	27	8.9	Ru-Pet-Co	31	10.4
NmMp	32	8.8	Food Prd	21	9.8
Ru-Pet-Co	31	8.1	Bever'g	22	9.4

3.3 TFP Growth Rates measured in terms of Kendrick, Domar, Solow.

Total Factor Productivity arises only when output growth is more than what is /are contributed growth in each factor input of all inputs/factors together. It means an additional output growth caused by an unknown factor termed Technical Progress that can be/is due to change in combination of inputs or factors or output process change or to technology change. Thus TFP growth is due to Technical Progress in processes or to technology advancement/up-gradation/modernization in technical processes constituted in Industry.

Wood Industry (IN27) showed maximum TFP growth rate due to Kendrick (9%) and Domar (7.3%). While its rank has fallen due to Solow at a growth of 1.3%, [this may be due to changing current year weights in Solow different from the comparable fixed base year weights in Domar and Kendrick formula] the highest TFPG was reached by Rubber Petroleum and Coal Industry (IN31) at 2.3%. IN31 was in second position in Kendrick and Domar. Growth in TFP differed due to three authors' measures in Non-Metallic Mineral Products (IN32), Wood (IN27), Transport (IN37).

The lowest TFP growth was seen in Chemicals (IN30), Textiles (IN25). While Chemicals was a sunrise industry, Textiles growth spurted in 1970s and 1980s. Since Chemicals being a capital- intensive industry does have further scope to raise growth it thus may become a 'leading' industry if TFPG can be further exploited. Textiles (IN25) is subject to further capital injection and efficiency, this being a Labor-intensive industry and is actually the highest in rank in capital intensity in our study and hence is a cause for growth.

Ambiguous or inconsistent result is seen in Paper (IN28) and Food (IN21). Paper Industry (IN28) had good growth due to Domar but, along with Beverage, Food, all three being labor intensive, and less relatively capital intensive in our study, showed scant TFP growth due to Solow. Managerial deficiencies are likely prime reason for low TFPG in labor intensive industries. The culture of high labor turnover, holidays, seasonal character of agriculture both in food crops and cash crops, high disguised unemployment in agriculture, high population and dependency burden-all these mar rise in productivity in these L-intensive industries.

Wood Industry (IN27) TFPG is highest in Kendrick and Domar. As wage rates in forest based products are abysmally low and tribal population being a high % tage of total population in India, cost of procurement of forest produce for Wood Industry is very low and consequently the value attached to growth in money terms turned out to be high.

Rubber Petroleum and Coal (IN31) showed High TFPG, this being a high K intensive industry and petroleum being found short in extraction leading to high prices may not be able to meet high demand growth and its capacity to act as a leading sector in India's economic and industrialization may be limited.

Electricity, Gas and Steam (IN41) showed higher growth well but will need further power reforms with greater decentralization and expansion. Textile Products (IN26) need input-output linkages between Textiles and Textile Products, with their capital intensity providing a case for augmenting Labor intensity and for capturing Asian, European and American markets. Basic Metals and Alloys (IN33) also another promising Intermediate industry, can be another leading industry if wage costs are kept down at reasonable levels. Smaller states are coming up and demand in those directions is increasing, Basic Metals and Alloys (IN33) will be one of the best leading Industries for growth in Indian Industry and economy followed by Other Manufacturing Industries (IN38) and Electrical and Non Electrical machinery other than Transport (IN36).

Transport Equipment (IN37) and Metal Products (IN34) though not causing alarm, can raise themselves up to serve as effective channels of growth.

Table: 3.3 TFP Growth Rates of Kendrick, Domar, Solow of 2-digit Industries in 1956-95 (in the order of their rankings)

Ind Name	Ind No.	Kendrick (%)	Ind Name	Ind No.	Domar(%)	Ind Name	Ind No.	Solow(%)
Wood Prd	27	9.0	Wood Prd	27	7.3	Ru-Pet-Co	31	2.3
Ru-Pet-Co	31	6.44	Ru-Pet-Co	31	4.17	Tex Prd	26	2.1
EGS	41	4.9	BM&A	33	3.45	EGS	41	1.9
NmMP	32	4.6	Paper Prd	28	2.74	BM&A	33	1.8
BM&A	33	4.5	Tex Prd	26	2.51	TrE&P	37	1.7
Food Prd	21	4.46	Leath Prd	29	2.26	Met Prd	34	1.6
Tex Prd	26	4.32	EGS	41	2.1	MotTr	36	1.5
OMI	38	4.31	MotTr	36	1.94	OMI	38	1.4
Beverage	22	4.28	Food Prd	21	1.91	NmMP	32	1.4
Leath Prd	29	3.84	Beverage	22	1.55	Wood Prd	27	1.3
MotTr	36	3.58	Textiles	25	1.47	Textiles	25	1.3
Met Prd	34	3.51	Met Prd	34	1.43	Paper Prd	28	1.0
TrE&P	37	3.4	TrE&P	37	1.38	Beverage	22	1.0
Paper Prd	28	2.97	OMI	38	1.37	Food Prd	21	1.0
Textiles	25	1.96	Chem	30	1.32	Leath Prd	29	0.8
Chem	30	1.91	NmMP	32	1.11	Chem	30	0.6

4 Analysis of Relative Rankings of Industries

This Section deals with results and analysis of relative rankings of industries in terms of growth rates of Factories, Employment, Fixed Capital, Net Value Added, Gross Value Added vis-à-vis All Industries growth rates in the corresponding variables.

Food Products (IN21) and Electricity, Gas and Steam (IN41) top the rankings of concerned variables such as Factory growth rate, Workers, Fixed Capital, NVA, GVA of Industries vis-à-vis All India Industries, though first two variables and latter three variables grew in opposite ways.

EGS Industry tops rank in FC, NVA, GVA but is ranked 13th in factory growth rate and 5th in Employment (NW) growth rate. EGS being capital intensive does well in output growth rates that were fuelled by higher Fixed Capital Input.

Food Products (IN21), a Labor Intensive Industry, did grow well with high employment (NW) growth particularly due to horizontal, decentralized spread of factories though NVA and GVA of IN21 were low due to lower productivities even with increasing capital, both Fixed and Productive. Measures to improve Labor productivity will go a long way to improve NVA and GVA growth rates.

Next in order of rankings in NVA growth were Textile Products, Leather, Beverages, Rubber, Petroleum and Coal. Textile Products being a labor Intensive Industry had shown remarkable consistency in showing higher Labor productivity growth of both L1P and L2P and in turn particularly of Labor Productivity (L1P) on employment Growth rate. Despite a lower FC growth rate rankings, those industries had high ranks of NVA

and GVA growth rate.

Though Leather (IN29) and Beverage (IN22) are traditionally Labor Intensive Industries, they had FC growth more than Factories growth that propelled to higher output growth rankings. Rubber, Petroleum and Coal (IN31) being Capital-Intensive had higher Output growth ranks due to higher FC growth. Employment Growth rates in Rubber, Petroleum and Coal (IN31) and in Transport Equipment (IN37) raised NVA and GVA growth rates in these industries due to their higher Capital Intensities and TFPG.

However, lower growth rates in some Intermediates and Consumer Goods industries were due to low factor productivities and low TFP growth.

The desired need and rational principle lie in both capital and skilled and unskilled labor intensification in all industries of all states, union territories and in their rural backward regions as to minimize unemployment, underemployment, regional disparities and to increase industrial growth of small, medium and large scale industries, with high linkages [forwards and backward,] of ancillary and parent units that provide wage goods to reduce inflation, poverty, inequality. Next in importance come the capital goods, Basic Goods and Intermediates to enable high rate of capital formation, economic growth and development followed by household durable consumer goods, house construction materials, electricity gas and water supplies to households of lower middle income, and to enhance levels of living of masses. Durable goods of the elite, top rich group consumption in five star hotels, scandals of brokers, speculators, politicians, top bureaucrats and corporate managers and professional executives in governments and MNCs Business Houses, Banks, Companies, etc should receive the lowest priority.

Industrial and Trade Policies should address to issues pertaining to generation of employment of labor, balanced regional development, even distribution of assets, income work opportunities to all in India to meet social and economic goals of Five year Plans and also to the current decades of export led import liberalization strategies of industrialization, and need for reduction of brain drain and skills trained at huge costs in higher education in India that fetches better growth and amenities for developed countries at cost of underdeveloped ones.

Table 4 Ranking of Industries in terms of growth rates of Factories, Emp, FC, NVA, GVA vis-à-vis All Industries growth Rates in the corresponding variables (in the order of higher to lower for each variable growth rates)

Fact	Fact	Fact	Emp	Emp	Emp	FC	FC	FC	NVA	NVA	NVA	GVA	GVA	GVA
I.Name	Ind No	$\hat{\beta}$	I.Name	Ind No	$\hat{\beta}$	I.Name	Ind No	$\hat{\beta}$	I.Name	Ind No	$\hat{\beta}$	I.Name	Ind No	$\hat{\beta}$
Food	21	33.1	Food P	21	14.7	EGS	41	14.4	EGS	41	18.1	EGS	41	18.1
Leath.	29	19.2	Ru-P-Co	31	7.7	B.M&A	33	12.7	Tex Prd	26	17.2	Tex Prd	26	17.2
Met.Prd	34	18.9	Bev	22	7.1	Chem	30	12.4	Leather	29	17.1	Leather	29	17.1
Tex	25	17.5	Leather	29	6.9	MotT	36	11.8	Bev	22	15.9	Bev	22	15.9
Ru-P-Co	31	14.5	EGS	41	6.7	Leather	29	11.4	Ru-P-Co	31	15.9	Ru-P-Co	31	15.9
Bev	22	12.6	Tex.Prd	26	5.1	NmMP	32	11.2	MotTr	36	14.9	MotTr	36	14.9
MnMP	32	10.4	Tr.Eq	37	4.3	Bev	22	10.7	Tr.Eq	37	14.9	Tr.Eq	37	14.9
Paper	28	10.1	B.M&A	33	3.9	Ru-P-Co	31	10.9	OMI	38	13.1	OMI	38	13.1
Trs Eq.	37	9.4	NmMP	32	4.3	All-Indus	All-Indus	10.5	All-Indus	All-Indus	13.9	All-Indus	All-Indus	13.9
Chem	30	9.2	MotT	36	3.9	Tr.Eq	37	10.4	B.M&A	33	13.7	B.M&A	33	13.7
Wood	27	9.2	Chem	30	3.8	Paper	28	10.4	Met.Prd	34	13.7	Met.Prd	34	13.7
B.M&A	33	8.8	Paper	28	3.8	Tex	25	10.2	Paper	28	13.3	Paper	28	13.3
All-Ind	All-Ind	8.8	All-Indus	All-Indus	3.2	Food P	21	9.7	Chem	30	13.2	Chem	30	13.2
EGS	41	1.2	Met.Prd	34	3.1	Met.P	34	8.3	NmMP	32	13.2	NmMP	32	13.2
OMI	38	5.8	Tex.	25	2.3	Tex.Prd	26	7.6	Food P	21	12.6	Food Prd	21	12.6
Tex Prd	26	7.7	Wood	27	2.2	OMI	38	5.1	Wood	27	11.1	Wood	27	11.1
MotT	36	7.9	OMI	38	1.8	Wood	27	4.4	Tex.	25	10.1	Tex.	25	10.1

5. Causal Relations to Influence TFP Growth, GVA, NVA, Employment Growth and their Determinants in Indian Industries.

This Section 5 traces the causal relations between TFP Growth, GVA and NVA Growth and each one's determinants through estimated linear regressions of TFP= f (K/L), NVA =f(TFP), GVA= f(TFP), GVA= f(labor Productivity), NVA = f(Labor Productivity), GVA = f (Capital Productivity), GVA= f (Capital Intensity), NVA= f (K/L), NVA= f(Capital Productivity), Employment (NW)= f (K/L), NW= f(TFP), NW= f(Labor Productivity), NW= f(Capital Productivity). TFP is of Solow as mentioned earlier.

5.1 Analysis of Influence of Capital Intensity (K/L) on TFP of Solow

The growth of TFP influenced by Capital Intensity was in Beverages (IN22) at 24.861%, followed by Textile Products (IN26) at 12.461% and Wood Products (IN27) at 11.22%, Textiles at 10.58%, leather Products at 10.55%, Food Products (IN21) at 8.6 followed by Metal Products (IN34) at 6.097% and Other Manufacturing Industries (IN38) at 4.879%.

The influence of Capital Intensities on TFPG was lower in Electricity, Gas and Steam (IN41) at 4.46% followed by Transport Equipment (IN37) at3.94%, Paper (IN28) at 3.77% and Machinery other than transport (IN36) at 3.7% Non metallic Mineral Products at 2.93%, Chemicals at 2.99% and Rubber, Petroleum and Coal at 1.75%, followed by the lowest in Basic Metals and Alloys (IN33) at 1.1%. These findings are contrary to usual notion that higher the capital intensity growth higher will be the TFPG in capital intensive industries, followed by less influence in Intermediates and very much less TFPG in consumer goods industries. However, the empirical verification indicated contrary results that in consumer goods like Beverages, Textile Products, Wood Products, Textiles, Leather products, Food Products, EGS, OMI TFP growth was influenced more by their capital intensity than in capital goods and intermediate goods Industries in India, which is a welcome trend to meet wage goods shortages.

Table: 5.1 Growth in TFP of Solow in response to capital intensity for 1956-95

Industry Name	Industry Number (IN)	$\hat{\beta}$
Beverages	22	24.861
Textile Products	26	12.461
Wood and Wood products	27	11.22
Textiles (23+24+25)	25	10.575
Leather and Leather Prd.	29	10.549
Food Products	21	8.613
Metal Products	34	6.097
Other Manf. Industries	38	4.879
Electricity, Gas and Steam	41	4.45
Transport Equip. Parts	37	3.941
Paper and Paper Products	28	3.778
Machinery o.t. Transport	36	3.704
NmMP	32	2.927
Chemicals	30	2.288
Rubber-Petroleum & Coal	31	1.75
Basic Metals and Alloys	33	1.102

5.2 Influence of TFP on NVA, GVA and Employment in Indian Industries for 1956-95

Growth in NVA and GVA in response to TFP by Solow

Table: 5.2.1 Growth in NVA and GVA in Response to TFP by Solow for 1956-95

NVA= a +b (TFP); GVA= a +b (TFP)

NVA	NVA	NVA	GVA	GVA	GVA
Ind Name	INCode	$\hat{\beta}$ in NVA	Ind Name	INCode	$\hat{\beta}$ (GVA)
EGS	41	2.557	Met. Prd.	34	1.914
Tex	25	2.484	Beverage	22	1.816
MotTr	36	2.466	OMI	38	1.576
BM&A	33	2.436	Leather	29	0.806
Ru-Pet-Co	31	2.433	Mac.otTr.	36	0.768
Food	21	2.354	Transport	37	0.626
Chem	30	2.351	R-Pet-C	31	0.579
TrEq	37	2.335	Food Prd	21	0.528
NmMP	32	2.24	Paper	28	0.526
Paper	28	2.215	EGS	41	0.519
Met Prd	34	2.179	NmMP	32	0.462
Bev	22	2.138	Chemical	30	0.45
OMI	38	1.977	Bas M&A	33	0.434
Tex.Prd	26	1.846	Textiles	25	0.426
Wood	27	1.846	Tex Prd	26	0.357
Leather	29	1.773	Wood Prd	27	0.118

In Electricity, Gas and Steam (IN41) NVA growth had maximum influence of TFP growth (Solow) with b^ at 2.557 followed by Textile (IN25) at 2.48 and then by Electrical and Non-Electrical Machinery Other Than Transport (IN36)) at 2.47, Basic Metals and Alloys (IN33), Rubber, Petroleum and Coal (IN31) in that descending order.

The lowest influence was revealed in Leather (IN29) where b^ was the lowest at 1.77, only preceded by Wood (IN27) and Textile Products (IN26) at 1.85.

Influence of TFPG on GVA growth had the maximum influence in Metal Products Industry (IN34), followed by Beverages (IN22). However, Leather takes the 4th position whereas Electricity, Gas and Steam (IN41) takes the 10th position.

Wood (IN27) and Textile Products (IN26) had the lowest influences of TFPG on growth of both output (GVA and NVA) measures.

5.2Analysis of Influence of TFP on employment of 2-digit Industries for 1956-95

The influence of TFP on employment growth measured in terms of number of workers (NW) was highest in case of Metal Products (IN34), followed by Manufacturing other than Transport (IN36) and Beverages (IN22). So TFP influence for raising employment growth is imperative both in capital intensive and labor intensive industries. The lowest influence is seen in case of Wood (IN27) led by Basic Metals and

Alloys (IN33), Paper (IN28), Textiles (IN25) employment growth.

Table: 5.2.2. Growth in Employment in Response to TFP in 2-digit Industries for 1956-95

Ind.Name	Ind	$\hat{\beta}$	Ind.Name	Ind	$\hat{\beta}$
Metal Prd	34	1.612	Leather	29	0.583
MotTr	36	1.425	Tex.Prd	26	0.553
Beverage	22	1.372	NmMP	32	0.374
Chem	30	1.309	Tr.Eq	37	0.361
Food	21	1.249	Textiles	25	0.241
Ru-Pet-Co	31	1.047	Paper	28	0.145
OMI	38	0.739	BM&A	33	0.106
EGS	41	0.682	Wood	27	0.092

5.3 Analysis of Influence of Capital Productivity on Gross Value Added, NVA and Employment in Indian Industries for 1956-95

Table: 5.3.1. Growth in GVA in response to capital productivity

Ind.Name	In	$\hat{\beta}$	Ind.Name	In	$\hat{\beta}$
NmMP	32	1.64	Textile	25	0.476
Paper	28	1.581	MotTr	36	0.44
Beverage	22	1.135	Metal Prd	34	0.318
Leather	29	0.971	Tr.Eq	37	0.315
Food Prd	21	0.803	Tex.Prd	26	0.266
Chem	30	0.768	BM&A	33	0.18
Ru-P-Co	31	0.559	Wood	27	0.067
OMI	38	0.557	EGS	41	0.041

The influence of capital productivity on growth of GVA was highest in case of non-metallic mineral products (IN32), followed by Paper (IN28), Beverage (IN22), Leather (IN29) and Food (IN21), Chemicals (IN30), Rubber, Petroleum and Coal (IN31) and Other Manufacturing Industries (IN38).

The lowest influence of capital productivity on GVA growth was seen in case of Electricity, Gas and Steam (IN41) inspite of its capital intensity. Similarly, Textile products (IN26) and Transport Equipment (IN37) are also on the lower side, inspite of capital intensity of IN37 and Labor Intensity of IN26.

Analysis of Influence of Capital Productivity on Net Value Added (NVA)

Table: 5.3.2. Growth in NVA in response to Capital Productivity in 2-digit Industries for 1956-95

Ind. Name	Ind	$\hat{\beta}$	Ind. Name	Ind	$\hat{\beta}$
Beverage	22	1.511	BM&A	33	0.482
Leather	29	1.275	NmMP	32	0.32
Ru-Pet-Co	31	1.162	Tex.Prd	26	0.293
Paper	28	0.972	Textiles	25	0.232
Food	21	0.87	Wood	27	0.079
Met.Prd	34	0.834	Tr.Eq	37	0.065
Chem	30	0.75	MotTr	36	0.064
OMI	38	0.686	EGS	41	0.048

The influence of capital productivity on NVA was maximum in case of Beverages (IN22), followed by Leather (IN29), Rubber, Petroleum, and Coal (31), Paper (IN28) and Wood (IN27), Metal Products (IN34), Chemicals (IN30), Other Manufacturing Industries (IN38), Basic Metals and Alloys (IN33) and Non-Metallic Mineral Products (32).

Analysis of effect of Capital Productivity on Industries' Employment for the period 1956-95

Table: 5.3.3. Growth in Industries' employment (NW) in response to capital productivity in Indian Industries for 1956-95 (in Descending Order)

Ind. Name	Ind.	$\hat{\beta}$	Ind. Name	Ind.	$\hat{\beta}$
Leather	29	1.375	Chemicals	30	0.316
Beverage	22	0.924	BM&A	33	0.281
Ru-Pet-Co	31	0.477	Wood	27	0.098
Food	21	0.396	OMI	38	0.096
Paper	28	0.383	Metal Prd	34	0.079
NmMP	32	0.373	Tex.Prd	26	0.063
MotTr	36	0.33	EGS	41	0.058
Textiles	25	0.318	Tr.Eq	37	0.058

Leather (IN29) shows the maximum influence of capital productivity on growth rate of employment (NW) followed by Beverages (IN22), Rubber-Petroleum and Coal (IN31) and Food (IN21) in descending order. So, employment in Labor -intensive industries also need to be enhanced through increase in efficiency of capital productivity. Chemicals (IN30) takes the 9th position, followed by Basic metals and Alloys (IN34) and Wood (IN27). The lowest influence was in Electricity, Gas and Steam (IN41) and Transport Equipment (IN37), showing b^ of 0.058.

5.4 Analysis of Influence of Capital Intensity on Gross Value Added, NVA and employment in Indian Industries in 1956-95:

The influence of capital intensity on growth of output in terms of GVA is highest in case of Electricity, Gas and Steam (IN41) followed by Textile Products (IN26), Leather (IN29) and Other Manufacturing Industries (IN38) in descending order. The least influence is seen in Metal Products (IN34). Capital intensive industries such as Chemicals (IN30), Rubber-Petroleum and Coal (IN31) and Basic Metals and Alloys (IN33) show least influences of capital intensity on GVA growth.

Table: 5.4.1 Growth in GVA in response to Capital Intensity in Indian Industries for 1956-95: (in Descending Order)

Ind.Name	I.N.	$\hat{\beta}$	Ind.Name	I.N.	$\hat{\beta}$
EGS	41	1.346	Food Prd	21	0.991
Tex.Prd	26	1.296	Paper	28	0.982
Leather	29	1.272	Textiles	25	0.925
OMI	38	1.255	Wood	27	0.821
Tr.Eq	37	1.229	Chem	30	0.682
MotTr	36	1.128	Ru-Pet-Co	31	0.556
Beverage	22	1.051	BM&A	33	0.547
NmMP	32	1.001	Metal Prd	34	0.475

Analysis of effect or influence of Capital Intensity on Net Value Added:

The growth in NVA is most influenced by capital intensity in case of Leather (IN29) followed by Textile products (IN26), Electricity, Gas and Steam (IN41). Food (IN21) occupies 9th position in the descending scale. Beverages (IN22) is 6th while, Chemicals (IN30) is 15th. The lowest position i.e. 16th position is in Rubber-Petroleum and Coal (IN31).

Table:5.4.2 Influence of KI_2 (FC/NW) on Net Value Added (NVA) in each of the 2-digit Industries for 1956-95 (in Descending Order)

Ind.Name	I.N.	$\hat{\beta}$	Ind.Name	I.N.	$\hat{\beta}$
Leather	29	1.346	Food	21	1.002
Tex.Prd	26	1.32	NmMP	32	0.927
EGS	41	1.19	Metal Prd	34	0.871
Tr.Eq	37	1.16	Wood	27	0.854
OMI	38	1.088	Textiles	25	0.792
Beverage	22	1.077	Paper	28	0.767
MotTr	36	1.059	Chem	30	0.63
BM&A	33	1.03	Ru-Pet-Co	31	0.565

Analysis of Influence of Capital Intensity on Employment

Transport Industry (IN37) shows maximum growth in employment (NW) in response to capital intensity with b^ showing 1.16, followed by Textile Products (IN26) and Rubber, Petroleum and Coal Industry (IN31). So capital intensity is important for employment growth even in capital intensive industries as in IN37 and IN31. The need of K/L increase in EGS is also vindicated here even in context of need for higher employment growth.

The lowest influence of capital intensity on employment (NW) growth is in textiles (IN25). Wood (IN27) and Manufacturing other than transport (IN35+36=36) also shows low influence of capital intensity on employment growth. Thus the need of the textile sector for employment increase is less in raising in capital intensity.

Table: 5.4.3 Growth in employment (NW) in response to capital intensity for 2-digit All India Industries for 1956-95 (in Descending Order)

Ind.Name	Ind	$\hat{\beta}$	Ind.Name	Ind	$\hat{\beta}$
Tr.Eq	37	1.161	Metal Prd	34	0.353
Tex.Prd	26	0.656	Paper	28	0.349
Ru-Pet-Co	31	0.646	BM&A	33	0.264
EGS	41	0.515	Chem	30	0.229
Leather	29	0.501	Food	21	0.224
Beverage	22	0.418	MotTr	36	0.149
OMI	38	0.412	Wood	27	0.055
NmMP	32	0.386	Textile	25	0.041

5.5 Analysis of Influence of Labor Productivity on Net Value Added, GVA and Employment- Analysis is done here for Results showing growth in NVA, GVA and NW due to the influence of Labor Productivity.

The influence of labor productivity on NVA growth rate was maximum in case of Rubber-Petroleum and Coal (31), followed by Textile Products (IN26), Beverages (IN22) and Other Manufacturing Industries (IN38). The lowest influence is in Chemicals (IN30) as it was in case of influence of labor productivity on GVA growth rate. Food Industry, Textile, Wood also showed lack of influence of labor productivity on NVA growth, these being L-intensive industries.

Table: 5.5.1. Growth in Industries output (NVA) in response to L-productivity for 2-digit Industries for 1956-95

Ind.Name	Ind	$\hat{\beta}$	Ind.Name	Ind	$\hat{\beta}$
Ru-P-Co	31	1.727	MotTr	36	1.129
Tex.Prd	26	1.372	BM&A	33	1.12
Beverage	22	1.284	NmMP	32	1.034
OMI	38	1.263	Wood	27	1.025
Leather	29	1.248	Textile	25	0.969
Tr.Eq	37	1.189	Food Prd	21	0.855
Met Prd	34	1.166	Chem	30	0.739
Paper	28	1.157			

Influence of Labor Productivity on GVA Growth in Indian 2-digit Industries for 1956-95

In other Manufacturing Industries (IN38), Transport Equipment (IN37), EGS (IN41) though capital Intensive, the growth rates in GVA were influenced to the maximum by their Labor Productivities. Food products assumed the 15th Position, though it is a Labor Intensive Industry. Its productivity is not a concern for units selling in a local market Rubber, Petroleum and Coal (IN31) showed the lowest influence of Labor productivity on GVA growth, being a Capital Intensive Industry.

Table: 5.5.2 Growth in GVA in Response to Labor Productivity for Indian Industries for 1956-95 (in Descending Order)

Ind.Name	IN	$\hat{\beta}$	Ind.Name	IN	$\hat{\beta}$
OMI	38	1.331	M.ot.Tr	36	1.107
Transport	37	1.261	Textile	25	1.086
EGS	41	1.246	Ba.M&A	33	1.078
Tex.Prd	26	1.221	NmMP	32	1.06
Met.Prd	34	1.203	Wood	27	1.026
Beverage	22	1.197	Chemical	30	0.989
Paper	28	1.158	Food Prd	21	0.756
Leather	29	1.15	Ru-P-Co	31	0.661

Analysis of influence of Labor Productivity of 2-digit Industries on Employment for 1956-95

The influence of labor productivity on employment (NW) growth was maximum in case of Leather (IN29), followed by Textile Products (IN26) and Rubber-Petroleum and Coal (IN31). Food (IN21) takes 10th position.

The least influence was in Textiles (IN25), though this is a Labour-intensive industry. Its Employment growth recorded a low figure too. Transport Equipment (IN37) and Wood (IN27) also showed low influence of Labour-productivity on growth of employment in terms of NW. These two need more infusion of capital and greater increase of capital productivity and TFP.

Table: 5.5.3. Growth in Industries' employment (NW) in response to Labor productivity in 2-digit Industries for 1956-95

Ind.Name	Ind	$\hat{\beta}$	Ind.Name	Ind	$\hat{\beta}$
Leather	29	0.697	OMI	38	0.324
Tex.Prd	26	0.648	Food	21	0.318
Ru-Pet-Co	31	0.483	MotTr	36	0.309
NmMP	32	0.396	Metal Prd	34	0.288
EGS	41	0.379	BM&A	33	0.283
Chemical	30	0.378	Tr.Eq	37	0.166
Beverage	22	0.361	Wood	27	0.072
Paper	28	0.352	Textiles	25	0.013

6 Analysis of Returns to Scale through Cobb-Douglas Production Function Estimation for 2-digit Industries for 1956-95.

Returns to Scale is an aggregate performance of Factors and Inputs in terms of sum of output elasticities of factors and inputs whichever are employed and contributed to output. These elasticities are independent of their scale, origin and Unit (s) measurements, hence the sum, each being a pure number can be obtained by adding them. Thus we get >1(IRS), <1(DRS) and =1(CRS)

Table:6.

956-95	1956-95	1956-95	1956-95	1956-65	1956-65	1966-75	1966-75	76-85	76-85	1986-95	1986-95
I. Name	IN	a+b	Ind.Name	IN	a+b	IN	RS	IN	a+b	IN	RS
extiles	25	1.88	Tex.Prd	26	5.13E+00	33	3.8	33	4.34	31	7.69
emical	30	1.777	Leather	29	1.48E+00	25	2.68	41	2.67	32	5.61
mMP	32	1.646	Beverag	22	1.44E+00	28	2.54	36	2.6	28	4.68
ac.Ot.T	35+36	1.346	NmMP	32	1.33E+00	26	2.15	25	2.35	36	3.28
etalPrd	34	1.309	Chemical	30	1.18E+00	22	1.13	31	2.33	25	2.81
Food	20+21	1.286	Textile	25	1.13E+00	27	1.55	27	2.3	30	2.76
ansport	37	1.24	MetalPrd	34	1.06E+00	38	1.84	34	2.12	27	2.17
Wood	27	1.239	Food	21	1.05E+00	34	1.7	30	1.79	33	1.8
OMI	38	1.2	Paper	28	9.66E-01	32	1.52	38	1.69	34	1.79
EGS	40+41	1.197	Transport	37	9.18E-01	30	1.51	32	1.67	41	1.67
ex. Prd.	26	1.157	EGS	41	8.94E-01	36	1.48	29	1.42	29	1.41
eather	29	1.123	Wood	27	7.98E-01	21	1.41E+0	26	1.19	26	1.38
everag	22	1.11	Mac.ot Tr.	36	7.21E-01	29	1.24	37	1.22	37	1.32
Paper	28	1.0581	Bas M&A	33	6.84E-01	31	1.19	22	1.06	21	1.27
u-P-Co	31	0.808	OMI	38	6.24E-01	41	1.15	21	0.699	38	1.1
s.M&A	33	0.57	Ru-P-Co	31	5.97E-01	37	0.767	28	0.601	22	0.818

Notes: IRS- Increasing returns to Scale. CRS- Constant Returns to Scale. DRS- Decreasing returns to Scale.

Increasing returns to scale in 40 year period 1956-95 was noted in Textiles (IN25) followed by Chemicals (IN30), Non-metallic Minerals (IN32) and Machinery other than transport (IN36), Metal Products (34), Food (21), Transport Equipment and parts (37), Wood (27), Paper (28) in descending order. But scale economies do not necessarily reflect growth in NVA, GVA or Employment growth or factories growth rate. Thus scale economies constitute a factor for entry and exit of firms in the industry. The rest of the industries had constant returns to scale (CRS).

The decades show temporal shifts in the industries' relative scale economies. Textiles (IN25) had 6th position from above in descending order, but it shifted to 5th position in 1966-75. In the next two decades it got relegated to 5th and 6th position respectively. Thus Textiles has been reaping scale economies constantly and the recession period did not dampen scale economies.

In the period 1956-65, Textile Products (26), Leather and Leather Products (29), Beverages (22), Non-Metallic Mineral Products (32), Chemical and Chemical Products (30), Textiles of Cotton, Wool, Silk and Jute (25), Metal Products (34) and Food Products (21) showed increasing returns to scale, the rest showing constant returns to scale.

In the second decade, all showed increasing returns except Transport Equipment and Parts Industry (IN37) that showed Constant Returns to Scale (CRS).

In the 3rd decade, Basic Metals and Alloys (33), Electricity, Gas and Steam (41), Machinery other than Transport (36), Textiles (25), Rubber-Petroleum and Coal (31), Wood and Wood Products (27), Metal Products (34), Chemical and Chemical Products (30), Other Manufacturing Industries (38), Non-Metallic Mineral Products (32), Leather (29), Textile Products (26), Transport Equipment (37), Beverages (22) showed Increasing Returns to Scale. Food Products (21) and Paper (28) showed Constant Returns to Scale(CRS).

In the final decade, Rubber-Petroleum and Coal (31), Non-Metallic Mineral products (32), Paper (28), Machinery other than Transport (36), Textiles (25), Chemicals (30), Wood (27), Basic Meals and Alloys (33), in fact all, except Beverages (22) showed Constant Returns to Scale (CRS).

The perennially low scale economies were in Basic Metals and Alloys (IN33) and Rubber, Petroleum and Coal (IN31), Beverages (IN22) and Other Manufacturing Industries (IN38). Basic Metals though these did show high scale economies during 1966-85 and slipped back in the last decade due to onslaught of economic reforms that left this industry to fendfor its own, this being an Intermediate Industry.

Food, Leather, Metal Products, Textiles show high scale economies in the first decade, but Food slipped into DRS in 1976-85.

7 Major Findings and Conclusion:

An Analysis of Growth Rates of Factories revealed Food Products Industry (IN21) growing at a maximum growth rate of 33.1%, followed by User and intermediates Industries. The Comparative Study of Industries' growth rates of Factories brought out possible weak forward and backward linkages and lack of implementation in terms of numbers corresponding to planning goals.

Net Value Added (NVA) growth rate was highest Electricity, Gas and Steam (EGS) at 18.1% followed by growth rate on Textile Products (IN26), the lowest growth rate being recorded by Textiles (IN25), indicating lack of appropriate production planning and weak linkages.

Low growth rates in employment in most of the industries except Food Products Industry (IN21) confirmed that most industries in India are low labor intensive. Low employment growth rate figures n Beverages (2.2%), Textiles (2.3%) and OMI (1.8%) pointed to lacunae in employment planning and thereby hinted at greater employment absorption capacity.

Growth Rate in Fixed Capital (FC) was highest in Electricity, Gas and Steam (IN41). That is also inferred to be the cause of recording highest NVA growth rate in EGS (IN41). But Intermediates showed low FC growth rate. Bolstering FC in these with proper Regional Input Output Planning can alter the overall

investment climate.

The highest growth in Capital Intensity was shown in Textiles (IN25) and Capital productivity Growth Rate in Textile Products (IN26) influenced positively its NVA and GVA growth rates. Higher Labor Productivity growth rates in many industries (OMI recorded the highest) contributed to work force growth and in turn to labor intensity, hinting at scale operation leading to both factor intensification and factor productivities and that in turn to NVA and GVA growth. All these results envisaged greater role for Total Factor Productivity (TFP).

TFPG was maximum in Wood Industry (IN27) Chemicals (IN30), Textiles (IN25) and Basic Metals (IN33) also showing higher growth rates mean Smaller States can grow faster.

Food and EGS ranked high in Factories and NW growth rates. Textiles showed remarkable consistency in both Labor Productivity and Employment growth rates. Leather and Beverage, though Labor Intensive, had high FC growth rate that contributed to high output growth.

A Causal Analysis showed highest TFPG due to K/L was in Beverages, but lowest in Basic Metals, contrary to common understanding. Influence of TFPG on NVA showed maximum influence in EGS (IN41) followed by Textiles (IN25) and Machinery other than Transport (IN36). On GVA growth, maximum influence of TFPG was in Metal Products (IN34) followed by Beverages (IN22) and OMI (IN38). Similarly, TFP influence on Employment growth rate showed maximum effect on Metal Products (IN34) followed by Machinery other than Transport (IN36) and Beverages (IN22). Thus TFPG influence was seen in both Labor Intensive and Capital Intensive Industries. Lowest TFPG influence in Output (GVA) and employment growth rates was noticed in Wood (IN27).

Influence of Capital Productivity on GVA was highest in NmMP (IN32) followed by Paper (IN28), Beverages (IN22) and Leather (IN29). Influence of Capital Productivity on NVA was maximum in Beverages (IN22) followed by Leather and RPC (IN31). Influence of Capital Productivity on employment was highest in Leather (IN29) followed by Beverages (IN22) and RPC (IN31). So improvement in Capital Productivity may be the key to raising the Labor Intensiveness of Industries.

Labor Productivity is high generally in those industries where Capital Productivity was low. But highest Labor Productivity influence on NVA was in Transport Equipment (IN37) followed by RPC (IN31). Highest Labor productivity influence on GVA growth was in OMI (IN38) followed by transport Equipment (IN37) and then EGS (IN41). On Employment, highest influence of Labor Productivity was in Leather (IN29), though Textile Products (IN26) and RPC (IN31) also ranked high, though it recorded low figures.

An Analysis of returns to Scale decadal period wise showed that recession did not dampen higher scale economies in Textiles (IN25). In 1966-75, all industries showed IRS except Transport Equipment (IN37). Food slipped into Diminishing Returns to Scale in the third decade of 1976-85. In the fourth decade (1986-95), all industries except Beverages showed CRS. Increasing Returns to Scale in Textiles (IN25), Chemicals (IN30), NmMP (IN32) and MotTr (IN36) shown in the long run period of 40years. But such scale economies do not necessarily reflect growth in NVA, GVA, Employment, and Factories' growth rates.

Thus despite high growth in Units, to reap scale economies, a proper agricultural environment and high expectations need to be maintained and nurtured which slackened during the decade of New Economic reforms period. Transport is another industry that showed inconsistent scale economies largely due to inadequate planning. Also, higher growth rate in units does not necessarily bring about scale economies. To improve scale economies, an enabling environment, innovative marketing techniques, development of support infrastructure are necessary. These are conspicuous by their absence in a developing economy due to inadequacy of resources for balanced development of industries and of regions/states/districts; rural vs urban diversity and forward vs backward states/regions.

References

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Growth of Small Scale Industries in India: Is there a Unit Root?

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Economic reforms initiated in India in the early 1990s has exposed the small scale enterprises to market competition in a significant way. The present note examines if the growth path of the small scale enterprises is stationary in the long run perspective. It is found that the time series of number of units, production and employment of the small scale industries in India have unit root and hence are non-stationary

1Introduction

Since the initiation of economic reforms in India in the early 1990s, a number of deregulatory measures have been introduced in the industry, trade, investment and competition related policies. These policy resolutions have changed the basic structure and functioning of the Indian economy in general and industrial sector in particular in a considerable way. The basic objectives of these policy changes were to dismantle the policies of protection and state intervention and to facilitate increasing competitiveness required for efficient functioning of the market forces in determining production and distribution of goods and services.

The remarkable shift in policy directions in the 1990s has exposed the small-scale enterprises (SSEs) to market competition in a significant way. While in the pre-liberalization era the SSEs were protected from competition from large-scale enterprises and imports and they had isolated sheltered markets due to geographical and product market segmentation, policies of dereservation of items, reduction of tariffs, and removal of quantitative restrictions on imports and entry barriers on multinational corporations have created possibility of extensive competitive threats to these enterprises. This competitive pressure on the SSEs has been intensified further with the financial sector reforms that have squeezed the benefits of lower interest rates and priority sector lending, and reduction in price control that has taken away the advantages of obtaining scarce raw materials at nominal prices.

The changes on the policy front have differential impact on productivity at the firm level. Under the

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[1] In addition, as the government has recently raised the asset size limit used to define small firms for government aid eligibility to include what had been defined as the medium-size sector, the SSEs can now openly pursue a growth objective without running the risk of losing their small firm status and all the accompanying promotional subsidies.
[2] However, due to their low capital base, the SSEs face limitations in both human and financial resources.
[3] Here, by stationarity we refer to convergence of the growth path with the equilibrium.

new business conditions, the SSEs continue to have immense potential in generating additional employment, indigenizing technology, and leveraging cheap labor and flexibility of operations to create competitive advantage for Indian industry. But, while small firms have experienced a fall in productivity levels during the post-reform period, the large firms have raised the same (Kumar, 2006). The differences in the productivity levels of small and large firms largely reveal the heterogeneity in the conditions required for productivity improvement at the firm level. Thus, while the policy changes in the post-reform era widen the scope for improving efficiency and growth[1], the decline in productivity is likely to squeeze the same. Further, the SSEs have some fundamental advantages vis-à-vis the large firms as they need low investment[2] and also have flexibility and closeness to the customers. The SSEs also have the advantage of economies of scale and lower overheads and due to informal settings they can strike the market fast. On the other hand, due to their limited exposure, the small enterprises have less information about the market and suffer from lack of economies of scope (Van Kirk and Noonan, 1982; Nooteboom, 2002). The nature of the growth path of the SSEs, therefore, depends on the relative strength of these various diverse forces.

In this perspective, the present paper makes an attempt to examine if the growth path of the small scale enterprises is stationary in a long run perspective[3]. In other words, the basic objective of the present paper is to examine if there is unit root in the time growth path of the SSEs. The rationale for such an effort lies not only in assessing the impact of the policy reforms on growth of the SSEs that can facilitate in developing a comprehensive policy framework for the sector, but also in understanding the relevance of the government's efforts in liberalising the FDI norms for the cash-strapped micro and small enterprises to attract higher overseas investment by replacing the current 24% ceiling on foreign holding with the sector[4]. The rest of the paper is organized as follows. Section 2 discusses growth performance of the SSEs in a long run perspective. Section 3 examines if the growth performance of these enterprises is stationary. Section 4 concludes the paper with some important research issues.

2 Growth of SSEs in India: An Overview

Small-scale enterprises (SSEs) constitute the backbone of economic structure of a developing country like India and the rising importance of the small firm has become one of the most striking trends in economic development since the 1970s[5]. Growth of the SSEs not only contributes to the GDP and exports, but it also creates vast employment opportunities for the workforce. Furthermore, the SSEs have a major part in the process of decentralization of industries by creating industrial estates, effective utilization of local resources as well as redistribution of economic power and income. A modern and thriving SME sector also supports the transformation of the economy by helping the innovation and adaptation of the economic system. For example, in Central Europe, there is a growing segment of SMEs investing in growth and modernization as suppliers mostly to transnational companies, or sometimes as final producers and exporters. However, on many occasions such developmental roles of the SSEs are constrained by the nature of transition including

the lack of relevant institutions, infrastructure, experience and expertise necessary to operate in a competitive market economy successfully.

In India, SSEs have played a very significant role in the socio-economic development of the country since Independence. The promotion of the small-scale sector in India has been an important thrust in various industrial policies since Independence though the focus of concern changed with the priorities of each five year plan. With the process of economic development leading to changing priorities, the policy focus has shifted gradually to regional imbalances, ancillarization, exports and dispersal in rural areas, and then to small, tiny and village industries. Over the years, several Committees have been constituted by the government to examine the functioning of SSEs with a view to promoting their growth and efficiency within the context of the main objectives of the national economic plans.

The SSEs have contributed considerably to the overall growth of the GDP, employment and exports. As in 2006-07, 128.44 lakhs SSEs constituted nearly 95 percent of all the industrial units existing in the country, producing a wide range of 7,500 items[6] and employing nearly 312.52 lakhs people (Table 1). However, majority of these enterprises are unregistered. These enterprises contributed around 38.56 percent of the industrial production as a whole and 5.83 percent of the GDP of the nation. They also contributed 32.9 percent of direct exports from the country[5]. The role of these SSEs is quite large in industries where there is no market failure arising out of asymmetric information, where firms can objectively determine quality and there are no large economies of scale of production.

Table 1: Some Important Aspects of SSEs, 2006-07

Characteristic	
Number of Units (in Lakhs)	
Registered	20.32
Unregistered	108.12
Total	128.44
Employment (Lakh Person)	312.52
Fixed Investment (Rs. Crs.)	207307
Production (Rs. Crs.) at constant (1999-2000) Prices	473339
Share in the Overall Industrial Production (%)	38.56[1]
Share in GDP (%)	5.83[1]
Production per Employee/Worker (Rs. Lakh)	1.88
Share in Exports (%)	32.9[1]

Note: [1]for the year 2005-06.

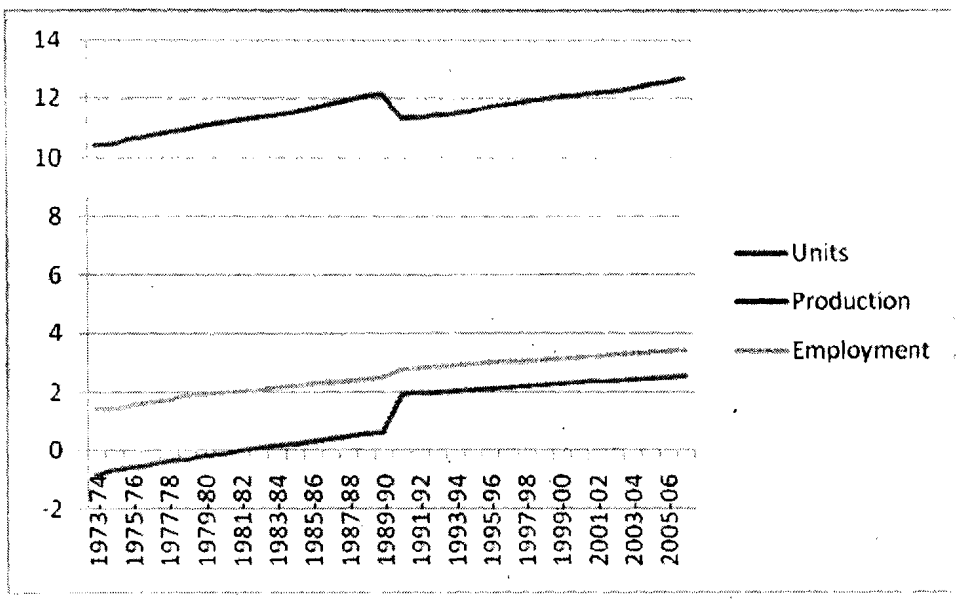
Source: DC (MSME), Govt. of India

Historically, the SSEs in India are quite competitive. During the pre-reform era, a wide variety of incentives, concessions and institutional support have largely facilitated growth of the SSEs in the country. But these socialistic promotional policy measures, in many cases, resulted in protection of weak units rather

than the independent growth of units under competitive business environment. Under the regime of economic liberalization, the focus has shifted from protection to competitive promotion.

The present paper examines growth performance of the SSEs under the new business conditions by using three indicators, viz., number of units, production at constant (1993-94) prices and number of persons employed. Table 2 shows the trends of these indicators during 1973-74 to 2006-07. It is observed that the sector grew at a reasonably satisfactory pace during this period. The number of SSEs increased from 4.2 lakhs in 1973-74 to 128.4 lakhs in 2006-2007, whereas the value of production (at constant prices) grew from Rs. 34200 crore to Rs. 320753 crore during the same period. Employment also recorded an increase from 39.7 lakhs in 197374 to 312.5 lakhs in 2006-07. While the number of small scale units has grown steadily with a sudden upward shift during 1989-92, the time path of production has recorded abrupt downward shift during this period (Figure 1). The trend line of employment is, however, observed to be steadily upward rising without any abrupt upward or downward shift.

Figure 1: Trends in Number of Units, Production and Employment in SSEs, 1970-71 to 2006-07



Note: *The variables are measured in natural logarithmic scale*

Source:

Table 3 shows the growth performance of the SSEs during 1973-74 to 2006-07. It is observed that the average rate of growth of number of the SSEs declined over the decades. More importantly, the average rate of growth in the post-reform era is even less than 50% of that during the pre-reform period. In other words, the process of economic reforms seems to have affected growth of number of SSEs adversely. This may be in two

ways. First, the removal/reduction of restrictions and hence increasing competitive pressures under the new business conditions might have discouraged many of the potential entrants to enter into the market. Second, many of the existing SSEs might have failed to face the competitive threats and hence have left the industry. It can therefore be said that the process of economic reforms has corrected the inefficiencies arising out of increased number of production units due to the reservation policy for the SSEs followed during the first four decades after Independence[1].

Table 2: Trends in Number of Units, Production and Employment in SSEs, 1970-71 to 2006-07

Year	No. of Units (lakhs)	Production at 1993-94 Prices (Rs. Crore)	Employment (lakhs)
1973-74	4.2	34200	39.7
1980-81	8.7	72200	71.0
1985-86	13.5	118100	96.0
1991-92	70.6	87355	166.0
1995-96	82.8	121175	197.9
1999-00	97.2	170379	229.1
2004-05	114.0	253616	275.3
2006-07	128.4	320753	312.5

Source: www.rbi.org.in

The average rate of growth of production, on the other hand, though declined in the 1990s, has increased thereafter. The production of the SSEs, in fact, has grown at an impressive rate throughout the period under consideration. Further, though the average rate of growth in the post-reform era is low as compared to that during the 1970s and the 1980s, the difference is not

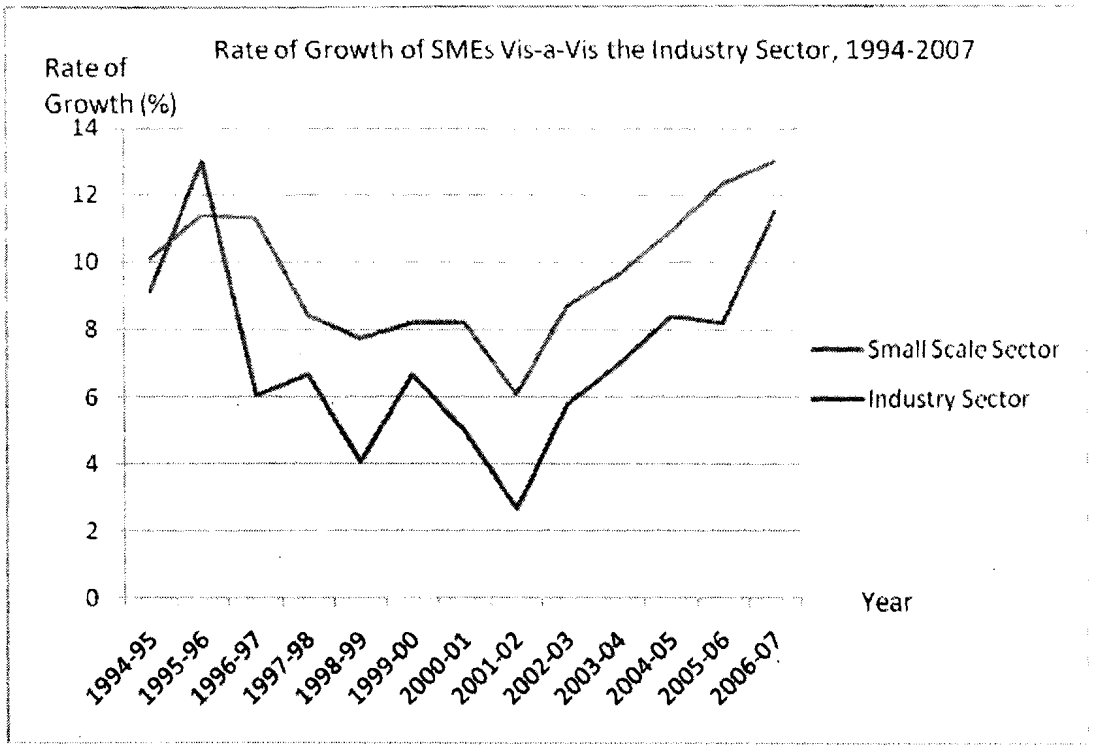
Table 3: Growth Performance of the SSEs

Year	Growth		
	Units	Production	Employment
1973-74 to 1979-80	10.4	11.3	9.5
1980-81 to 1989-90	8.2	11.0	5.9
1990-91 to 1999-2000	4.0	8.3	4.1
2000-01 to 2006-07	4.0	9.3	4.3
1973-74 to 1990-91	8.9	10.6	7.0
1991-92 to 2006-07	4.0	8.3	4.2

The rate of growth of production of the SSEs is quite impressive during the post liberalization period, particularly, when compared with that of the industry sector (Figure 2). Production of the SSEs has increased manifolds within a span of one and half decades of economic reforms. What is more important,

perhaps, is that except in 1995-96 rate of growth of production in the small-scale sector was higher than that in the industry sector as a whole.

Figure 2: Rate of growth of SMEs vis-a-vis the industry sector, 1994-2007



Growth performance of the SSEs is, however, inspiring in terms of employment generation. No doubt, the rate of growth of employment in the SSEs has declined over the decades and it is quite low in the post-reform era vis-à-vis that during the 1970s and the 1980s. In other words, the output elasticity of employment of the SSEs has declined in the post-reform era. Interestingly, the growth performance of the SSEs in terms of employment appears to be better when compared with that of the industry sector as a whole. While employment in the manufacturing sector grew only at an annual rate of 2.1 percent and the sectors like mining and quarrying and gas and water supply experienced even a negative rate of growth of –2.9 percent and –0.9 percent respectively during 1994-2000, employment in the SSEs grew at an average rate of 4.2 percent during 1991-2007. This increase in employment in the SSEs is also significant in the context of loss of job for about 15 percent workforce in the organized manufacturing sector spread over the major states and industry groups during 1995-2001 (Nagraj, 2004).

As regards performance of the SSEs in the international market, Table 4 shows that the SSEs continue to contribute considerably to the total exports of the economy over the years in the post-liberalization era. The sector on an average contributed 34 percent of the country's total exports during 1991-2006.

Table 4: Export Performance of the Small Scale Sector, 1980-2001

Year	Value of Exports (Rs. Crore)	Share of SSEs in Total Exports (%)
1991-92	13883.4	31.5
1992-93	17784.8	33.3
1993-94	25307.1	36.4
1994-95	29068.2	35.2
1995-96	36470.2	34.3
1996-97	39248.5	33.4
1997-98	44442.2	35.2
1998-99	48979.2	34.6
1999-00	54200.5	34.0
2000-01	69796.5	34.5
2001-02	71244.0	34.3
2002-03	86012.5	34.0
2003-04	97644.0	33.5
2004-05	124416.6	33.2
2005-06	150242.0	32.9

Source: Handbook of Industrial Statistics & Policy, Govt. of India, 2006-07

However, sickness of the SSEs remains a matter of concern in the post-liberalization era as well. Although declined over the years during 1990-2006, the number of sick SSEs is still quite large. Besides, the number of potentially viable sick SSEs declined significantly after 2001. Although the average proportion of potentially viable sick SSEs in total number of sick SSEs was only around 7 percent during 1990-2006, it has a declining tendency (Table 5).

Source: Handbook of Industrial Statistics & Policy, Government of India, Various Issues.

From the above discussion, it is, therefore, clear that, growth performance of the SSEs in the post-liberalization era is discouraging as the average rate of growth of number of SSEs, production and employment is lower as compared to that in the pre-reform era. The extent of decline in the growth rate has, however, varied across the variables considered. While the decline in the rate of growth is quite substantial in case of number of SSEs and employment, it is marginal for production. However, the SSEs have better production performance when compared with that of the industry sector as a whole. Further, exports have increased only marginally during the post-reform era, whereas no significant improvement is experienced in respect of sickness of these enterprises.

Thus, the reforms of the 1990s have failed to provide any significant boots to the SSEs. Instead, the policy measures affected the performance of SSEs adversely in terms of growth of units, production and employment[1]. This raises several important questions. Is the declining growth performance of the SSEs in the post reform-era policy driven? How have the SSEs performed when examined in a long-run perspective? Are

Table 5: Sickness of the SSEs, 1990-2007

As at the end of March	No. of Sick Units	No. of Potentially Viable Units in Sick SSEs	Share of Potentially Viable Units in Sick SSEs (%)
1990	218828	16451	7.5
1991	221422	16140	7.3
1992	245575	19210	7.8
1993	238176	21649	9.1
1994	256452	16580	6.5
1995	268815	15539	5.8
1996	262376	16424	6.3
1997	235032	16220	6.9
1998	221536	18686	8.4
1999	306221	18692	6.1
2000	304235	14373	4.7
2001	249630	13076	5.2
2002	177336	4493	2.5
2003	167980	3626	2.2
2004	138811	2385	1.7
2005	138041	3922	2.8
2006	126824	4594	3.6

the time paths of number of units, production and employment stable (or stationary)? The next section of the paper attempts to answer these questions by applying time-series unit root test.

Section III Testing Instabilities in Growth Performance of SSEs

Instabilities in an economic time series arise when it is non stationary in nature, i.e., the mean and variance of the series depend on time and they depart from the equilibrium value as time goes on. If the movement is predominantly in one direction, the time series exhibit a trend. The existing literature suggests applying time-series unit root test to examine if the time-series is stationary.

Methodology

In order to examine if the growth performance of the SSEs is stationary (and hence stable), we apply three different tests of unit root. First, the Augmented Dickey-Fuller (1981) (ADF) unit root test is used with the following specification:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{j=1}^{k} \delta_j \Delta y_{t-j} + u_t \, (t = 1, 2, .., T) \qquad (1)$$

where, Δ is the first difference operator, y_t is natural logarithm of the growth indicator, t is the time trend, and u_t is an independently and identically distributed process with mean 0 and variance σ^2. The null hypothesis is that H_0: $\gamma = 0$, which implies that there is a unit root in y_t. This null hypothesis is tested against the alternative hypothesis H_1: $\gamma < 0$ which implies that y_t is stationary around a deterministic trend. The lag length for this test is selected on the basis of Akaike Information Criteria (AIC), the nearest integers of $(T)^{1/4}$ and $4(T/$

$100)^{2/9}$ as suggested by Diebold and Nerlove (1990) and Newey and West (1994) respectively.
Second, Phillips-Perron (1988) (PP) test is applied in order to validate the findings of the ADF test with the following specification:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + u_t \text{ where } t = 1, 2, .., T \quad (2)$$

The nearest integer of $4(T/100)^{2/9}$ as suggested by Newey and West (1994) is used as the truncation lag over the study period while conducting the PP test.

The third one is the Dickey–Fuller Generalized Least Squares (DF-GLS), a modified version of the Dickey–Fuller test developed by Elliott, Rothenberg, and Stock (1996) using the following specification:

$$\Delta y^d_t = \gamma y^d_{t-1} + \sum_{j=1}^{k} \delta_j \Delta y^d_{t-j} + u_t \quad (3)$$

where $t = 1, 2, .., T$ and the superscript 'd' denotes GLS-detrended series of y.

The DF-GLS test has the same null and alternative hypotheses as the traditional ADF test, i.e., $H_0: \gamma = 0$ versus $H_1: \gamma < 0$. We use the Modified Akaike Information Criterion (MAIC) to select the lag length for this test.

The paper uses three indicators of growth, viz., number of units, value of production at constant (1993-94) prices and the number of people employed for the period from 1993-94 to 2006-07. The necessary data are collected from Reserve Bank of India website

Empirical Findings:

The findings of the ADF unit root test are presented in Table 6. The results favor non-rejection of the null hypothesis that there exists unit root in the time-series of production and employment in small scale industries. Neither of the test statistics is statistically significant. This is so because stationarity requires statistical significance of the test statistic. It can, therefore, be said that the time-series of number of small-scale units, their production and employment therein have unit root. In other words, the time-series are non-stationary in nature. This makes the growth performance of the enterprises unstable in the long-run.

Table 6: Results of Unit Root Test

Variable	ADF			PP	DF-GLS
	L=2	L=3	L=AIC	L=3	L=MAIC
Units	-1.556	-1.529	-1.577 (1)	-1.744	0.388 (1)
Production	-2.221	-2.257	-2.260 (1)	-2.174	0.686 (1)
Employment	-1.319	-1.399	-1.513 (1)	-1.144	0.353 (3)

Figures in the parentheses indicate the respective lag length.

The same can be said for the results of the PP as none of the test statistic is statistically significant (Table 6). In other words, the results of the PP test validate the findings of the ADF test. In case of the DF-GLS test, on the other hand, the test statistics are positive for all the variables considered. A positive test statistic though is a theoretical possibility, rules out the likelihood of stability of the respective time-series. This

means that the DF-GLS test also confirms that the time-series of number of units, production and employment of the SSEs are explosive and non-stationary, and therefore, will diverge from equilibrium over the period of time.

4 Summary and Policy Suggestions

Hence, while the deregulatory policy measures of the 1990s and the resultant changes in the business environment have made industrial competitiveness as the hallmark of the survival and growth of the domestic firms, the SSEs are yet to be accustomed to these new business conditions. The average rate of growth of number of small scale units, their production and employment therein have declined in the post-reform era. Further, when seen in a long-run perspective, it is also found that the time-series of number of units, production and employment of the small scale industries in India have unit root and hence are non-stationary. This makes the time paths diverging from the equilibrium over the period of time. In other words, growth performance of the SSEs is observed to be unstable in the long-run.

The Government has taken various measures from time to time to enhance productivity, efficiency and competitiveness of the SSEs. For example, a number of exemptions and privileges to these enterprises have been enlisted in the comprehensive policy package of 2000. Further, the National Commission on Enterprises in the Unorganized/Informal Sector has been set up in September 2004 to recommend measures for improvement in productivity of the SSEs, linking up the SSEs to institutional framework in the areas like credit, raw material supply, infrastructure, technology upgradation, marketing facilities, skill development, etc. Some other policy measures include increase in investment limit, enhancement of composite loan limit, formulation of "Promotional Package for Small Enterprises", etc.

The aforesaid measures are aimed largely at proving greater and easy access to materials, credit and technology and hence may not be enough for stable growth of these enterprises in the long run, particularly, considering the various problems of these enterprises like poor and obsolete technology, inadequate attention to research and development, strategic/managerial incompetency, inadequate demand and other marketing problems, infrastructure constraints, etc. In other words, a comprehensive policy framework for the SSEs should also include the following measures to make the growth path of these enterprises stable in the long-run:

Greater innovative Efforts:

In the present era of extensive competition, the SSEs desperately need technology innovation to improve the quality of their products and reduce the cost of production and hence prices. But, despite giving priorities and introducing a number of supportive measures in this direction since the early 1980s, the technology strategies of the SSEs still rely heavily on technology transfer rather than promoting in-house innovation. Although a few firms are informally engaged in in-house R&D being driven by competitive pressure, customer needs and technological change, these enterprises spend only around 1 percent of their revenue for this purpose. Furthermore, while existence and growth in the long run require development of

new products and processes, the innovative efforts of these SSEs centre mainly around quality/product performance, solving common problems and changing product shapes/designs/dimensions to succeed in the short-run.

It may, therefore, be suggested that 'Technology Pool' should be developed in the state-sponsored research laboratories and research institutes in different regions of the country with active participation of the SSEs in the process of technological development. This should be accompanied by necessary technical expertise and effective system for dissemination of information on available technologies. There should also be intermediary organizations/agencies to bridge the gap between the developers and the users. Such efforts will not only help the SSEs to become aware of developments on technology front but also to source necessary technologies easily and apply them successfully.

Building up Strategic Competencies:

Many of the enterprising efforts in the small-scale sector fail because of their lack of necessary strategic competencies. Competitive business environment requires traditional managerial knowledge and skills to be attuned to the new environment, systems, technologies and competition on regular basis. Competitiveness of an enterprise, to a large extent depends on its operational efficiency and strategies. While operational efficiency helps a firm to run the same race faster, strategies are important to choose to run a different race successfully. In other words, operational efficiency assures short-term success, whereas strategies matter to succeed in the long run.

Hence, formulation and implementation of appropriate strategies are necessary for creating competitive advantages (either through cost advantage, or through differentiation advantage or both) for the SSEs and, therefore, as in the large firms, the entrepreneurs and/or managers of these enterprises should be capable enough to deal with the strategic issues. In order to develop such capabilities, state sponsored training programmes and workshops should be organized on regular basis with the professionals and experts from the relevant fields being the resource persons to guide the entrepreneurs and/or the managers towards formulating as well as implementing appropriate strategies.

Developing Sub-Contractual Linkages

'Subcontracting' refers to the contract by which a larger firm (prime contractor) makes contract(s) with another firm called subcontractor to do work that the prime contractor assigns to do. Apart from marketing their products through the marketing network of the large firms, such relationships help the SSEs in sourcing technology and managerial expertise from the large enterprises. Besides, the nodal large enterprises can also pressurize the small firms to maintain specific standards of production quality.

In India, sub-contractual linkages exist in the industries like drugs & pharmaceuticals, yarn, dyes, textile weaving, etc. where industry structure represents bimodality in the size distribution of firms. But, more and more SSEs should be guided towards developing such sub-contractual linkages with the larger ones, especially, in the areas of processed foods, biscuits, garments, home appliances, etc. where the market is split

between the small and large firms with enhanced possibilities for the SSEs to produce as sub-contractors or on contract basis to large marketing and assembly industries with national and regional brands.

However, successful sub-contractual linkages between the large firms and the SSEs, particularly with the rural ones require development of necessary infrastructure facilities in addition to a certain level of development of small-scale metal and engineering industries. Emphasis should also be put on developing linkages between rural SSEs and the large firms. Besides, while the role of development agents is very crucial for such linkages, be it business or production or both, increase in facilities and level of skills are also urgent for worthwhile and substantial subcontracting to take place.

Setting up Industrial Clusters

During the last three decades or so, place bound industrial clusters are considered major sources of growth of the SSEs in many of the developing countries. In India too, there are large number of industrial clusters in several parts of the country, such as pump manufacturing cluster of small firms in Coimbatore and Rajkot, knitwear cluster in Tirupur, etc. The policy framework for SSEs should provide necessary infrastructure facilities and other incentives for developing more of such industrial clusters. The advantages of these clusters arise from low transaction costs as a result of high linkages network, joint action and combination of competition and cooperation. They may also be expected to help the SSEs to utilize local level resources and expertise optimally and to overcome the disadvantages of 'smallness' and become innovative and competitive.

Growth through Mergers and Acquisitions:

A small firm can grow either internally (i.e., growth on own without joining hands with other enterprises) or externally (i.e., growth by joining hands with others) or both internally and externally. While expansion and diversification are major forms of internal growth strategies, external growth can take place in the form of joint-venture, mergers, acquisitions, sub-contracting, and franchising. In the context of the spate of mergers and acquisitions (M&A) in the Indian corporate sector since the early 1990s, role of such strategies for external growth of the SSEs should be seriously examined. The rationale for M&A for growth of the SSEs can be seen in the context of their role in achieving economies of large scale production and hence lower average cost of production and developing vertical linkages among the firms to have easy access to inputs and greater market penetration. Besides, M&A can also help the SSEs in developing strong information network for markets of both inputs and outputs, which these enterprises largely lack.

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Economics of *Baluchari* Handloom Product of Bishnupur Town in Bankura District of West Bengal

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Baluchari sharee, a product of exclusive design and fabulous weaving technique, reflects the cultural heritage of India. The present note examines the economics of baluchari handloom units working under different production organizations, namely independent, tied and cooperative in Bishnupur town of West Bengal and analyses the factors that explain the survival of the industry.

1. Introduction

The *Arthashastra* mentions that silk weaving in Bengal exists from the ancient times. Silks of Bengal were much acclaimed the world over since ancient times. The most well known Bengal silk sharee that carries its popular name is *Baluchari sharee* – a production of exclusive design and fabulous weaving technique. The *Baluchari* sharee is native to the village called *Baluchar* in Murshidabad of Bengal. It was way back in 1704 A.D that the first baluchari weaving took place. In the eighteenth century, Mursidkuli Khan, Nawab of Bengal patronized its rich weaving tradition and *baluchari* flourished from that time onwards. But this flourishing trend later declined, specially during the British rule, due to political and financial reasons and it became a dying craft as most of the weavers were compelled to give up the profession. Later in the first half of twenth century, Subho Thakur, a famous artist, felt the need of recultivating the rich tradition of *baluchari* craft. Though Bishnupur was always famous for its silk, he invited Akshay Kumar Das, a master weaver of Bishnupur to his centre to learn the technique of jacquard weaving. Sri Das then went back to Bishnupur and worked hard to weave *baluchari* on their looms. At one stage no gold or silver thread was used in the making of the fabric. The important feature is the white outlining of the motifs like animals, vegetation, miniscule images of human beings, vignettes from the *Ramayana*, marriage processions, brides in palanquins, horse riders ethnic musicians to name a few. Nowadays *baluchari* style sharees are woven using highly mercerised cotton thread and silky threadwork ornament in bold colors. The cloth is very fine with a soft drape A revival in recent time of both the *baluchari* and another outstanding traditional Bengal sharee – "Daccai" has led to nation wide and world wide popularity and interest in Bengal silks. Like silks cotton sharis are also woven in a fascinating and exquisite range.

The unique feature of *baluchari* sharees was the combination of animal and bird motifs incorporated in floral and paisley decorations while other motifs included hunters on horses, elephants, and scenes from the *Nawab's* court. The silk yarn used for *baluchari* saris was not twisted and so had a soft and heavy

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texture. Limited ground colours were used, which were permanent in nature and retain their freshness even after so many years.

It reflects the cultural heritage of India. *Baluchari* handloom products are not only piece of decoration but also a source of livelihood to several numbers of artisans, middlemen and traders etc. *Baluchari h*andloom product and its production process are friendly to the environment. It uses the ideal working capacity of household women workforce without hampering their household chores. It still plays a very important role in the economy of a group of people who belong to the particular caste and are involved in production of *baluchari* product by generation of employment and income in Bishnupur town.

Bishnupur is a medium size town having population of 61947 as per 2001 Census. It has a good cultural and social tradition of renown in the tourist map and history of India.

Against this brief historical backdrop the present note sets the following objectives for itself.

Objectives of the Study

The objectives of the study are as follows:

i) To examine the economics of *baluchari* handloom units under different production organizations of the industry, namely independent, tied to mahajan and cooperative, and

iv) To analyse the factors which explain the survival of this industry.

Methodology

We selected randomly twenty *baluchari* handloom household units from each organization of production. The relevant data on employment, capital, production, and profit were collected from the sample units. The reference period of the study is 2008. Simple statistical tools like mean, standard deviation and coefficient of variation have been used to analyse the data.

2. Economics of Baluchari Manufacturing

The baluchari is an unorganized craft product and the discussion on its economics starts with that of the labour process of the industry.

Labour Process of Baluchari sharee

Marx discussed the labour process, the activity of production, in general terms as a process of producing use values (Brewer, 1984) and analyzed the labour process "independently of the particular form it assumes under given social conditions" (Marx, 1867: 173). He defines labour process as "human action with a view to the production of use-values, appropriation of natural substances to human requirements; it is the necessary condition for effecting exchange of matter between man and nature" (Marx, 1867). To him, the labour process is not a peculiarity of capitalism; it is a basic inevitable condition for human existence. Human

[2] See Singh (1990), The Political Economy of Unorganised Industry,P.20.

beings, having imagination, interact with material world in a purposive way so that their imagination is reflected in an object at the end of every labour process. The labour process is composed of three elements[2]: (a) personal activity of man, that is work itself, (b) the subject of that work (raw materials), and (c) the instruments of labour (Marx, 1878). This is abstract of the labour process. The labour process should here be rightly called the social labour process because the knowledge of the processes is part of social tradition (Childe, 1964).

The labour process of *Baluchari* can be divided into four stages

i) *Cultivation of cocoons*:- Since the discovery so many years ago the fibre or filament composing the cocoon of the silkworm is constructed into a beautiful and durable fabric, silkworm is bred for the sole purpose of producing raw silk.

ii) *Processing of yarns*:- To make the yarn soft it is boiled in a solution of soda and soap and then dyed in acid colour, according to the requirement of the sharee. The yarn is stretched from both the sides in opposite directions putting some force with both palms. This process is needed to make the yarn crisper.

iii) *Motif making*:- Making of the motifs for 'pallavs' and other part of *baluchari* is in itself an intricate process. The design is drawn on a graph paper, it is coloured and punching is done using cards. After punching, these cards are sewed in order and fixed in the jacquard machine.

iv) *Weaving*:- After jacquard loom has been introduced, weaving of a *baluchari* sharee takes five to six days to get completed. The special features of *baluchari* weaving that the shuttle is thrown by weaver's hand and two weavers work on a loom on shifting basis of four hours and generally the total operating hours of a loom is sixteen hours per day . Different types of labour are engaged in different phases of production of baluchari.

Baluchari thus prepared becomes the sign of aristocracy, the attire of status. Maintenance of quality of *baluchari* sharee is taken care of precisely. The quality is checked from the stage of dying of the yarn to the packaging of the sharee.

Employment

Baluchari constitutes petty commodity production which involves small number of workers. The number of workers engaged in this industry is classified into three categories – (i) 1-3 workers, (ii) 4-5 workers and (iii) workers above 5. Distribution of *baluchari* silk sharee units by number of persons engaged shows that 40 percent of the *baluchari* silk sharee producing handloom very tiny units belong to the first category employing number of workers ranging from 1 to 3 whereas 33 percent tiny units belong to the second category employing number of workers ranging from 4 to 5 and the rest 27 percent small units belong to the third category employing number of workers more than 5 in Bishnupur town. Distribution of *baluchari* silk sharee units by both number of persons employed and type of production organization shows that most of the independent units (55 per cent) belong to the second category employing 4 to 5 workers while most of the

units under cooperative belong to the first very tiny category engaging 1 to 3 workers. 50 per cent of the tied units belong to this category in respect of workers engaged (Table 1).

Table 1 Distribution of Handloom Units by Number of Workers and by Type of Production Organization

Organization	Number of units by number of persons employed			Total number of units
	1 to 3	**4 to 5**	**Above 5**	
Independent	0(0.00)	11(55.00)	9(45.00)	20(100)
Cooperative	14(70.00)	2(10.00)	4(20.00)	20(100)
Tied to *Mahajan*	10(50.00)	7(35.00)	3(15.00)	20(100)
	24(40.00)	**20(33.33)**	**16(26.67)**	**60(100)**

Source: Field Survey *Note:* Parentheses represent percentage share

Most of the very tiny units producing baluchari sharee work with family labour and hence number of hired workers is very low or even zero. Distribution of baluchari silk sharee units by number of hired workers and by type of production organization shows that 53 percent of the total sample units does not employ hired worker, 37 percent units employ number of hired workers ranging from 1 to 2 and the rest only 10 percent small units employ number of workers more than 2 in Bishnupur town. Distribution of baluchari silk sharee units by number of hired workers and by type of production organization shows that most of the independent units (45 per cent) belong to the second category employing 1 to 2 hired workers while most of the units under cooperative (55 per cent) and tied (80 per cent) belong to the first very tiny category does not employ hired worker. Only 30 percent independent units belong to the third category employing number of hired workers more than 2 (Table 2).

Table 2 Distribution of Handloom Units by Number of Hired workers Employed and by Type of Production Organization

Organization	Number of units by number of hired workers			Total number of Units
	0	1 to 2	Above 2	
Independent	5(25.00)	9(45.00)	6(30.00)	20(100)
Cooperative	11(55.00)	9(45.00)	0(0.00)	20(100)
Tied to *Mahajan*	16(80.00)	4(20.00)	0(0.00)	20(100)
Total	**32(53.33)**	**22(36.67)**	**6(10.00)**	**60(100)**

Source: Field Survey *Note:* Parentheses represent percentage share

The artisans are mostly engaged in this industry throughout the year. The number of working days in the year is classified into three categories – (i) upto 300 working days, (ii) 301 to 325 working days and (iii)working days above 325. Distribution of *baluchari* silk sharee units by number of working days in the year shows that 8 percent of the *baluchari* silk sharee producing handloom units belong to the first category

having number of working days upto 300 days whereas 43 percent units belong to the second category having number of working days ranging from 301 to 325 and the rest 48 percent units belong to the third category having number of working days more than 325 in Bishnupur town. Distribution of *baluchari* silk sharee units by both number of working days in the year and type of production organization shows that most of the independent units (50 per cent) belong to the second category having working days ranging from 301 to 325 while most of the units under cooperative belong to the third category having number of working days more than 325. 50 per cent of the tied units belong to this category having number of working days more than 325 (Table 3).

Table 3 Distribution of Handloom Units by Average Working Day in the Year and by Type of Production Organization

Organization	Number of units by number of working days in the year			Total number of units	Average working day	CV (%)
	Up to 300days	301 days to 325 days	Above 325 days			
Independent	02 (10)	10(50)	08(40)	20(100)	325.2	3.57
Cooperative	00(0)	09(45)	11(55)	20(100)	329.40	2.50
Tied to *Mahajan*	03(15)	07(35)	10(50)	20(100)	325.80	4.01
	05(8.33)	26(43.33)	29(48.33)	60(100)	326.80	3.41

Source: Field Survey *Note:* Parentheses represent percentage share

Capital

Small amount of fixed capital is invested in Baluchari units. The amount of fixed capital invested in this industry is classified into three categories – (i) upto Rs 35,000, (ii) above 35,000 but below Rs 50,000 and (iii) fixed capital above Rs. 50,000. Distribution of *baluchari* silk sharee units by amount of fixed capital investment shows that 60 percent of the *baluchari* silk sharee producing handloom very tiny units belong to the first category invested amount of fixed capital up to Rs 35,000 whereas 10 percent tiny units belong to the second category invested amount of fixed capital more than Rs 35,000 but below Rs. 50,000 and the rest 30 percent small units belong to the third category invested amount of fixed capital more than Rs. 50,000 in Bishnupur town. Distribution of *baluchari* silk sharee units by both amount of fixed capital used per unit and type of production organization shows that most of the units under cooperative (60 per cent) and units tied to mahajan (85 per cent) belong to the first category invested amount of fixed capital up to Rs 35,000 while most of the independent units belong to the third small category invested amount of fixed capital more than Rs 50,000 (Table 4).

Table 4 Distribution of Handloom Units by Amount of Fixed Capital Used Per unit and by Type of Production Organization (Rs. 000)

Organization	Number of units by amount of fixed capital used per unit			Total number of units	Average Fixed Capital (Rs.)	CV (%)
	Up to 35	35.1 to 50	Above 50			
Independent	7(35.00)	4(20.00)	9(45.00)	20(100)	54.72	46.86
Cooperative	12(60.00)	2(10.00)	6(30.00)	20(100)	44.95	35.82
Tied to Mahajan	17(85.00)	0(0.00)	3(15.00)	20(100)	38.05	30.17
	36(60.00)	**6**(10.00)	**18**(30.00)	60(100)	45.91	42.75

Source: Field Survey *Note:* Parentheses represent percentage share

Capital intensity

Fixed capital intensity is measured by the ratio of fixed capital to the number of labourers employed in the manufacturing units.[1] Capital intensity in baluchari industry is very low as in other traditional industries[2]. The amount of capital intensity in this industry is classified into two categories – (i) Upto Rs 17, 000 and (ii) Above Rs 17,000.Distribution of baluchari silk sharee units by amount of fixed capital investment per worker shows that 58 percent of the total sample units belong to the first category having amount of fixed capital investment per worker of Rs 17000 or below and the rest only 42 percent units belong to the second category having more than Rs 17000 as fixed capital investment per worker in Bishnupur town. Distribution of *baluchari* silk sharee units by both amount of fixed capital investment and type of production organization shows that most of the independent units (70 per cent) belong to the second category having amount of fixed capital per worker more than Rs 17,000 while most of the units under cooperative belong to the first category having amount of fixed capital investment upto Rs. 17,000. 75 per cent of the tied units belong to this category in respect of amount of fixed capital investment .Amount of average fixed capital invested per worker registers highest (Rs. 17539) in case independent organization followed by cooperative and tied organizations (Table 5).

Table 5 Distribution of Handloom Units by Amount of Fixed Capital used per worker and by Types of Production Organization

Organization	Number of Units by amount of fixed capital used per worker		Total number of units	Average Fixed Capital (Rs.)	CV (%)
	Upto Rs 17, 000	Above Rs 17,000			
Independent	6(30)	14(70)	20(100)	17538.75	5.96
Cooperative	14(70)	6(30)	20(100)	16693.75	5.92
Tied to Mahajan	15(75)	5(25)	20(100)	16612.50	4.97
	35(58.33)	**25**(41.67)	60(100)	16948.33	6.09

Source: Field Survey *Note:* Parentheses represent percentage share

[1] See also Q.K. Ahmad & M.U.Ahmad (1985), " A review of Rural Non-Farm Economic Activities in Bangladesh" in Mukherjee & Lim (ed), *Development and Diversification of Rural Industries in Asia.* APDC, pp. 86-87.

[2] R. Islam (1987) *Rural Industrialization and employment in Asia,* ILO-ARTEP, pp.10-11

Total capital intensity is also small in the units as fixed capital is a major part of total capital. It is measured by the ratio of total capital to the number of labourers employed in the manufacturing units. The amount of capital intensity in this industry is classified into two categories – (i) Upto Rs 26, 000 and (ii) Above Rs 26,000.Distribution of baluchari silk sharee units by amount of fixed capital per worker shows that 65 percent of the total sample units belong to the first category having amount of total capital investment amounted to Rs 26,000 or below per worker and the rest 35 percent units belong to the second category having amount of total capital investment more than Rs 26000 per worker in Bishnupur town. Distribution of *baluchari* silk sharee units by both amount of total capital investment and type of production organization shows that most of the independent units (65 per cent) belong to the second category having amount of fixed capital per worker more than Rs 26,000 while most of the units under cooperative belong to the first category having amount of total capital investment upto Rs 26,000. 85 per cent of the tied units belong to this category in respect of amount of total capital investment. Amount of average total capital investment per worker registers highest (Rs. 26,632) in case independent organization followed by cooperative and tied organization (Table 6).

Table 6 Distribution of Handloom Units by Value of Total Capital (K) per Worker and by types of Production Organization

Organization	Number of Units by amount of total capital used per worker		Total number of units	Average Total Capital (Rs.)	CV (%)
	Upto Rs.26,000	Above Rs 26,000			
Independent	7(35)	13(65)	20(100)	26632	6.95
Cooperative	15(75)	5(25)	20(100)	24693	7.53
Tied to Mahajan	17(85)	3(15)	20(100)	24488	6.01
	39(65.00)	**21**(35.00)	60(100)	25271	7.77

Source: Field Survey *Note:* Parentheses represent percentage share

Output

Most of the baluchari silk sharee units produce small annual value of output. The annual value of output is classified into three categories – (i) up to Rs 2.5 lakh, (ii) Rs 2.51 lakh to Rs 4.0 lakh and (iii) above Rs. 4.0 lakh. Distribution of baluchari silk sharee units by amount of annual value of output shows that 50 percent units of the total sample units (60) belong to the first category having annual value of output amounting to Rs. 2.5 lakhs and less, whereas 27 per cent units belong to the second category having annual value of out put amounting more than Rs 2.5 lakhs to Rs 4 lakhs and rest 23 per cent belong to the last category having annual value of out put amounting more than Rs 4 lakhs in Bishnupur town. Distribution of *baluchari* silk sharee units by both annual value of out put and type of production organization shows that 40 per cent of the independent units belong to the third category having annual value of out put amounting

more than Rs 4 lakhs while most of the units under cooperative (55 per cent) belong to the first category having annual value of out put amounting to Rs 2.5 lakhs and less. 65 per cent of the tied units belong to this category in respect of amount of annual value of out put. Estimated average annual value of output (Vo) per unit is highest Rs. 391637 in case of independent units followed by cooperative units and tied units (Table 7).

Table 7 Distribution of Handloom Units by Value of Output per Unit and by types Production Organization

Organization	Number of units by value of output per unit			Total number of units	Average Vo (Rs.)	CV (%)
	Up to Rs 2.5 lakh	Rs 2.51 lakh to Rs 4.0 lakh	Above Rs. 4.0 lakh			
Independent	6(30)	6(30)	8(40)	20(100)	391637	46.68
Cooperative	11(55)	4(20)	5(25)	20(100)	292450	45.76
Tied to Mahajan	13(65)	6(30)	1(5)	20(100)	241411	38.71
	30(50.00)	16(26.67)	14(23.33)	60(100)	308499	49.47

Source: Field Survey *Note:* Parentheses represent percentage share

Value Addition

Most of the baluchari silk sharee units produce also small annual value added. The annual value value addition is classified into three categories – (i) upto Rs 1.25 lakh, (ii) Rs 1.26 to Rs 2.5 lakh and (iii) above Rs 2.5 lakh. Distribution of baluchari silk sharee units by amount of annual value added shows that 37 percent units of the total sample units (60) belong to the first category having annual value added amounting to Rs. 1.25 lakhsand less, whereas 45 per cent units belong to the second category having annual value added amounting more than Rs1.25 lakhs to Rs 2.5 lakhs and rest 18 per cent units belong to the last category having annual value added amounting more than Rs 2.5 lakhs in Bishnupur town. Distribution of *baluchari* silk sharee units by both annual value added and type of production organization shows that most of the independent (60 per cent) units belong to the second category having annual value of output amounting more than Rs 1.25 lakhs while most of the units under cooperative (50 per cent) belong to the first category having annual value of out put amounting to Rs 1.25 lakhs and less. 55 per cent of the tied units belong to this category in respect of amount of annual value added. Estimated average annual value added (Va) per unit is highest Rs. 217544 in case of independent units followed by cooperative units and tied units (Table 8).

Table 8 Distribution of Handloom Units by Annual Value Added (Va) Per Unit and by Type of Production Organization

Organization	Number of units by amount of value added			Total number of units	Average (Va) (Rs.)	CV (%)
	Upto Rs 1.25 lakh	Rs 1.26 to Rs 2.5 lakh	Above Rs 2.5 lakh			
Independent	1(5)	12(60)	7(35)	20(100)	217544	47.69
Cooperative	10(50)	7(35)	3(15)	20(100)	160847	45.76
Tied to Mahajan	11(55)	8(40)	1(5)	20(100)	132776	38.71
All	22(36.67)	27(45.00)	11(18.33)	60(100)	170389	50.23

Source: Field Survey *Note:* Parentheses represent percentage share

Income:

Most of the artisans' monthly income is low from this industry. The artisans' monthly income in this industry is classified into three categories – (i) upto Rs 4000, (ii) Rs 4001 to Rs 4500 and (iii) above Rs 4500. Distribution of baluchari silk sharee units by amount of monthly income from this industry shows that 40 percent units of the total sample units (60) belong to the first category having monthly income per artisan amounting to Rs. 4,000 and less, whereas 30 per cent units belong to the second category having monthly income amounting more than Rs 4,000 to Rs 4,500 per artisan and rest 30 per cent units belong to the last category having monthly income amounting more than Rs 4,500 per artisan in Bishnupur town. Distribution of *baluchari* silk sharee units by both monthly income per artisan and type of production organization shows that most of the independent (85 per cent) units belong to the third category having monthly income per artisan amounting more than Rs 4,500 while most of the units under cooperative (55 per cent) belong to the first category having monthly income per artisan amounting to Rs 4,000 and less. 60 per cent of the tied units belong to this category in respect of monthly income per artisan. Estimated average monthly income generated per artisan from this industry is highest Rs. 5886 in case of independent units followed by cooperative units and tied units (Table 9).

Table 9 Distribution of Handloom Units by Average Monthly Income per Weaver (30days of 8 hrs) from Handloom Weaving and by Type of Production Organizations (Rs)

Organization	Number of units by monthly income per weaver			Total number of units	Average (Rs.)	CV (%)
	Upto 4000	4001 to 4500	Above 4500			
Independent	01(5)	02(10)	17(85)	20(100)	5886	15.51
Cooperative	11(55)	08(40)	01(5)	20(100)	3853	15.61
Tied to *Mahajan*	12(60)	08(40)	00(0)	20(100)	3758	13.84
	24(40.00)	18(30.00)	18(30.00)	60(100)	4499	27.35

Source: Field Survey *Note:* Parentheses represent percentage share

Labour productivity:

Labour productivity is measured in terms of (i) value of output (Vo) per man-day (md) and (ii) value added (Va) per man-day (md), i.e.,Vo / md and Va / md. Nost of the independent units produce higher value of output. The amount of annual value of output per man-day (Vo/md) in this industry is classified into two categories – (i) upto Rs. 250 and (ii) above Rs 250. Distribution of baluchari silk sharee units by amount of annual value of output per man-day (Vo/md) shows that 42 percent units of the total sample units (60) belong to the first category having annual value of output per man-day (Vo/md) amounting to Rs. 250 and less, whereas rest 58 per cent units belong to the second category having annual value of out put per man-day (Vo/md) amounting more than Rs 250 in Bishnupur town. Distribution of *baluchari* silk sharee units by both annual value of out put per man-day (Vo/md) and type of production organization shows that most of the independent (85 per cent) units belong to the second category having annual value of out put per man-day (Vo/md) amounting more than Rs 250 while 50 per cent of the units under cooperative belong to each of the category having annual value of out put per man-day (Vo/md) amounting to Rs 2.5 and less and more than Rs. 250. 60 per cent of the tied units belong to the first category in respect of amount of annual value of out put per man-day (Vo/md) amounting to Rs 2.5 and less. Estimated average annual value of output per man-day (Vo/md) is highest (Rs. 278) in case of independent units followed by cooperative units and tied units (Table 10).

Table 10 Distribution of Handloom units by Value of Output per Man-day (Vo/md) and by Type of Production Organizations

Organization	Number of units by value of output per manday (Rs)		Total number of units	Average (Rs)	CV (%)
	Up to Rs. 250	Above Rs 250			
Independent	3(15)	17(85)	20(100)	278	9.33
Cooperative	10(50)	10(50)	20(100)	252	10.59
Tied to *Mahajan*	12(60)	8(40)	20(100)	249	10.25
	25(41.67)	35(58.33)	60(100)	260	11.07

Source: Field Survey *Note:* Parentheses represent percentage share

Most of the independent units produce higher value addedthan tied and cooperative units. The annual value added per man-day (Va/md) in this industry is classified into two categories – (i) upto Rs. 150 and (ii) above Rs 150. Distribution of baluchari silk sharee units by amount of annual value added per man-day (Va/md) shows that 63 percent units of the total sample units (60) belong to the first category having annual value added per man-day (Va/md) amounting to Rs. 150 and less, whereas rest 37 per cent units belong to the second category having annual value added per man-day (Va/md) amounting to more than Rs 150 in Bishnupur town. Distribution of *baluchari* silk sharee units by both annual value added per man-day (Va/md) and type of production organization shows that most of the independent (70 per cent) units belong to the second category having annual value added per man-day (Va/md) amounting more than Rs 150 while most of

the units under cooperative (75 per cent) belong to the first category having annual value added per man-day (Va/md) amounting to Rs 150 and less. 85 per cent of the tied units belong to this category in respect of annual value added per man-day. Estimated average annual value added per man-day (Va/md) is highest (Rs. 155) in case of independent units followed by cooperative units and tied units (Table 11).

Table 11 Distribution of Handloom units by Value added per man-day (Va/md) and by Type of Production Organizations

Organization	Number of units by value added per manday (Rs)		Total number of units	Average (Rs)	CV (%)
	Up to Rs.150	**Above Rs 150**			
Independent	6(30)	14(70)	20(100)	155	12.95
Cooperative	15(75)	5(25)	20(100)	139	10.59
Tied to *Mahajan*	17(85)	3(15)	20(100)	137	10.25
	38(63.33)	22(36.67)	60(100)	144	12.58

Source: Field Survey *Note:* Parentheses represent percentage share

***Capital Productivity*:**

Capital productivity is measured in terms of value of output (Vo) or value added (Va) per unit of fixed capital (Fk) has been shown in table 12 and 13. The amount of annual value of output per unit of fixed capital (Vo/Fk) in this industry is classified into three categories – (i) upto Rs. 6, (ii) Rs 6.1 to 7 and (iii) above Rs 7. Distribution of baluchari silk sharee units by annual value of out put per unit of fixed capital (Vo/Fk) shows that 31 percent units of the total sample units (60) belong to the first category having annual value of out put per unit of fixed capital (Vo/Fk) amounting to Rs. 6 and less, whereas 31 per cent units belong to the second category having annual value of out put per unit of fixed capital (Vo/Fk) amounting more than Rs 6 to Rs 7 and rest 37 per cent units belong to the third category having annual value of out put per unit of fixed capital (Vo/Fk) amounting to more than Rs 7 in Bishnupur town. Distribution of *baluchari* silk sharee units by both annual value of out put per unit of fixed capital (Vo/Fk) and type of production organization shows that most of the independent (60 per cent) units belong to the third category having annual value of out put per unit of fixed capital (Vo/Fk) amounting to more than Rs 7 while most of the units under cooperative (75 per cent) belong to the first category and the second category having annual value of output per unit of fixed capital (Vo/Fk) amounting less than Rs 7. Fifty per cent of the tied units belong to the first category in respect of annual value of out put per unit of fixed capital. Estimated average annual value of output per unit of fixed capital (Vo/Fk) is highest (Rs. 7.19) in case of independent units followed by cooperative units and tied units (Table 12).

Table 12 Distribution of Handloom units by Value of Output per Unit of Fixed Capital (Vo/Fc) and by Type of Production Organizations

Organization	Number of units by Vo/Fc (Rs)			Total number of units	Average (Rs)	CV (%)
	Up to Rs.6	Rs.6.1 to Rs. 7	Above Rs. 7			
Independent	1(5)	7(35)	12(60)	20(100)	7.19	9.96
Cooperative	8(40)	7(35)	5(25)	20(100)	6.40	19.44
Tied to *Mahajan*	10(50)	5(25)	5(25)	20(100)	6.33	23.95
	19(31.33)	19(31.33)	22(36.67)	60(100)	6.64	18.79

Source: Field Survey *Note:* Parentheses represent percentage share

The annual value added per unit of fixed capital (Va/Fk) in this industry is classified into three categories – (i) upto Rs. 3, (ii) Rs3.1 to 4 and (iii) above Rs 4. Distribution of baluchari silk sharee units by amount of annual value added per unit of fixed capital (Va/Fk) shows that 20 percent units of the total sample units (60) belong to the first category having annual value added per unit of fixed capital (Va/Fk) amounting to Rs. 3 and less, whereas 40 per cent units belong to the second category having annual value added per unit of fixed capital (Va/Fk) amounting more than Rs 3 to Rs 4 and rest 40 per cent units belong to the third category having annual value added per unit of fixed capital (Va/Fk) amounting more than Rs 4 in Bishnupur town. Distribution of *baluchari* silk sharee units by both annual value added per unit of fixed capital (Va/Fk) and type of production organization shows that most of the independent (70 per cent) units belong to the third category having annual value added per unit of fixed capital (Va/Fk) amounting more than Rs 4 while most of the units under cooperative (50 per cent) belong to the second category having annual value added per unit of fixed capital (Va/Fk) amounting more than Rs 3 to Rs. 4. 75 per cent of the tied units belong to the first and second category in respect of annual value added per unit of fixed capital (Va/Fk). Estimated annual value added per unit of fixed capital (Va/Fk) is highest (Rs. 3.99) in case of independent units followed by cooperative units and tied units (Table 13).

Now, we explain the variation in labour and capital productivity across production organisation. Capital intensity of independent units is higher than that of the cooperative units and tied units. So, there is a positive relationship between productivity and capital intensity[1]. Higher the capital intensity better the technology and hence higher productivity[2]. Besides, larger independent units employ hired workers on piece rate basis so that they can avoid supervision cost. Hired workers generally want to maximize wage income through the minimization of idle working hours in the form of contractual agreements. Hired workers are ready / bound to accept even lower than the subsistence wage rate due to their low opportunity cost, especially in agricultural slack season. So, hired workers are getting wage rate below their contribution to the total product. Petty independent, cooperative and tied units mainly depend on the household labourers and these household labourers work simultaneously with other household activities and it takes normally longer hour. Among the household workers, there is considerable participation of female and child labourers who

have much lower opportunity cost even in the agricultural peak season. Both cooperative and tied weavers have very little scope to produce the types of product and design of the product which has growing demand in the market in accordance their own choice. Cooperative units are akin to tied weavers in their functioning.

Table 13 Distribution of Handloom units by Value added per Unit of Fixed Capital Used (Va/Fc) and by Type of Production Organizations

Organization	Number of units by Va / Fc (Rs)			Total number of units	Average (Rs)	CV (%)
	Up to Rs 3	Rs 3.1 to Rs 4	Above Rs 4			
Independent	1(5)	5(25)	14(70)	20(100)	3.99	12.58
Cooperative	5(25)	10(50)	5(25)	20(100)	3.52	19.44
Tied to *Mahajan*	6(30)	9(45)	5(25)	20(100)	3.48	23.95
	12(20)	24(40)	24(40)	60(100)	3.66	19.49

Source: Field Survey *Note:* Parentheses represent percentage share

Profitability :

Profitability of sample *baluchari* units is measured in two ways – (i) gross profit per 100 rupee of sales and (ii) net profit per 100 rupee sales. Gross profit = (total sales value - total paid out cost) and Net profit = {total sales value – (total paid out cost + total imputed cost for use of own factors of production)}. Of all the three production organizations independent units represent the highest values in terms of both the indices, followed in most cases by the tied units (Table 14 and 15).

The gross profit ratio {GP/Sales (%)} in this industry is classified into three categories – (i) upto 35 per cent, (ii) 36 to 50 per cent and (iii) above 50 per cent. Distribution of baluchari silk sharee units by gross profit ratio {GP/Sales (%)} shows that 47 percent units of the total sample units (60) belong to the first category having gross profit ratio amounting to 35 per cent and less, whereas 27 percent units belong to the second category having gross profit ratio amounting more than 35 to 50 percent and rest 27 per cent units belong to the last category having gross profit ratio amounting more than 50 percent in Bishnupur town. Distribution of *baluchari* silk sharee units by both gross profit ratio and type of production organization shows that most of the independent (80 per cent) units belong to the last category having gross profit ratio amounting more than 50 percent while most of the units under cooperative (60 per cent) belong to the first category having gross profit ratio amounting to 35 percent and less. 80 percent of the tied units belong to this category in respect of gross profit ratio. Estimated gross profit ratio of this industry is highest (53.39 percent) in case of independent units followed by cooperative units and tied units (Table 14).

[1] See M. Hossain (1987), " Employment Generation through Cottage Industries: Bangladesh" in R. Islam (ed) *Rural Industrialisation and Employment in Asia,* ILO-ARTEP, pp.33-34.

[2] " ..... size and capital intensity, and hence labour productivity, are positively related. There is no ground for this assumption in the theory of production or of the firm. It is an empirical matter." I. M. D. Little, D. Mazumdar & J. M. Page (1987), *Small Manufacturing Enterprises: A Comparative Analysis of Indian and Other Economics,* OUP, pp. 106

Table 14 Distribution Handloom Units by Gross Profit per unit of Sales (Gross Profit/sales) and by Type of Production Organizations

Organization	Number of units by gross profit/sales (%)			Total number of units	Average (%)	CV (%)
	Up to 35	36 to .50	Above .50			
Independent	0(0)	4(20)	16(80)	20(100)	53.39	4.96
Cooperative	12(60)	8(40)	0(0)	20(100)	34.47	4.79
Tied to *Mahajan*	16(80)	4(20)	0(0)	20(100)	33.84	4.19
	28(46.67)	16(26.67)	16(26.67)	60(100)	40.56	23.05

Source: Field Survey *Note:* Parentheses represent percentage share

The net profit ratio {NP/Sales (%)} in this industry is classified into three categories – (i) Negative, (ii) 1-15 percent and (iii) above 15 percent. Distribution of baluchari silk sharee units by net profit ratio {NP/ Sales (%)} shows that 17 percent units of the total sample units (60) belong to the first category having negative net profit ratio, whereas 50 percent units belong to the second category having net profit ratio more than 0 to 15 percent and rest 33 per cent units belong to the last category having net profit ratio more than 15 percent in Bishnupur town. Distribution of *baluchari* silk sharee units by both net profit ratio and type of production organization shows that most of the independent (80 per cent) units belong to the last category having net profit ratio amounting more than 15 while most of the units under cooperative (75 per cent) belong to the second category having net profit ratio amounting more than 0 to 15. 55 percent of the tied units belong to this category in respect of net profit ratio. Estimated net profit ratio of this industry is highest (23.17 per cent) in case of independent units followed by cooperative units and tied units (Table 14).

Table 15 Distribution Handloom Units by Net Profit per unit of Sales (Net Profit/sales) and by Type of Production Organizations

Organization	Number of units by net profit/ sales (%)			Total number of units	Average (%)	CV (%)
	Negative	1 to 15	Above 15			
Independent	0(0)	4(20)	16(80)	20(100)	23.17	33.86
Cooperative	3(15)	15(75)	2(10)	20(100)	4.55	125.36
Tied to *Mahajan*	7(35)	11(55)	2(10)	20(100)	2.36	227.44
	10(16.67)	30(50.00)	20(33.33)	60(100)	10.03	112.93

Source: Field Survey *Note:* Parentheses represent percentage share

Explanations for Profitability Variation

Variation in profitability across independent units and tied units is significantly explained by both labour productivity and capital productivity while that in units under cooperatives by capital productivity alone. The respective models are significant at 1 per cent level (Table 16 A, B and C).

For the industrial units taken together (60 units) across the three production organizations the

profitability variation is explained by labour productivity, capital productivity and type of production organization which has been taken as dummy variable (D) [D = 1 for independent organization and D = 0 for otherwise]. The dummy variable , i.e., production organization emerges as more significant than either labour productivity and or capital productivity to explain the variation in profitability across the industrial units working under different production organization. All the models are significant at 1 per cent level (Table 16 D).

Table 16 Estimated Linear Regression Equations in case of *Baluchari* product

A. For Independent Unit

Dependent variable	Constant	Vo/K	Vo/L	Va/L	R^2	R^{-2}	F	P
Profitability (GP/TC)	.137 (.411)	.499 (7.255)			0.745	0.731	52.63	.000
Profitability (GP/TC)	0.073 (0.234)		3.901E-05 (7.902)		0.776	0.764	62.435	.000
Profitability (GP/TC)	.588 (2.566)			5.551E-05 (8.561)	0.803	0.792	73.286	.000

B. For Cooperative Unit

	Constant	Vo/K	Vo/L	Vo/Fk	R^2	R^{-2}	F	P
Profitability (GP/TC)	-1.38 (-1.295)	0.377 (15.528)			0.931	0.927	241.113	.000
Profitability (GP/TC)	0.206 (1.706)			0.202 (10.902)	0.868	0.861	118.86	.000
Profitability (GP/TC)	1.05 (3.326)		5.399E-06 (1.439)		0.103	0.053	2.071	0.167

C. For Tied Unit

	Constant	Vo/K	Vo/L	Vo/Fk	R^2	R^{-2}	F	P
Profitability (GP/TC)	-0.145 (-2.182)	0.374 (24.45)			0.971	0.969	597.83	.000
Profitability (GP/TC)	9.181E-03 (0.248)			0.226 (39.69)	0.989	0.988	1575.36	.000
Profitability (GP/TC)	0.777 (3.012)		9.97E-06 (2.67)		0.284	0.244	7.142	0.016

D. Overall

Dependent variable	Constant	Vo/Fk	Vo/K	Vo/L	Va/L	D	R^2	$\bar{R}^2$	F	P
Profitability (GP/TC)	-4.00E-02 (-0.489)	0.237 (18.96)				.866 (26.337)	0.964	0.962	757.62	.000
Profitability (GP/TC)	-0.299 (-3.45)		0.412 (20.79)			0.881 (29.31)	0.969	0.968	895.02	.000
Profitability (GP/TC)	.793 (4.618)			9.059E-06 (4.07)		1.168 (14.829)	0.795	0.788	110.377	.000
Profitability (GP/TC)	0.767 (4.63)				1.713E-05 (4.40)	1.166 (15.203)	0.802	0.795	115.62	.000
Profitability (GP/TC)	1.474 (30.46)					1.061 (12.686)	0.735	0.731	160.937	.000

Source: Field Survey

1. Survival Factors of this Industry

Baluchari product has a long tradition and it not only survives but also grows based on differential production organization. The factors that are responsible for the phenomenon are classified into four categories, namely economic, social and cultural, institutional and psychological.

Economic Factors

*Baluchari h*andloom industry survives and even grows because there is sufficient domestic and foreign demand for the products, which several hundreds of poor labour artisans along with giving good returns to weaver artisans. By large, *baluchari* handlooms like other crafts in India are engaged in by poor households for day to day survival[1]. Wages paid in both tied and independent units allow the labour artisans to support themselves with their crafts. In the areas under our study characterized by labour abundance and low farm incomes manufacturing offers one of the ways for both men and women to generate income.

Given the physical conditions of agriculture in drought prone and non-irrigated mono-crop areas, there is low opportunity cost of women's and even man's labour. Given the non-abundance of land handlooms are organized largely around hereditary family skill. The importance of the industry lies in its contribution to the local economy and the economy of men and women belonging to a particular artisan caste group.

The industry survives and expands as it is seen that the number of shops proliferates. Traders invest in such trading because it gives them high returns in festive peak seasons though low return in slack seasons, averaging and ensuring reasonable good returns to the traders for the whole year. Traders play an important role for the survival of industry not only by selling the products to the consumers direct and/ or by retailers but also by acting as *mahajans* giving raw materials and *bani* to the artisans attached to them and thus ensuring markets for the products produced by them. The tied artisans are not paid price for their products (or do not sell their products at the market price) but are paid raw materials and *bani.* The tied artisan

appears to be benefited because (i) he can earn surplus over employment of hired labour, (ii) he can reduce the cost of production by using services of the modern machinery. Hence, the tied units as well as the industry survive.

The demand for handloom products is increasing along with the development of the economy. Consumers' taste and preferences are also continuously changing and demand for artistic and exclusive *baluchari* handloom products are increasing.

Baluchari product has an aesthetic value with exclusive decoration, design and texture. With the change in tastes and preferences, consumers very likely prefer the exclusive designed products. Design and art of the products create an additional value, i.e., aesthetic value to the products and raise the additional demand for the products.

Institutional Factors

Some governmental organizations namely Directorate of Handlooms and Handicrafts, DIC, *Zilla Parisad, W*eaver Service Centres, Institutions of Handloom Technology, NIFT Apex Society, Cooperative Societies etc. valuable services for development of this industry. The training programmes are organized by three agencies and National & Regional Level Handloom Fair gives best prizes and incentives so that artisans participate and prosper. Some non-governmental organizations like big merchants or exporter also encourage artisans to produce diversified *baluchari* products and arrange artisans' training and often marketing facilities for their products.

Social & Cultural Factors

Social customs regulate the market of *baluchari* handloom product. Demand for this product increase seasonally during social ceremonies like marriage and festival time and some families wear *baluchari* from past generations as their ritual custom. The designs of *baluchari* sharee reflect the ancient culture and history of *Ramayana & Mahabharata* and also the beauty of nature. In addition imitate modern culture also reflect that the production of this product depend on customers' tastes and preferences.

Indian society is divided into caste-based occupations and activities from long historical past. The caste-based occupational system prevails to a large extent in modern society. Predecessor of a particular caste family *(tantubay)* have the mentally of working family occupation from the childhood and have heriditacy skill.

Psychological Factors

Psychological factors play vital role in two ways, from the supply side and demand side. Some artisans enjoy art pleasure from the production of innovative and continuously.changing design of *baluchari* handloom product. Sometimes they receive hig price at the fair or by order due to its aesthetic value. They

[1] M. Krishnaraj (1991: WS-8) also observed in her study on bamboo craft, "This craft is by no means a dying one. There is sufficient domestic demand .....". Similar also made by Libet and Roy (2003).

enjoy production of creative and artistic items. Some work is preferred to leisure, especially in the slack seasons. On the other hand, consumers enjoy some status from the use of this exclusive product. People prefer this product due to its exclusiveness and qualities.

4. Conclusion

Baluchari sharee manufacturing has a long tradition of repute and excellence as a handicraft. Being a labour intensive art product it is produced with small amount of capital with substantial value addition. Both gross profitability and net profitability in this industry are substantial for the independent units. Gross income generated for the artisans working under different production organization is significant for livelihood.

Variation in profitability across independent units and tied units is significantly explained by both labour productivity and capital productivity while that in units under cooperatives by capital productivity alone. For the industrial units taken together (60 units) across the three production organizations the profitability variation is explained by labour productivity, capital productivity and type of production organization. Production organization emerges as more significant than either labour productivity and or capital productivity to explain the variation in profitability across the industrial units working under different production organizations.

From the foregoing discussion the following policy conclusions emerge.

First, independent organization is the best form of production organization in respect of productivity, value addition and profitability and hence it should be encouraged through institutional measures like provision of credit and training for improvement of skill of workers,

Second, units under cooperative are not performing well in terms of economic indicators. Cooperative as a production organization needs to be revamped and rejuvenated so that economic benefits accrue to production units and artisans working under it.

Third, Tied units should be encouraged to be converted into independent units through provision of institutional credit and marketing facilities.

The industry has good development potential with favourable economic, social and cultural, institutional and psychological factors. These factors should be further strengthened to have their positive impact on boosting up the industry.

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ECONOMICS OF LEARNING-EXTENT VERSUS LEVEL: A VILLAGE LEVEL STUDY BASED ON TWO MIDNAPORE DISTRICTS, WEST BENGAL

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Importance of education and the learning process that achieves it can be hardly over-emphasized particularly in the case of an underdeveloped country like India. However, there appears to be a genuine lacuna in our understanding of the learning mechanism due to the overstress on extent side of education - whether people simply know to read or write. However learning involves level - the quantum of knowledge accumulated by the family. In this sense, learning is an interactive process. It depends not only on the learning tools but also on learner's willingness to utilize them in a meaningful way. In this paper, we have tried to understand the mechanism of learning fostering educational level and the reasons therein. We followed the suggestion of Basu and Foster (1998) that literacy rate may be a crude indicator of actual educational achievement because of its inability to capture externalities arising in the field of education. We considered numerous parameters of family education level and tried to construct a composite index for family education level. These are in turn regressed on a set of sociological and economic parameters using step regression technique. Our results show the importance of the educational level of head in determining the level parameters. However, family literacy rate is largely dependent on economic factors. Thus while it may be comparatively easy to remove proximate illiteracy, it may be quite difficult to remove isolated illiteracy unless the economic problems of the poor families are properly addressed. Education because of its positive externality may be under-produced.

1. Introduction

Importance of education and the learning process that achieves it can be hardly overemphasized, particularly in the case of an underdeveloped country like India. Education has strong influence on economically relevant variables (such as productivity, health, efficiency, poverty, technical innovations etc.) having direct influence on growth and prosperity (Basu et.al,.2000). In addition, education is an important component of well-being of a people. A person's ability to transform informational inputs into *functionings* is crucially

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dependent on his educational status (Sen 1985). Success of different welfare programmes (such as family welfare) is limited by the general educational level of the masses. Educated people are generally more receptive towards newer ideas and techniques that may improve their productivity and welfare (Lucas 1988). It has been well documented that countries that spent more on education have benefited in terms of long run growth than others that did not (Barro 1991). Even meaningful exercise of rights and duties, which is the key to the operation of a popular democracy, may be influenced by educational status.

It is from this point of view that national and international agencies have always emphasized the importance of education. The United Nations and UNESCO have repeatedly stressed the importance of education in their numerous documents and publications. Free and compulsory education is enshrined in the directive principles of Indian Constitution. However, the sad fact is that in spite of such noble intentions a significant section of humanity has been left in the darkness of illiteracy. Moreover, a significant portion of this *so-called* literates lack proper information processing skill that could benefit them towards enhancing their welfare. Researchers have tried to find out the reasons behind such abject failure of noble intentions. However, there appears to be a genuine lacuna in our understanding of the learning mechanism. Learning is an interactive process. It depends not only on the learning tools but also on learner's willingness to utilize them in a meaningful way. Many educational programs failed not only due to the supply of quality learning infrastructure but because they failed to generate enough positive response from the potential learners. An analysis into this process is thus prerogative for any meaningful analysis of educational attainment. Though economists have discussed the subject since Adam Smith, Lucas (1988) formally addressed the problem in his exposition of the new growth theory. Recently number of authors (Basu and Foster 1998; Basu, Foster and Subramainan 2000, Subramanian 1999, Basu, Narayan and Ravallion 1999 etc.) has revitalized the subject.

An attempt has been made in this paper to relate these issues with family level micro data collected from two villages in two Midnapore (East and West) districts of West Bengal. The plan of the paper is as follows. We give a conceptual and methodological framework in section II and the description of data used in this analysis in the next section. The findings of the application of this methodology on the village level data are discussed in Section III. The paper ends with some concluding remarks in Section IV.

2. Conceptual and Methodological Framework

Lucas (1988) noted that learning is never costless *even when the required educational infrastructure is provided at a subsidized rate by the state. This is because learning requires time. Additional learning often cuts into the learner's time that could have been otherwise used*[1]*. Thus, the cost of learning is essentially the alternatives foregone*[2]*. However, learning also enhances the possibility of increased future income that may enable him to acquire a greater degree of well-being. Thus, there is a trade-off. It is the individual's concern for future and his attachment towards current uses that determine the optimum amount of learning he wishes to undertake.*

The above exercise can be extended to the learning decision of a poor household in underdeveloped areas. There are two alternative models regarding household behavior in a poor economy (Bardhan and Udry 1998). In one model, household decisions are taken by the family head often assumed to be a benevolent despot. However, while taking decisions he might consider views from other adult members of the family. In some cases, some other influential members of the family enjoy this position though there is a functional head. Thus, households are characterized by patriarchal structure. According to an alternative view, decisions are a result of bargaining between family members. However even in this case there may be an oligarchy where the bargaining is limited to a subset of family members[3].

However, the motives behind allowing some family members to spend time in learning are essentially the same in both these approaches. In poor households, almost every member after a certain age has to contribute directly or indirectly to family chores. They may be employed either in family household activities, family production units or hired outside to enhance family earning. Hence, it becomes difficult to dispense with family members (even children after a certain age). Abject poverty of the households together with the operation of the child labor market aggravates this problem (Basu and Van 1996).

In this context, Basu and Foster (1998) conceptualized the notion of *externalities* in education. They argued that presence of at least one literate member in the family has significant impact on family welfare. They distinguished between *isolated* illiterate and *proximate* illiterate. An isolated illiterate is one residing in a family with no literates. A proximate illiterate on the other hand have access to at least one literate person who is a member of the family he belongs. They argued that a proximate illiterate could garner greater welfare for him than an isolated illiterate. This is enhanced if he is proximate to a literate female family member(female proximate illiterate). They thus replaced the notion of literacy rate with that of *effective* literacy rate that incorporates this externality.

They defined a set of parameters. If L is the total number of adult literates, N the total adult population then the adult literacy rate (r) may be defined as

$$r = \frac{L}{N} \qquad \text{[Adult Literacy Rate]} \quad (1)$$

However, r cannot capture externality in education. In order to do so they segregated the entire illiterate population into isolated (P)* and proximate (P)

1 In the original model proposed by Lucas (1988), a given unit of time has two alternative uses-earning extra income or acquiring educational skill. In a later version developed by Solow (2000) leisure is introduced as an additional alternative.

2 We are assuming that there are no substantial monetary expenses in acquiring the learning skill.

3 See for example the plight of widows (Rahman, Foster and Menken 1992; Chen and Dreze 1992) or elderly (Dreze 1990; Kochar 1996).

$$N - L = P + P^{*} \qquad (2)$$

Basu and Foster defined two measures of *effective* literacy. Overall effective literacy rate is:

$$r^{*} = \frac{L + eP}{N} \qquad (3)$$

where e is a parameter to be estimated from the data. Obviously:

In another measure, they discriminate between a female proximate illiterate and a male proximate illiterate giving more weight to the females. We have to decompose equation (2) further as:

$$N - L = P_f + P_m + P^{*} \qquad (4)$$

where P_f is the number of female and P_m is the number of male proximate illiterates. Then the gender biased effective literacy rate is defined as:

$$r^{**} = \frac{L + e_f P_f + e_m P_m}{N} \qquad (5)$$

where $0 < e_m < e_f < 1$

So far the arguments have considered only one dimension of learning-the **extent of education** (whether people are educated or not). However education has another dimension-namely **level dimension** –how far people have gained in knowledge (Lucas 1988,Baumol,Litan and Schramm 2007). It is customary to state that the human development school stresses only on the extent side while the human capital theorists stressed on the level side of education.

The above arguments can be extended to augment Lucas' understanding of the learning process from the ***level side***. Since learning provides externalities, the family may try to maximize such externalities while minimizing the cost. As a result, it may discriminate among its members[4]. Thus, while trying to understand the ***education level*** achieved by its members it is not sufficient to concentrate on isolate and proximate illiteracy. Consider the following example. Suppose we find two families, A and B: each having three adult members with one illiterate. In Family A, one member is a postgraduate while the other is primary educated. In Family B, both the literate members are primary educated. For both the families

$r = \frac{2}{3} = 0.67$ in addition, $r^{*} = \frac{2 + (0.21)1}{3} = 0.796$ assuming $e = 0.21$ following Basu and Foster

4. A good example may be the disparity between a girl child and boy child. It is typically assumed that benefits of investing in a girl will flow to her in-laws after marriage while that of a boy will remain within the confines of the family. This may be one of the major reasons behind the gender disparity in intra

(1998). However if we assume that the extent of externality due to education depends on the nature and degree of knowledge acquired, Family A is better placed than Family B in this regard.

Thus, it is our contention that even the refined measure of literacy cannot capture the entire dimension of ***family education level***. There are at least three dimensions of family education level: (a) the maximum level of education achieved by the family (b) maximum level of female literacy attained by the family and (c) the extent of illiteracy within the family. We first tried to identify these factors for our sample families. Then we regress them on some relevant variables. Our purpose is ultimately to construct a family education index. We then regress this index on the same set of parameters discussed earlier to test its efficacy.

3. Data Analysis and Results

3.1 Sample Characteristics

For empirical analysis, we have selected two villages –one from Paschim Midnapore (Village A) and another from Purba Midnapore (Village B). There are several reasons for selecting these districts. These two are districts with high literacy. Moreover, these two are districts with wide socio-economic and agro-climatic variations. Unlike other parts of Bengal, these districts grow a large number of non-traditional agro-products besides the food crops (such as betel leaf, flower, shrimp, and mushroom etc.). In short, the district provides a wide canvas for studying the economics of learning. We have selected two different villages from these districts in order to sharpen our focus. The villages are selected purposively from two different districts keeping in view their contrasting socio-economic features.

In order to set our analysis in proper perspective, we first concentrate on certain socio-economic aspects of these two villages. These are presented in table 2. From this table it becomes apparent that these two villages display quite different socio-economic indicators. In comparison to Village A, Village B is a larger village with greater population size. Economists normally do however; this difference in population size cannot be associated with a thriving agricultural economy in Village B as. It is evident that per capita land availability is more than three times higher in Village A as compared to B. Thus, the base of agriculture is significantly lower in B. This observation is not blurred by the difference in inter-village land quality. This is because the two villages fall within the alluvial zone. To assert our logic we determined the percentage of farming households in both the villages. We first described those households as *farmers* whose income from cultivation accounts for *at least* 50 % of their total earnings. From this table it is apparent that while all the households of Village A are farmers, only 9% households of village B are farmers. This implies that Village B has a non-agricultural base. This is further exposed in Table 3. However, the average income per capita of the two villages is comparable though Village A has a stronger asset base than Village B. With a prosperous agriculture, the inhabitants of Village A have been able to build up a strong asset base. Village B did not have a stable agricultural set-up. They have to depend on other rural non-farm activities.

Table 1: Basic information regarding the sampled villages

	Village-A	Village-B
Name of the village	Fulchak	Brindabanpur
Gram Panchayat.	Monoharpur (5/1)	Shantipur-2
Subdivision	Ghatal	Tamluk
Block	Kshirpai	Sahid Matangini
Police Station	Chandrakona	Kolaghat
District	Midnapore (West)	Midnapore (East)
Primary School	1	1
Nearest High School	Natuk (about 2 km. away)	Hakola (about 1 km away)
Nearest Health Center	About 3 km.away	About 2 km away
% of households with Electrification	50	100
% of households with telephone facilities	0	0

Distinction between the two villages is quite clearly brought out by the social parameters. It is seen that Village B enjoys a much better literacy rate than Village A. The beneficial effect of higher literacy rate is reflected in certain parameters of *women empowerment*-sex ratio and number of female-headed households. In both these counts Village B outperforms Village A.

Table 2: Some selected socio-economic indicators of the sampled villages

	Village-A	Village-B
No of households	69	100
No. of households headed by women	1	16
No of individuals	356	494
Sex Ratio (per 1000 males)	845	937
Literacy Rate (%)	66.3	79
% of farming families	76.81	9
Per Capita Land holding (acre)	0.48	0.15
Per capita value of Asset (Rs.)	59329	16712
Per-Capita Income (Yearly) (Rs.)	8950	8895

Table 3: Occupational Breakup of the two Villages

MAJOR SOURCES OF INCOME (AT LEAST 50% SHARE)	% OF FAMILIES	
	VILLAGE A	VILLAGE B
Farming	77	9
Cottage Industries	0	1
Business	0	13
Service	6	6
Other	17	54
Mixed	0	17

3.2 Regression Results

In most of the empirical studies literacy rate is projected as the most important variable that captures human effort towards acquiring knowledge. However, recently UNDP have included enrolment rate as a secondary variable in assessing educational attainment of people. Basu and Foster (1998) were the first to point out the influence of externalities on the knowledge acquistion of families. They pointed out significant differences in the pattern of knowledge accumulation depending on the presence or absence of literate persons in the family. Taking up gender issues into consideration makes further generalistaion in this line. The externality argument can be easily extended to take up levels of education instead of just being literate or illiterate. This was our argument in Section II. Now we propose to verify this argument using our data set.

We may now turn to the regression results. For measuring levels of education, our variables are (as stated before): (a) the maximum level of education achieved by the family (MAXEDU)-as measured by a categorical variable taking up discrete values for different levels of education (b) maximum level of female education attained by the family (MAXFMEDU)- measured similarly as MAXEDU and (c) the extent of illiteracy within the family (FILLT)-measured as the proportion of illiterate to total members of the family. In order to explain these variables we have selected a number of explanatory variables.

(a) ***Sociological Factors***

(i) *Education of the Family Head (HDEDU)*

This variable (measured similarly as MAXEDU) captures the patriarchal structure of Indian families. Family head often finds to enjoy a privilege position within the family. In different versions of family, decision making family head is always given a dominant position. He assumes the leader of the family oligarchy, often the sole member of this group. He also decides the extent of maximum education of a family. We have postulated that educational experience guides his/her decisions

(ii) *Sex of the Family Head (HDSEX)*

This is another aspect of family head measured by a dichotomous dummy. We posited a gender difference between male and females in this regard. The idea is motivated by the observation that externality due to female education is significantly higher.

(b) *Economic Factors*

(i) *Per capita Family Income in real terms (FTOTIN)*

It is asserted that families with higher per capita income can spend more on education. They can also devote more time for acquiring higher educational skill. Hence, they are likely to achieve a greater level of education.

(ii) *Per capita Family Land Holdings in value terms (FLAND)*

In a poor country asset serves as an important instrument of future economic plan of the households (Ray 1998; Banerjee and Newman 1993; Galor and Zeira 1993). Assets serve as collateral that can cover default risk in an imperfect credit market. Because of this imperfection in the capital market, it is often difficult for resource poor households to garner enough credit that is necessary for educating themselves or their children. We use per capita land holding as a proxy for per capita assets. This is to overcome certain methodological difficulties in valuing assets.

(iii) *No. of family members engaged in family production activity (Workfarm)*

The influence of this variable is quite complex. On the one hand, it directly influences learning decisions by way of allocation of time. On the other, it depends on the family's assessment of utilization of formal education for family production activity. Often formal education is assumed to have little influence of family production. In fact spending too much time in acquiring formal education may be assumed to have detrimental effect on family productive activity. Hence the exact effect of this variable will be determined by the economic status of the family. For a large farmer specialized in entrepreneurial activity this may be positive. For a small or marginal farmer doing largely manual job, this is negative.

(iv) *No. of family members engaged in outside production activity (Workout)*

This is more complex than the variable workfarm. The reason is that the level of education needed is linked with the nature of outside work. For government or private service, higher education is required. However, working as a farm laborer in other's farm does not require much educational skill. In fact, it may deem to have negative impact. Again, the exact effect of this variable will be determined by the economic status of the family. For a large farmer with high skilled members this may be positive. For a small or marginal farmer doing largely manual job requiring low skill, this is negative.

We have used the step regression technique where the most relevant variables are chosen from the list of variables using the standard econometric techniques. We represent the results in Tables 4-6. The variables that are ultimately retained by this technique are presented below

Table 4: Regression Results——————Dependent Variable MAXEDU

Villages → / Variables ↓	Village A	Village B
Constant	0.9204*	2.36**
	(2.89)	(18.55)
HDEDU	0.7796**	0.5998**
	(6.10)	(7.41)
FTOTIN	(0.5215×10^{-4})*	--------
	(2.30)	
R^2	0.42	0.35
F	25.77	54.91
Observ.	69	100

*-significant at 5% level & **-significant at 1% level.

Table 5: Regression Results——————Dependent Variable MAXFMEDU

Villages → / Variables ↓	Village A	Village B
Constant	0.3618	1.86**
	(1.116)	(16.09)
HDEDU	0.6544**	0.3350**
	(5.46)	(4.56)
FTOTIN	(0.5693×10^{-4})*	--------
	(2.70)	
WORKOUT	0.2658*	----------
	(2.101)	
R^2	0.40	0.17
F	16.08	20.78
Observ.	69	100

Table 6: Regression Results————————Dependent Variable FILLT

Villages→ Variables ↓	Village A	Village B
Constant	0.6546**	0.2381**
	(7.80)	(10.52)
HDEDU	----------	-0.0663**
		(-4.59)
FTOTIN	----------	--------
FLAND	-0.0067**	--------
	(-4.31)	
R^2	0.21	0.17
F	18.59	21.09
Observasions.	69	100

Results of the regression analysis as presented in Table 4 to Table 6 are very interesting. They clearly imply the importance of sociological factors particularly the education status of head to be the most important determinants of level indicators- maximum family education and maximum female education. For village A, however some economic variables (such as *ftotin* and *workout*) are important. Such is not the case of Village B. This can be easily justified noting that Village B has non-agricultural base. It becomes apparent that in spite of Lucas' suggestion level of education achieved by the farm families is not so much constrained by economic factors. Rather the educational experience of the family patriarch (sex makes no differences) is that which is omnipotent. Proximity to education has greater influence on family decision in this regard.

The picture is slightly different for family illiteracy rate. For Village A, it depends only on per capita land allocation –an important indicator of economic viability of a family. For Village B, education status of head once again becomes important. The analysis is clearly justified using Basu-Foster's suggestion of educational externality. Since education has strong externality, it is always beneficial to have at least one literate member . The extent of externality that he will provide depends crucially upon family head's assessment that in turn is dependent on his education status. In making this decision, the head is guided by family interests rather than individual member's well-being. Thus, the notion of greater benefit of female education does not apply here. We may regard this as *family effect*. However, individual's striving for education crucially depends on the economic base of the family. In this respect, economists bring in the concept of *sibling rivalry*- competition

among the offsprings to get greater share of the family cake (Ray 1998). Like any goods with positive externality, there is an inherent tendency to produce education below the social optimum level...

3.3 Towards a composite index of family education

After having understood the factors behind learning, our next concern is to construct a composite index of family education level considering its three components. This index should ideally capture the level externality of education[1]. *We can easily define the* family education index (FEI) *as a weighted average of the above three parameters. The crucial problem is to determine these weights. For this, we first segregate the parameters into two components:*

(a) Level Learning Index (LVLI)

(i) the maximum level of education achieved by the family (MAXEDU)

(ii) maximum level of female education attained by the family (MAXFMEDU), and

in Gender deprivation in learning

(b) the extent of illiteracy within the family (FILLT)

We then constructed:

$$LVLI = \frac{\sum w_i x_i}{\sum w_i} \qquad (6)$$

where x_i are the factors included in LVLI with weights w_i. These weights are selected from the Principal Component Analysis (PCA). This is done to give unequal weights to the different components of LVLI[1]. Next, the FEI is calculated as:

$$FEI = \frac{\frac{1}{2}(LVLI) + \frac{1}{2}(-FILLT)}{\frac{1}{2} + \frac{1}{2}} = \frac{LVLI - FILLT}{2} \qquad (7)$$

We now present certain statistical properties of FEI in Table 7. From this table, it becomes apparent that not many differences are there between the two villages with respect to FEI. This directly contrasts with literacy rate where the condition of Village B was much better. This may be a reflection of better *maxedu* or *maxfmedu* in Village A as compared to Village B. Hence, while there is evidence of some correlation with per capita family income in Village A, there is no such evidence in Village B[1]. Thus, FEI might catch up features of learning mechanism that are overlooked by a simple measure such as literacy rate.

Table 7: Some statistical properties of FEI in the sampled villages

	Village-A	Village-B
Mean	1.12	1.17
Standard deviation	0.73	0.47
Rank correlation with per capita family income	0.48	-0.07

Next, we regress FEI on the previously mentioned set of parameters. The results are given in the Table 8. These results indicate that in both the villages education level of head is the prime factor behind FEI. In Village A, per capita family income also becomes very important. As compared to Table 6, where family illiteracy rate is regressed, the fit is much better here (as is indicated by adjusted R-square and F statistic). Thus, FEI is a better indicator of family education performance than the literacy rate.

Table 8: Regression Results——————Dependent Variable FEI

Villages→ Variables ↓	Village A	Village B
Constant	-0.0296	0.8924**
	(-0.18)	(15.58)
HDEDU	0.3817**	0.2430*
	(5.75)	(6.68)
FTOTIN	0.41×10^{-4}*	--------
	(3.47)	
R^2	0.45	0.31
F	28.58	44.65
Observ.	69	100

4. Conclusion

In this paper, we have tried to understand the mechanism of learning and the reasons therein. We followed the suggestion of Basu and Foster (1998) that literacy rate may be a crude indicator of actual educational achievement because of its inability to capture externalities arising in the field of education. We considered numerous parameters of family education level and tried to construct a composite index for family education level. These are in turn regressed on a set of sociological and economic parameters using step

4 Obviously this index is broader than literacy rate that captures only the extent but not the level of learning.

5. One of the main reasons for this may lie in giving additional weightage to female education. Because of the greater variability of MAXFMEDU, PCA automatically achieves it.

6. This corroborates our earlier regression results.

regression technique. Our results show the importance of the educational level of head in determining the level parameters. However, family literacy rate is largely dependent on economic factors. Thus while it may be comparatively easy to remove proximate illiteracy, it may be quite difficult to remove isolated illiteracy unless the economic problems of the poor families are properly addressed. Education because of its positive externality may be underproduced.

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GLOBALISATION AND HIGHER EDUCATION IN INDIA

Sebak Kumar Jana[1]

Higher education plays a very crucial role in economic development of a country by providing knowledge-workers to its industry and services. Higher education which was treated as non-tradable commodity is now tradable with the formation of WTO in 1995. The globalization has opened up both opportunities and has thrown challenges for higher education in India. The present paper tries to identify the various issues pertaining to globalization and higher education in India.

1. Introduction:

The process of globalisation in higher education started from the later half of the 20th century. Thatcher government started full fee based market education system in the UK in 1980-82. The process of opening of higher education started in Australia in 1982. Several forces have been at work over the past 20 to 30 years to initiate significant reforms in the structure of higher education at a global level. There has been a shift from an industry-based to a knowledge-based economy driven by scientific and technological advances located primarily in central countries such as Germany, Japan, the United Kingdom, and the United States. (Collins and Rhoads 2009).

The idea of inclusion of trade in services within the General Agreement on Trade and Tariff (GATT) was first proposed by the USA at the GATT's ministerial conference in 1982. This became necessary for US because by 1981, the service sector comprised about 66% of GDP of the developed countries (Narlikar 2005). But introducing trade was difficult because services were traditionally considered 'non-tradables'. Also developing countries that the international regulations of the services may jeopardize their sovereignity and the removal of barriers in trade in services may require modifications of domestic regulatory regimes.

The World Trade Organistion (WTO) was established in 1995 replacing GATT. Under WTO the GATS (General Agreement on Trade in Services) has been formed which comprises 12 specific services including educational services. Education in GATS has been classified into five groups – primary education, secondary education, higher education, higher education, adult education and other education services. Higher education services were included in the GATS in 2000. There are four modes of supply of tertiary education services (Singh 2006). These are as follows:

(i) Cross Boarder Supply: It mainly includes international distance education. It does not require movement of supplier or consumer.

(ii) Consumption abroad: When students travel abroad to study.

(iii) Foreign Commercial Presence: Establishment of branches of educational institutions and franchise agreements.

(iv) Presence of natural persons: Teachers traveling abroad to teach.

Out of the four modes of trade in services mode (ii) i.e. consumption abroad is in vogue for centuries. Presently this is the major mode of trade in higher education in India. GATS has two components. (i) The framework agreement containing 29 articles. (ii) A number of annexes that are meant to remove trade restrictions. The basic principles of GATS are as follows:

(i) Most Favoured Nation (MFN): Equal opportunities to all WTO members.

(ii) National Treatment: Treating one's nationals and foreigners equally.

(iii) Transperancy: All policies relating to barriers to market access are to be notified by the members.

Against this brief backdrop the present note examines some issues pertaining to globalization and higher education in India.

The rest of the note is organized as follows. Section 2 presents the status of higher education in India and Section 3 discusses recommendations of some expert committees for Improvement of higher education in India. Section 4 presents arguments for as well as concerns of globalization. Section 5 reviews international flow of students in higher education of India. Section 6 makes concluding observations.

2. Status of Higher Education in India

. The modern system of higher education started in India in 1857 with the establishment of three universities of Calcutta, Bombay and Madras. At the time of Independence there were only 20 universities, 496 colleges and 2.15 lakh students in higher education. There has been a huge quantitative expansion of higher education in India in the post independence period. In 2005-06 there were 355 universities, 18.064 thousand colleges, 1.1 crores of students in higher education in India (UGC, 2003-04). The growth of higher education in India is given in table 1.

Table 1: Growth of Higher Education in India

Institutions	1950-51	1990-91	1996-97	2005-06
Universities	27	184	228	355
Colleges	578	6627	8529	18064
Enrolment (lakh)	2.63	49.25	67.55	110.28
Teachers ('lakhs)	0.24	2.727	3.21	4.88

Source: UGC: *Annual Reports*, Adopted from Chakraborti P (2007)

In India, over the years, there have been private initiatives in education initially for philanthropic reasons and eventually in professional and even in general higher education not only to meet the growing demands but also to realize the huge and quick profits potential. There are several dimensions of changes that have taken place since 1991, the most important of which is in the position of the government which is reflected in the reduction of state funding to higher education, entry of private players, the increase in the individual cost of higher education, i e, the self-financing of higher education, the entry of foreign institutions (Collins and Rhoads 2009). Privatization of higher education has emerged in several forms and types in the recent decade in India through introducing self- financing courses within government/ government aided

institutes and also through opening private self-financing institutions (Rani 2009). The participation of the private sector in terms of number of institutions and enrolment are given in the table 2. The percentage share of enrolment in higher education in India has increased from 32.89% in 2000-01 to 51.53% in 2005-06 (Prakash 2007).

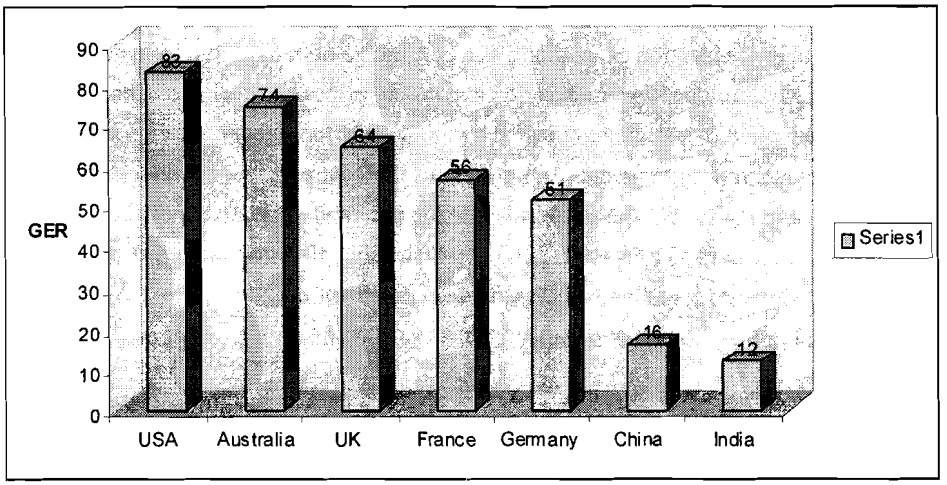
Table 2: Typology and Growth Trends of Higher Education Institutions, 2005-06

Type	Ownership	Financing	Percentage share of Institutions	Percentage share of Enrolment	Growth Trends
Government Universities	Public	Public	1.32	9.55	Not Growing
Private University	Private	Private	0.04	0.10	Emerging
Deemed University (Aided)	Private/Public	Public	0.21	0.38	Growing slowly
Deemed University (Unaided)	Private	Private	0.35	0.57	Growing rapidly
Govt. College	Public	Public	23.31	26.27	Not Growing
Private Aided College	Private	Public	31.73	32.96	Not Growing
Private Unaided College	Private	Private	42.21	30.09	Growing rapidly
Foreign University	Private	Private	0.83	0.08	Emerging on the scene
			100.00	100.00	

Source: Agarwal (2006)

Though growth in higher education is impressive, the access to higher education measured in terms of enrolment in higher education is still very low compared to developed countries and even with other developing countries. The gross enrolment ratio (GER) in higher education in India is only 12% where it is 83% in the USA. It should be mentioned that GER is very low in high income countries compared to low income countries. During 1980-2000, the GER increased from 35% to 62% in the high income countries and during the same period the average GER in lower middle income countries increased from 9% to 15% (Agarwal 2006). Again on equity considerations higher education should be more inclusive with more representation of backward classes and women. The percentage share of enrolment in higher education in India for these categories are as follows: women – 40%, SC- 11% and ST – 3.6% (Prakash 2007). Figure 1 below shows the disparity in GER in higher education for some selected countries (Agarwal 2006).

Figure 1: Gross Enrolment Ratios in Some Selected Countries, 2002-03



Subject-wise enrolment share in higher education in India in 2004-05 were as follows: Arts – 46%, Science -20%, Commerce – 18%, Engineering – 7%, Medicine – 3%, Law – 3%, Agriculture – 1% and others – 2%. It has been observed that students' demand for higher education are often based on their personal or parental choices which may result in mismatch between demand and supply creating unemployment in one and shortages in others.

The status of academic research in India is not very encouraging. The number of doctoral degrees awarded in India was 16,602 out of which the percentages for Arts -41%, science – 33% and Professional – 27% (Rao and Singh 2007). The percentage share of enrolment in Ph.D. for boys and girls are respectively 60% and 40%.

It is observed that despite a very large system of higher education and a significant number of science and engineering graduates, research output of India in terms of publications, particularly its quality, patenting and high technology exports is poor. India ranks rather low on various competitiveness indices (Table 3).

Table 3: Some Indicators For Four Top Economies, 2005

		USA	China	Japan	India
Expenditure on (R&D)	As percentage of GDP	2.6	1.31	3.15	0.81
Research manpower	Researchers (per million population)	4484	663	5287	119
	Technicians (per million population)			528	102
Patent – PCT applications		45111	2452	25145	648
Publications in refereed journals	Number of papers –Rank	1	9	2	13
	Number of Citations – Rank	1	18	4	21
	Citations per paper – Rank	1	121	11	113
High technology exports	As percentage of manufactured	32	30	24	5
Royalties and license fees	Receipts (in US$ billion)	52.64	0.24	15.7	0.03
	Payments (in US$ billion)	23.9	4.5	13.64	0.42
Number of HEIs on Sanghai's Top-500 university list		161	18	36	3

Source: Agarwal P (2006)

After the liberalisation of the economy in 1991, the proportion of expenditture on higher education is declining. Higher education as a percentage of GNP has declined from 0.61 in 1990-91 to 0.46 in 2004-05. During the same period higher education expenditure as a percentage of budget has declined from 2.09% to 1.6% and per student expenditure on higher education at constant prices has declined from Rs. 7626 to Rs. 5442 (Table 4). The contribution of state government in public support for higher education is about 75% and the rest is contributed by central government. Again most of the central government support few central institutes. On the other hand the NSSO report reveals that the per capita private expenditure on education almost quadrupled from 1.2% in 1983 to 4.4% in 2005 of which about 50% goes to higher education. As the public spending is falling, private spending is increasing to supplement it.

Table 4: Expenditure on Higher Education in India, 1990-91 to 2004-05 (Per cent)

Year	Percentage of GNP	Percentage of budget	Per student expenditure (Constant prices)
1990 -91	0.61	2.09	7676
1991 -92	0.56	1.93	6727
1992-93	0.55	1.90	6710
1993 -94	0.54	1.89	6738
1994 -95	0.52	1.87	6687
1995-96	0.49	1.80	5810
1996 -97	0.47	1.74	5619
1997 -98	0.47	1.75	5693
1998 -99	0.52	1.86	6450
1999 -00	0.61	2.09	6956
2000-01	0.62	2.29	6636
2001-02	0.52	1.72	5886
2002-03	0.52	1.72	5442
2003-04	0.50	1.63	-
2004-05	0.48	1.60	-

Source: Prakash (2007)

3. Recommendations by Diiferent Committees on Higher Education in India

This section presents the recommendations that have been made by different expert committees for the improvement of higher education in India in recent years.Various reports on higher education have been submitted for the improvement of higher education in India. A few of them have been mentined below which are more relevant in the context of globalisation.

National Policy on Education (NPE 1986): The National Policy on Education (NPE) was drafted and adopted during the period when the Bank had been advocating the elimination of subsidies for social services. The Bank was arguing that higher education should be considered non-merit good as a significant portion of subsidies in higher education is appropriated by the middle to high income groups, the poorer sections of society are easily competed out because of the limited

availibility of seats. The World Development Report 1980 noted that returns to investment (in countries with low incomes) in basic education amounted to 27 percent, while secondary and higher education yield returns only 17 percent and 12 percent, respectively. Based on ROR analyses, the World Bank (1986) explored policy options for financing education in developing nations (Collins and Rhoads). The World Bank's 'Report on Financing Higher Education in Developing Countries (1986)' pointed out that the only way out of general fund shortage is for students (parents) to bear a large part of the burden of education costs as the education beyond the elementary level falls outside the ambit of merit category. According to the NPE-86 the resources for higher education were proposed to be raised by "mobilizing donations", "raising fees", "effecting some savings by efficient use of facilities", "levying a cess or charge on the user agencies". The policy document clearly stated that these measures will "reduce the burden on State resources" and create "a greater sense of responsibility within the educational system."

Ambani Birla Report (2000): Ambani and Birla submitted their report *'A Policy Framework for Reforms in Education'* on April 24, 2000. The Report says, "the Government should play the role of a facilitator" and "the Government's role should be maximum at the primary stage and minimum at the higher education stage." Therefore, the report advocated private University Act for the establishment of "new private universities in the fields of science and technology, management, economics, financial management and other critical areas with commercial applications" The report recommended "user pays principle" will be "enforced strictly for higher education supported by loan schemes as well as financial grants for economically and socially backward sections of society."

Vice Chancellors' Meeting (2001): A National Level Meeting of Vice-Chairpersons of State Council of Higher Education, Vice Chancellors and Experts on "Trade in Education Services under WTO Regime" was organized by NIEPA on 11 September, 2001. The meeting expressed concern that "the socio-economic implications of opening the education system globally and making education service for profit needs to be carefully examined.

The UGC Model Act (2003): The Act recommended for the mobilisation of financial resources to become self-sufficient through different schemes like sponsored R & D projects by companies, consultancy services etc. The universities were advised to set up a "company or registered society," and to collaborate "with the private sector." Thus the *Vision and Strategy* of the UGC, in times to come, was not only that the universities should respond to the market needs, but that the universities should become a part of the market and private sector by setting up companies and registered societies for revenue generation (Sharma 2003). The fundamental task of the universities to assimilate, create and disseminate knowledge is of least priority for the *Vision and Strategy* of the UGC.

C.N. Rao Committee (2005): The committee set up by the Central Government submitted its recommendations on the entry of foreign univerisities in India by April 15, 2005. Rao committee specifying tough norms for foreign universities wanting to open shop here. Approval to FEPs will be for a limited trial period, and will be extended depending upon performance. The committee suggests that such institutions should not be allowed to repatriate surpluses. It also wants the government to discourage franchising and off shore study centers, and opt for only twinning programmes with existing Indian universities.

The Approach Paper to the Eleventh Five Year Plan (2006): The Approach Paper to the Eleventh Five Year Plan pointed out that only 10 per cent of the addressable global IT/ITES (Information Technology/ IT-

enabled Services) market has been realised and the remaining 90 per cent of a "global potential market of approximately $300 billion still remains to be realised. The approach paper recommended for working through WTO to assure access to overseas outsourcing. The approach paper recommended full exploitation of private sector initiatives in higher learning through public private partnership (*Sharma 2006-1*).

National Knowledge Commission(NKC) Report (2006): It is claimed that the competition between institutions within India and outside India would enhance quality and accountability. Foreign universities are coming to India to earn profits and loot our students. The report points out, good institutions are not coming to India as they "care more about their autonomy and wish to set benchmarks for themselves." And therefore, the NKC recommends that "all rules that apply to domestic institutions should also be applicable to foreign institutions." Economic barriers to higher education can be addressed, according to the Report, by scholarships or cross-subsidies. The NKC proposes the establishment of an independent regulatory authority for higher education (IRAHE). The IRAHE, to be established by an Act of parliament, would be the only agency that would be authorised for according degree granting power to higher education institutions, for monitoring standards and settling disputes, and for licensing accreditation agencies, public or private (Sharma 2006-2).
FEI Bill (2007): Foreign Educational Institution (FEI) means "an institution established or incorporated outside the territory of India which has been offering educational services in India or proposes to offer courses leading to award of degrees or diplomas through conventional method in the territory of India independently or in collaboration, partnership or in a twinning arrangement with any educational institution situated in India." Once a FEI is declared as a deemed to be university, it will be known as Foreign Educational Provider (FEP). However, this Act shall not apply to a courses offered by a central university, a state university, institution of national importance, or any other institution of higher education recognised. This provision would also encourage public funded colleges and universities, starved of funds, to enter into joint arrangements (collaboration, partnership or twinning programme) with FEIs to start self-financing courses in frontier areas of science, technology and other professions with high fee charges in order to raise resources. There was no restriction for the repatriation of surplus in revenue generated in India by way of collection of fee and other charges from the students (Sharma 2007).

Yash Pal Committee Report (2009): The committee which was constituted in 2008 has submitted its report to the minister of human resource development, Kapil Sibal on June 24, 2009. The committee emphasized for the device of imaginative ways for complementary sources of funds. The report recommended that Universities and other academic institutions should be able to hire professional fund raisers and professional investors to attract funding from non-government sources. The committee further opined that "Guaranteed student loans at low interest rates for those who can take loans and free education for those who cannot afford it at all will be necessary to educate India." The committee expressed its concern on the spurt in the number of newly established educational institutes as deemed universities. According to the report between 2000 and 2005, 26 private-sponsored institutions got the deemed university status. Before taking any decision on allowing foreign universities to operate in India, the Yash Pal committee emphasised on the purpose of establishing these. The committee argued that giving an open license to all and sundry carrying a foreign ownership tag to function like universities in India would only help them earn profit for their parent institutions. However, the committee observed that "if the best of foreign universities, say amongst the top 200 in the world, want to come here and work, they should be welcomed (Sharma 2009). The Committee suggested for the establishment of National Commission for Hihger Education and Research (NCHER), an oevrarching single autonomous body which will subsume all regulatory bodies in higher education

in India. Although recommendations of Yaspal Committee on academic refforms are premised on decentralisation of decision making process, the formation of NCHER tend towards decentralisation (Baby 2009).

4. Arguments for and concerns of globalization in higher education:

The following arguments are generally put forward in favour of globalization on higher education:

1. It is now being increasingly realized that knowledge is universal and its creation and distribution should not be confined with national boundaries. In the context of globalization, it is now imperative for Indian campuses to have a multicultural and multi-ethnic ambience. A proper mix of international students is felt necessary to ensure holistic education in the top universities of the country. The government has already allowed higher education institutions to have 15 per cent of the seats filled up by international students.
2. Exporting countries in higher education gain from exporting education through earnings from student fees, living expenses, repatriate funds and overseas operations. Importing countries gain greater access to specific knowledge which create the base for export of their education.
3. India also has an opportunity to attract a much larger number of international students than at present. India can provide quality higher education at affordable costs. There are distinct cost advantages to India. The success of Indians abroad and India's reputation in IT services has created a brand of Indian higher education abroad. In many subject areas, particularly science and mathematics, education in India is not only good but is seen to be of a high quality. It is expected that by adopting a right strategy for recruitment, the number of international students can easily go up from around fifteen thousand at present to nearly thirty-five thousand in the next few years (Agarwal, 2006).
4. Due to direct linkage between higher education and professional services, making Indian higher education globally competitive would enable India to play an important role in global market for professional services.
5. If the cost of higher education increases because of globalization, poor students can be given study loans and/or scholarships at an affordable rate for their studies.
6. Foreign competition introduced through foreign universities will improve educational services in India.
6. 30% of current Indian population is between the ages of 10 to 24. It is very important to bridge the existing gap in capacity in higher education in India (Varma 2009).

Areas of concern

India as a member of WTO cannot ignore the setbacks in higher education. The following are the areas of concern of globalization in higher education.

1. Globalisation has changed the world into a global market and there is growing demands for the disciplines like management, media and mass communication, fashion technology, etc. The private institutions are responding quickly to these demands. These new developments have led to the devaluation of subjects in the humanities and social sciences.
2. Neoliberal ideology has helped to produce a new political economy of higher education (Rhoads and Torres, 2006). The trend is toward incorporating market ideals into the teaching, research, and service functions of colleges and universities Students now commonly are viewed as consumers. In this regard, traditional ideals of the university, such as liberal learning and advancing knowledge for knowledge's sake, have in many ways taken a backseat to the fetishization of teaching, research, and service as commodities (Rhoads).
4. The Educational loan scheme in India was introduced in India after 2001 budget. The scheme covers a wide range of subjects for higher education for both in India and abroad. However there are no special provisions of any kind for the weaker sections in terms of security, government guarantee, lower rate of interest or repayment period, repayment in accordance with earnings, waivers, etc. The scheme neither adheres to the efficiency nor the equity principles unlike in many other countries, where merit-cum-means determine the eligibility for student loan (Rani 2009)

5. There are many grey areas in the multilateral trade rules in higher education. Aspects such as dispute mechanism, subsidies and treatment of monopolies need to be studied further in the context of education. Finally, it is feared that the commitment made to one country automatically applies to other countries and the GATS principle of progressive liberalisation will force liberalisation in spite of safeguards and undermine the public good nature of higher education (Knight, 2003).

6. Globalisation is accompanied by an increased focus on techno sciences which have gendered implications because women are less likely to be involved in those areas. They may also be unable to adjust to the time-space compression that IT demands or fosters (Collins and Rhoads 2009).

7. Globalised education may create digital divide among students as the rural and poor students do not have access to computers in most parts of the country. There may be the problem of recognition credentials. Increasing interest for foreign degree may cost precious foreign exchange. There is also the possibility of substandard courses being offered to the students. A new class with foreign degree may cause social discrimination. There may be adverse effects on our own culture.

5. International Flow of Students in Higher Education of India

The Indian education system, particularly higher education, falls under the GATS web. Indian educational institutions are following all the four modes of trade, namely, cross-border supply, consumption abroad, commercial presence, and individual presence. Globally the number of students going to various countries for higher education is about 2 million annually. However the Indian market share of global education is only 0.5%. The number of inbound students to India is only 12% of the number of students going abroad for higher education from India. Government has already allowed 15% of the seats to be filled up by the international students. However, the number of foreign students in India is reported to be declining. (Prakash 2009).

The number of foreign students in Indian campuses is on a decline. As has been shown in the table 5, the number of foreign students in India has declined from 14,710 in 1980, to 11,759 in 1990 and to 7, 738 in 2005. The percentage of foreign students of total enrolment in India has declined from 0.2% in 1990 to 0.1% in 2005. Currently, most of these students come from developing countries (the Middle East, South East and Far East, and Africa). Most of them opt for traditional graduate programmes, and only a few opt for professional courses. India has no multilateral obligation under the GATS framework so far to open up higher education services to foreign participation as it has not scheduled any commitment in education services in the Uruguay Round (Agarwal 2006). It should be noted that Foreign Direct Investment (FDI) in education, including higher education, is allowed in India under the automatic route, without any sectoral cap, since February, 2000. There is no offshore campus of any foreign university in India yet. There are, however, many foreign universities and education service providers operating in India through twinning programmes.

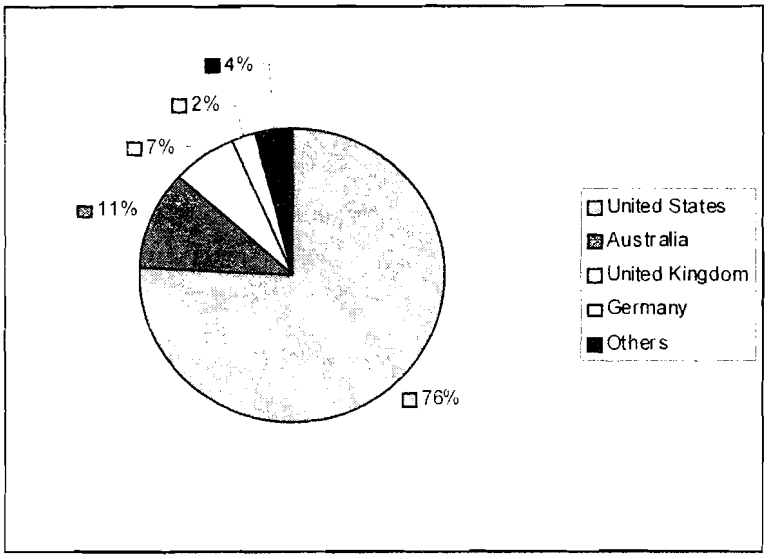
Table 5: Foreign Students in the Domestic Country in the Years of 2005, 1990 and 1980

		Foreign students in the domestic country			Percentage of foreign students in the domestic country		Percentage Increase of foreign students	
	Country	2005	1990	1980	2005	1990	(1990-2005)	(198 199(
1	United States	590167	407529	311882	3.4	2.9	44.8	30
2	India	7738	11759	14710	0.1	0.2	-34.2	-20
3	Russian Federation	90450	66806	62942	1	1.2	35.4	6
4	Japan	125917	23816	6543	3.1	0.9	428.7	264
5	United Kingdom	318399	70717	56003	13.9	6	350.2	26
6	Germany	259797	120348	68947	11.5	4.45	115.9	74
7	France	236518	136015	110763	10.8	8	73.9	22
8	Italy	44921	21416	27784	2.2	1.5	109.8	-22
9	Spain	45603	11051	10997	2.5	0.9	312.7	0
10	Canada	75249	35187	32303	6	2.6	113.9	8
11	Australia	177034	28993	8877	17.3	6	510.6	226
12	Sweden	39298	10650	10401	9.2	6.1	269.0	2
13	Belgium	4529	33335	12875	11.6	12.3	-86.4	158
14	Austria	34484	18434	12885	14.1	9	87.1	43
15	Switzerland	36827	22621	15515	18.4	16.4	62.8	45

Source: Nguni Eliam (1993) and Wissenschaft weltoffen 2009 (Author's calculation)

The number of inbound students of India is only 5.6 per cent of the number of students going abroad for higher education. In 2005, India received only 7,738 students (0.1% of the total students) from abroad, whereas 1.39 lakhs students (1.2% of total students) from India went abroad to various countries for higher education (Table A.1). The country-wise destinations of Indian foreign students are given in the table A.2. As the figure 2 shows 76% of Indian foreign students go to USA for higher education followed by Australia (11%), UK(7%) and Germany (2%). The number of Indian students applying for Masters and doctoral degrees in American Universities increased by 6% in 2006-07. According to Association of Indian Universities Indian students, comprising 4.3 per cent of the total enrolment in universities in the US brings in $11.95 billion into the economy of the US (Ghosh 2007).

Figure 2: Pie Diagram showing the destination of Indian foreign students



In the 1990's foreign universities are seen to be collaborated with private institutions in India. As there is no centralized policy or regulatory regime in India, there is no reliable statistics about the number and mode of operation of such foreign education providers in the country. According to a study conducted by the Association of Indian Universities, during the period January to June, 2005, 211 foreign providers were operating on their respective home campus, 31 were operating in India, and 11 were operating in India under twinning programme (Chakraborty 2007). It has been reported that majority of the Foreign Education Providers provide professional/vocational courses.

7. Conclusions:

Higher education under globalization is being treated as private good or marketable good. Therefore development of higher education will depend upon the demand pattern shaped by national and international markets. There are some opportunities from globalization in higher education. India will have to respond in a pro-active manner by adopting an open and flexible structure to reap the benefits. The foreign universities must be subjected to pre-entry academic audit and accreditation norms designed by the government. The challenges of GATS are to be met without compromising on the considerations of equity and access to Indian students. Students from developing economies are being lured by the aggressive marketing of many developed countries. India needs a co-ordinated effort in this direction. The need of the hour is that the higher education system in India needs to be restructured and be rejuvenated. Some of the steps that can be taken in this direction are as follows.

(1) Improvement of infrastructure facilities through greater public support.
(2) There should be operational, financial and academic autonomy coupled with accountability.
(3) There should be more emphasis on access and equity considerations in higher education in India. Higher education should be based on merit and not on economic and social forms.
(4) The higher education system in India need to be diversified to adapt it to the changing needs.
(5) The traditional teaching learning process should be changed. Learner should be able to develop technical, interpersonal and methodological skills.
(6) Most of the state universities are understaffed where modern system of education is very difficult to apply. Post graduate teaching and research in the state universities may be taken by the state government for their survival (Hatekar 2007).

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Table A.1: Total Students (domestic and foreign students) , percentage of domestic students abroad and percentage of foreign students in the respective host countries, 2005

		Students (lakhs)	Natives abroad	Foreigners in the domestic Country
		Number	% of total students	% of total students
1	United States	172.7204	0.2	3.4
2	India	118.5294	1.2	0.1
3	Russian Federation	90.03208	0.5	1
4	Brazil	42.75027	0.5	0
5	Japan	40.38302	1.6	3.1
6	Indonesia	34.41429	1	0
7	Korea	32.10184	3	0.5
8	Philippines	24.27211	0.3	0.2
9	Mexico	23.84858	1	0.1
10	United Kingdom	22.87541	1	13.9
11	Germany	22.68741	2.9	11.5
12	Thailand	22.51453	1.1	0.2
13	France	21.87383	2.5	10.8
14	Poland	21.18081	1.5	0.5
15	Turkey	21.06351	2.5	0.9
16	Argentina	20.26735	0.5	0.2
17	Italy	20.14998	1.9	2.2
18	Spain	18.09353	1.4	2.5
19	Canada	12.54833	3.4	6
20	Australia	10.24589	0.9	17.3
21	Chile	6.63694	1.4	0.3
22	Greece	6.46587	6.9	2.4
23	Malaysia	6.32309	6.8	4.4
24	Netherlands	5.64983	1.6	5.6
25	Hungary	4.36012	1.8	3.1
26	Sweden	4.26723	3.3	9.2
27	Belgium	3.89547	2.7	11.6
28	Portugal	3.80937	3.6	4.5
29	Czech Republic	3.36307	2.1	5.5
30	Finland	3.05996	3.1	2.8
31	Thailand	2.63414	9.1	0.9
32	New Zealand	2.39983	1.6	28.9
33	Denmark	2.32255	2.7	7.5
34	Switzerland	1.99696	4.8	18.4

Source: Wissenschaft weltoffen 2009

Appendix Table A. Indian students studying in Foreign Universities, 1999-2000 to 2001-02

		No of students			Percentage of Indian students Studying in different countries		
	Name	1999-2000	2000-01	2001-02	1999-2000	2000-01	2001-02
1	Australia	4578	6195	9539	8.904	9.996	10.841
2	Austria	98	104	78	0.191	0.168	0.089
3	Belgium	113	129	137	0.220	0.208	0.156
4	Canada	867			1.686		
5	Chile	2		8	0.004		0.009
6	Czech Reublic	24	27	36	0.047	0.044	0.041
7	Denmark	17	19	25	0.033	0.031	0.028
8	Finland	44	47	55	0.086	0.076	0.063
9	France	185	239	309	0.360	0.386	0.351
10	Germany	1282	1412	2196	2.493	2.278	2.496
11	Greece			2			0.002
12	Hungary	0	60	64	0.000	0.097	0.073
13	Iceland	1	2	1	0.002	0.003	0.001
14	Indonesia	1	1	1	0.002	0.002	0.001
15	Ireland	53	68	108	0.103	0.110	0.123
16	Italy	67	115	138	0.130	0.186	0.157
17	Japan	195	202	199	0.379	0.326	0.226
18	Jordan	4	0	14	0.008	0.000	0.016
19	Korea	34	0	52	0.066	0.000	0.059
20	Malaysia	91	714	497	0.177	1.152	0.565
21	Netherlands	38	49	53	0.074	0.079	0.060
22	New Zealana	201	355	952	0.391	0.573	1.082
23	Norway	102	103	114	0.198	0.166	0.130
24	Philippines	83	66	80	0.161	0.106	0.091
25	Poland	12	22	24	0.023	0.035	0.027
26	Portugal	19			0.037		
27	Slovakia	6	6	6	0.012	0.010	0.007
28	Spain	62	46	53	0.121	0.074	0.060
29	Sweden	85	97	122	0.165	0.157	0.139
30	Switzerland	93	120	162	0.181	0.194	0.184
31	Thailand		56	104		0.090	0.118
32	Turkey	11	10	6	0.021	0.016	0.007
33	United Kingdom	3962	4302	6016	7.706	6.941	6.837
34	United States	39084	47411	66836	76.018	76.498	75.961
	Total	51414	61977	87987	100	100	100

Source: UNESCO Institute of Statistics, The data for the blank cells are not available.

Foreign Direct Investment, Economic Growth & Labour productivity in China and India: An Analysis Using Cointegration Model

Jyotish Prakash Basu£

The paper attempts to study a long run relation between Foreign Direct Investment (FDI), economic growth and labor productivity of manufacturing between China and India. This analysis is based on Johansen and Juselius (1990) cointegration model. This is an empirical study based on secondary data. The data pertains to time series data during 1980-2004. The result shows that there is a long-run relation and positive relation between foreign direct investment, gross domestic product and labor productivity. In addition, in terms of FDI Confidence Index, emerging markets of China and India have achieved unprecedented levels of investors' confidence. In China about 60% FDI goes into the manufacturing sector which ranks first in FDI investment while in India the highest amount of FDI inflows into electrical equipment including Computer and software industries. The analysis has important policy implications. For China, implementation of World Trade Organization (WTO) requirements is fueling investor interest, as is continued liberalization and deregulation in banking, insurance, telecommunications, and wholesale and retail segments. Similarly, India is also implementing the economic reforms in opening up the service sector to the foreign firms mainly in telecommunications and transportation sector.

I. Introduction

China and India, respectively the world's most populous one-party authoritarian regime and most populous democracy, are poised to become major players in the globalised world economy. In recent years China and India have experienced unprecedented economic growth, growing twice as fast as the rest of the world, and, emerging as important global players. Together they account for 18% of the global economy (on purchasing power parity basis) and 40% of the global working age population (Ahya et al.2004). During the last decade, China's economy grew on average at 10% per annum and India's at 6% per annum. China's share in the world trade increased from a meager 1% in the early 1990s to 6% in 2004 and that of India from 0.5% to 1 % (Quarashi and Wan 2006).

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Foreign Direct Investment (FDI) is highly prized in developing countries for providing a catalyzing boost to significant economic growth through technology transfers, employment generation, international business relationships, and management and training, modernization, in addition to the underlying cross-border investment itself. The role of external capital inflows, particularly foreign direct (FDI) and portfolio investments (FPI) in the growth and global integration of China and India has captured the attention of analysts.

China has attracted and continues to attract far more FDI than India. The difference in FPI flows is smaller, but in terms of net private capital inflows China is far ahead.

Much has been written on the growth and development strategies adopted in each country. See, for example, Ahluwalia (1991, 1999, 2002), Tisdell (1993), Ash and Kueh (1996), Rosen (1996), Szirmai and Ren (1995, 2000), Maddison (1998), Chittle and Kim (1999), Wu (1997, 1998, 2000, 2001, 2002a,b), Williamson and Zagha (2002), Srinivasan (1996, 2003a,b,c), Srinivasan and Tendulkar (2003) and Thirlwell (2004). There are also some studies on foreign direct investment.

The empirical evidence on whether FDI facilitates technology spillovers is ambiguous. Caves (1974) finds positive and significant spillovers in the Australian manufacturing sector. In a study of Venezuelan firms, Aitken and Harrison (1999) find that FDI affects adversely the productivity of domestic firms. To explain their results they put forward a "market-stealing" hypothesis arguing that, while FDI may promote technology transfer, foreign-invested firms gain market shares at the expense of domestic firms and force the latter to produce smaller outputs at higher average costs. As a result, the overall benefit of FDI is small. Using a panel of manufacturing industries from China, Liu (2002) shows that FDI has large and significant impacts on the productivity of manufacturing industries in the domestic sector. It is widely believed that the type of FDI and its structural composition matter at least as much for economic growth effects as does the overall volume of inward FDI. Agrawal and Shahani (2005) reckon that it is the quality of FDI that matters for a country like India rather than its quantity. The economic consequences of inward FDI have been discussed. For example, studies by Lardy (1992 and 1994) and Wei (1996) have shown that foreign-invested firms have contributed significantly to China's impressive export expansion and to China's overall economic growth.

Chakraborty and Basu (2002) explore the two way link between FDI and growth by using a structural cointegration model with vector error correction mechanism. Using aggregate data for 1974-1996, they find that causality runs more from GDP to FDI. In the long run, FDI is positively related to GDP and openness to trade. Furthermore, FDI plays no significant role in the short-run adjustment process of GDP. In an earlier study, Dua and Rashid (1998) report similar results. Kumar and Pradhan (2002) consider the FDI-growth relationship to be Granger neutral in the case of India as the direction of causation was not pronounced. Sahoo and Mathiyazhagan (2002) corroborate what appeared to be the consensus until recently, while the Granger causality and Dickey-Fuller tests presented by Bhat et al. (2004) provide no evidence of causality in either direction (Sahoo and Mathiyazhagan (2002: 17-18).

Against this backdrop the objective of the paper is to examine the factors responsible for the growth of FDI in China and in India. In addition, this paper attempts to examine a long-run relationship between FDI, gross domestic product and labor productivity in manufacturing industries across China and India. This relationship is analyzed using Cointegration analysis by Johansen and Juselius(1990).

The paper is organized as follows. Section II presents the overview of the performances of Foreign Direct Investment (FDI) of China and India in recent years. Section III analyses cointegration relation between FDI, gross domestic product and labor productivity of manufacturing sector between India and China. Concluding remarks are in section IV.

II China and India: The New Asian Tigers

The economic performances of China and India since the early nineties have been impressive (see Table 1). In China, the average annual growth in real GDP and real GDP per capita during 1990-2004 was 9.31 percent and 8.24 percent respectively. During the same period, the average annual percentage change in real GDP and real GDP per capita in India was 5.71 percent and 3.90 percent respectively. Although until the early 1990s the GDP per capita in both countries was at comparable levels, China's GDP per capita is a now 2.2 times higher than India's (in US $ PPP terms). However, India's performance has improved noticeably since the last few years and it has outperformed most of the other countries in the same income group. The good macroeconomic performance of both countries is expected to continue in the short term and medium term and real GDP is expected to grow at 9.59 percent in China and at 7.3 percent in India during 2006-07 (IMF 2006 b).

Table 1: Macroeconomic indicators of China and India

Year	China (real GDP growth%)	India (real GDP growth%)	China (real GDP per capita growth%)	India(real GDP per capita growth%)	China(real GDP per capita in 2000US$)	India(real GDP per capita in 2000US$)
1990-94	10.66	4.86	9.27	2.89	448.94	326.50
1995-99	8.76	6.53	7.66	4.69	702.54	404.31
2000	8.00	3.94	7.24	2.21	855.93	450.21
2001	7.50	5.15	6.92	3.47	913.41	465.81
2002	8.30	4.09	7.58	2.49	982.68	477.39
2003	9.30	8.61	8.62	7.00	1067.40	510.81
2004	9.50	7.00	8.82	5.39	1161.50	538.36

Source : World Bank(2006)

China and India: Trends in Foreign Direct Investment (FDI)

Table 2 exhibits the trajectory of the realized flow of FDI going into China and India every year from 1980 to 2004. China attracted $60630 million in FDI in 2004, the highest among all developing economies while India attracted $5335 million in FDI in the same year. In 1991, for China, the amount of FDI was $4366 million and it increased to $60630 million in 2004. This means that the amount of FDI rose by 12.88 times over 1991.

Analogously, for India, the amount of FDI started rising in 1992. In 1992 the amount of FDI was $252 million and it stood at $5335 million in 2004. The increase in FDI was 20.17 times higher over 1992 in India (See Table 2). But upto 1979 there is no FDI in China. India's "open door" policy that started in 1991 has brought in more investment, but its total FDI is still less than a tenth of that headed to China. It is worth remembering while looking at these figures that the world in general experienced a dramatic FDI boom beginning in the early 1990's, a trend that continues today.

FDI has gained prominence in relative terms too. FDI inflows accounted for 3.2 percent of gross fixed capital formation in India in 2001-2004. Compared with all developing countries (10.5 percent in 2004) and China (14.9 percent in 2004), this share is still low. However, in the pre-reform period of 1987-1990, FDI inflows accounted for just 0.3 percent of gross fixed capital formation in India. The differences in competitive advantages of the two countries are explained by their inward FDI flows. On the basic economic determinants of inward FDI, China does better than India. China's total and per capita GDP are higher than India's, which attracts market seeking FDI.

Inward FDI stocks, relative to GDP, soared from less than one percent in the late 1980s and early 1990s to almost six percent in 2004. This ratio is approaching the corresponding ratio for China (8.2 percent in 2004), though still lagging considerably behind the corresponding ratio for all developing countries (26.4 percent). In China the Inward FDI stock relative to GDP started falling since 1999 while for India it is steadily increasing since 1994 (see fig(4)).

Table 2: Realized Foreign Direct Investment in China and India

Annual Flows, 1980-2004

(Millions of U.S. Dollars)

Year	China	India
1980	57	79
1981	265	92
1982	430	72
1983	916	6
1984	1419	19
1985	1956	106
1986	2244	118
1987	2314	212
1988	3194	91
1989	3393	252
1990	3487	237
1991	4366	75
1992	11008	252
1993	27515	532
1994	33767	974
1995	37521	2151
1996	41726	2525
1997	45257	3619
1998	45463	2633
1999	40319	2168
2000	40715	2319
2001	46878	3403
2002	52743	3449
2003	53505	4269
2004	60630	5335

Source: World Investment Report, 2005, UNCTAD

Fig (2)

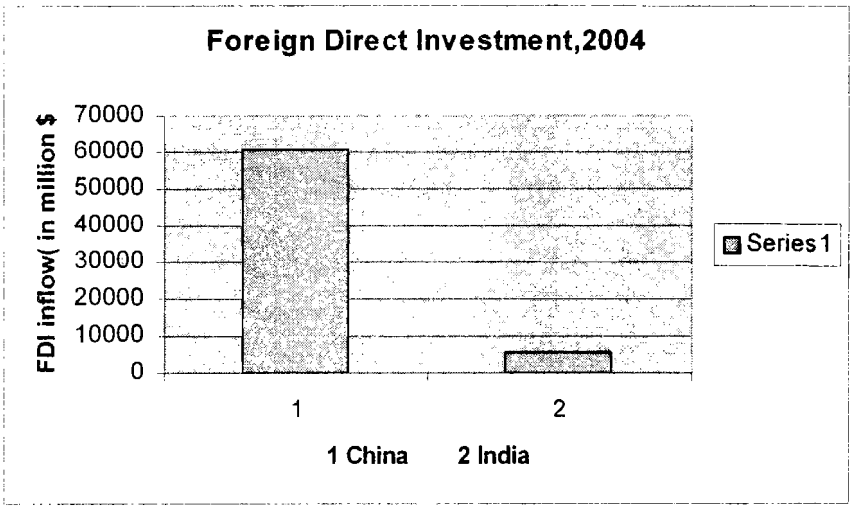


Fig (3)

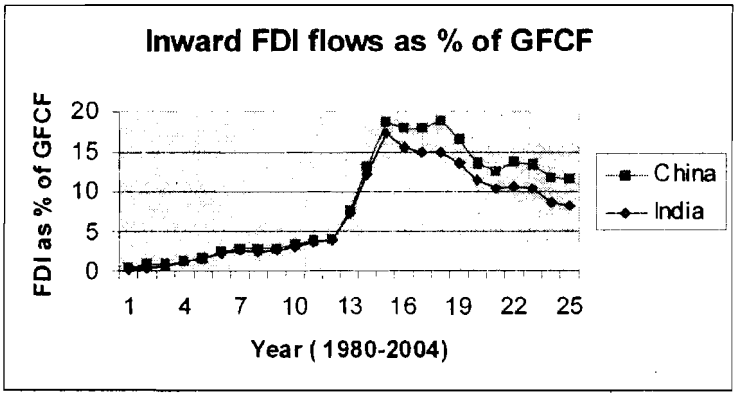


Fig (4)

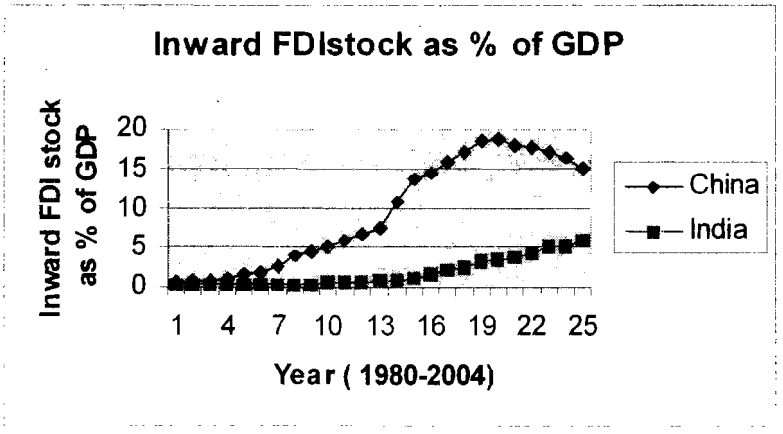


Table 3: Foreign Direct Investment inflows in Selected Asian Countries (2001 and 2002), (Billion US$)

Country	2001	2002
China	46.84(5.7)	52.70(8.1)
Hong kong	23.77(2.9)	13.72(2.1)
India	3.4(0.4)	3.45 (0.5)
Korea	3.52(0.4)	1.97(0.3)
Malaysia	0.55(0.1)	3.20(0.5)
Philippines	0.98(0.1)	1.11(0.2)
Singapore	10.94(1.2)	7.66(1.2)
Sri Lanka	0.08(0.0)	0.24(0.0)
Thailand	3.81(0.5)	1.07(0.2)
Developing economies	209.43(25.4)	162.15(24.9)
World	823.82	651.19

Notes: Figures in ( ) are percent share to world total
Sources: World Investment Report 2003, UNCTAD

Table 3 shows the receipt of FDI inflows in the top developing countries. This table highlights the competition that India faces in seeking to attract FDI. World FDI inflows declined in 2002 in relation to 2001. FDI inflow in India had largely remained unaffected by the global decline in FDI inflows over the same period. Similarly, in China, the FDI inflows increased from US$ 46.84 billion in 2001 to US$ 52.70 billion in 2002.

Sources of FDI: Based on cumulative FDI for 1979-2004, about 43% of FDI in China has come from Hong Kong. The United States is the second-largest overall investor in China, accounting for 8.5% ($48.0 billion) of total FDI, followed by Japan ($46.8 billion), Taiwan ($39.6 billion), and the British Virgin Islands ($36.9 billion) and South Korea ($25.9 billion) (See Table 4). U.S. FDI in China for 2004 was $3.9 billion, accounting for 6.1% of FDI for that year, and ranked 5th after Hong Kong, the British Virgin Islands, South Korea, and Japan. During the first 10 months of 2005, the top foreign investors in China (in terms of realized FDI) were Hong Kong, the British Virgin Islands, Japan, South Korea, and the United States. Actual U.S. FDI in China was down by 24% over the same period in 2004, although contractual FDI was up by 10.5%.

Table 4. Major Foreign Investors in China: 1979-2004 ($ billions and % of total)

Country	Cumulative Utilized FDI: 1979-2004		Utilized FDI in 2004	
	Amount ($ billions)	% of Total	Amount ($ billions)	% of Total
Total	563.8	100.0	64.0	100.0
Hong Kong	241.6	42.9	19.0	29.7
United States	48.0	8.5	3.9	6.1
Japan	46.8	8.3	5.5	8.6
Taiwan	39.6	7.0	3.1	4.8
British Virgin Islands	36.9	6.5	6.7	10.5
South Korea	25.9	4.6	6.2	9.7

Source: Chinese government statistics. Top six investors according to cumulative FDI from 1979 to 2004.

Table 5 shows the share of top nine countries in India's FDI inflows (in US$ terms) during January 1991 to March 2004. The biggest contributing countries are Mauritius (34.48 percent) followed by USA (16.56 percent), Japan (7.63 percent), Netherlands (7.04 percent) and U.K. (6.88 percent).

Table 5: Percentage share of investing countries in FDI inflows in India, 2004

Country	Percentage in total (in US$ terms)
1. Mauritius	34.48
2. USA	16.56
3. Japan	7.63
4. UK	6.88
5.Netherlands	7.04
6. Germany	4.83
7. France	2.74
8. South Korea	2.80
9. Singapore	2.52
Switzerland	1.97

Source: http://Indiabudget.nic.in

Growing investor confidence in China and India

Emerging market countries are the 1st and 2nd most attractive foreign investment (FDI) locations in the world. Led by China and India emerging markets have achieved unprecedented levels of investors confidence. United States drop to third place on corporate investors' lists, but remains a strong FDI magnet. Western

Europe, other than United Kingdom, lost FDI confidence due to increasing competition from emerging markets. China achieved its highest-ever score in 2005's index, while India's score has been surpassed only by China and United States in 2004 (see Table 6).

Telecom & utility investors upgraded China from fourth to first and India from fifth to second most attractive FDI destination, while dropping the U.S. from first to fourth place - just behind Hong Kong. India's strong performance among manufacturing and telecom & utility firms was driven largely by their desire to make productivity-enhancing investments in IT, business process outsourcing, research and development, and knowledge management activities.

Table 6 : FDI Confidence Index,2005

FDI Confidence Index, Top 25 countries, December 2005

Rank,2004	Rank,2005	Name of the Countries	FDI Confidence Index
1	1	China	2.197
3	2	India	1.951
2	3	United States	1.42
4	4	United Kingdom	1.398
12	5	Poland	1.363
11	6	Russia	1.341
17	7	Brazil	1.336
7	8	Australia	1.276
5	9	Germany	1.267
8	10	Hongkong	1.208
19	11	Hungary	1.157
14	12	Czech Public	1.136
29	13	Turkey	1.133
6	14	France	1.097
10	15	Japan	1.082
22	16	Mexico	1.08
13	17	Spain	1.075
18	18	Singapore	1.072
9	19	Italy	1.055
20	20	Thailand	1.05
16	21	Canada	1.04
*	22	Dubai/ UAE	1.039
21	23	South Korea	1.036
27	24	Central Asia	1.03
42	25	Romania	1.017

Source : A.T. Kearney, 2005

China's success in FDI

The Chinese economy continues its robust development, growing by 9.5 percent in the second quarter of 2005. Total growth in 2005 exceeded expectations at nearly 10 percent. Implementation of World Trade Organization (WTO) requirements is fueling investor interest, as is continued liberalization and deregulation in banking, insurance, telecommunications, and wholesale and retail segments. Policy changes to increase foreign ownership and reduce or eliminate geographic restrictions are also galvanizing FDI confidence. Investor interest in the Chinese financial sector is especially high. Despite concerns over non-performing loans and poor transparency, China ranks 1st among banking, insurance, real estate and holding companies. The Chinese government is seeking foreign investments to help restructure and modernize the country's financial system.

Investors in the food, tobacco, textile and apparel industries are optimistic about China. More than 61 percent of investors express a positive outlook on China. Investments by private equity and venture capital funds have become important sources of investment in China. The Texas Pacific Group (U.S.), General Atlantic LLC (U.S.), and Newbridge Capital LLC (U.S.) together invested $350 million in Lenovo's acquisition of IBM's PC business. Also, the Carlyle Group (U.S.) invested $400 million in China Pacific Life Insurance. China maintains its position as the number one destination for manufacturing and assembly, but. China's manufacturing base has developed over the years in large part by foreign multinational companies; two-thirds of China's manufacturing exports are from foreign companies. About 60% FDI goes into the manufacturing sector which ranks first in FDI investment (See Table 7). China has nearly the highest software piracy rate in the world (92 percent according to Business Software Alliance), while Zimbabwe and Indonesia offer more software protection.

Table 7: Sector wise share of FDI in China (to end of 2001)

Secor	By Foreign investment	
	Million of $	Share (%)
Agriculture	4763	1.32
Mining	1462	0.41
Manufacturing	214931	59.76(1)
Electricity, Gas & water	11606	3.23
Construction	7743	2.15
Geology investigation	1412	0.39
Logistics & Communication	15163	4.22(4)
Distribution	11311	3.14
Finance & Insurance	1415	0.39
Real Estate	55536	15.44(2)
Social services	23188	6.45 (3)
Health & Sports	1128	0.31
Education, culture& films	675	0.19
R & D & Technology service	2171	0.6
Others	7179	2
Total	359683	100

Source: ***China Statistical Year book*** 2002, tables 17-19. Percentage was calculated by the author.
Note: Figures in ( ) represents rank

India's success in FDI

India replaces the United States as the 2nd most attractive FDI location, up from 3rd place in 2004 and reaching its highest ranking ever. While India's IT and software industry has made it the darling in the global business community over the past few years, global investor interest in other areas is just now catching up. FDI flows to India surpassed the $5 billion mark for the first time in 2004, reaching $5.3 billion. India's FDI flows continue to be skill intensive, and concentrated in information and technology areas. Foreign corporate participation in the Indian economy typically occurs in the form of licensing and service contracts because of FDI restrictions and the increased capabilities of local subcontractors. This means companies can offshore their back-office IT operations to India without committing FDI. China and India use different FDI development paths. China attracts capital-intensive industries via an export-manufacturing framework that uses special economic zones. India favors an import-substitution system to attract more technology-oriented FDI. India's previously restrictive FDI regime limits foreign participation to mostly licensing and other contractual agreements—not FDI. This may explain why foreign companies that outsource to India prefer to purchase the services of a third-party provider. The survey results presented by A T Kearney (2004) suggest that India is increasingly perceived as a R&D hub for a wide range of industries. It has become common place among foreign investors that India offers a well educated workforce which, according to Borensztein et al. (1998), is essential for FDI to have positive growth effects. Likewise, India compares favorably with China in terms of financial market development (McKinsey Quarterly 2004), which represents another factor favoring positive growth effects of FDI (Alfaro et al. 2001; Choong et al. 2004; Hermes and Lensink 2003).

The sector-wise breakdown of India's FDI is presented in Table 8. It is observed from table 7 that the highest amount of FDI inflows into electrical equipment including Computer and software industries. The second largest concentration of FDI has been in the transportation sector Following the 1991 liberalization program, however, there has been a sharp rise in foreign investment in tertiary sector that encompasses critical elements of the modern economy, namely telecommunication, power generation, consulting services, and hotel & tourism. Increased FDI inflows to tertiary sector, especially in infrastructure and power generation, is a welcome development because this area had long been reserved for the public sector enterprises which were inefficient in managing these services, making India's trade and industrial sector least competitive in international context.

Table 8: Sectors attracting highest Inward FDI inflows (January 1991 to March 2004)

Rs in crore(US $ billion)

Rank sector	FDI approved	FDI inflows	% of total FDI inflows
1. energy of which	77828(20.99)	9802(2.32)	10.1
Power	43703(11.90)		
Oil Refining	34125(9.09)		
2. Telecommunications	57328(15.43)	10725(2.56)	11.17(3)
3. Electrical Equipment(including computer software & electronics)	28072(7.29)	13930(3.32)	14.5 (1)
4. Transportation	21966(5.73)	11517(2.78)	11.99 (2)
5. Services Sector	19261(5.12)	8134(2.04)	8.47
6. Metallurgical industries	15534(4.27)	1254(0.31)	1.31
7. Chemicals	13090(3.73)	5692(1.49)	5.93
8. Food & food processing	9620(2.770	4346(1.09)	4.53
9. Hotels & tourism	5215(1.45)	8899(2.14)	0.87
10. Textiles	3517(1.02)	1163(.31)	1.1

Source: Economic Survey 2003-04

Table 9 shows that the five top states of India attracting major shares of FDI approvals were Maharashtra (17.48 per cent), Delhi (12.06 per cent), Tamil Nadu (8.58 percent), Karnataka (8.26 percent) and Gujarat (6.44 per cent).

Table 9: Share of Top five states of India attracting FDI approvals (January 1991 to March 2004)

Rank	Name of states	Amount of FDI		% with total FDI approved
		Rupees in crore	US$ in billion	
1	Maharashtra	51114.68	13.18	17.48
2	Delhi	35250.74	9.78	12.06
3	Tamil Nadu	25071.77	6.52	8.58
4	Karnataka	24138.44	6.15	8.26
5	Gujarat	18837.3	4.81	6.44

Source: Economic Survey 2003-04

FDI policy of the Government of India

The Indian government is reforming the Foreign Investment Promotion Board, and has established the Indian Investment Commission to act as a one-stop shop between the investor and the bureaucracy. Also, India has raised FDI caps in the telecom, aviation, banking, petroleum and media sectors. India has signed an increased economic cooperation agreement with Singapore. This is the first Indian bilateral agreement that includes services and measures to avoid double taxation—and it will likely lead to increased FDI inflows from Singapore. Specifically, the agreement allows Temasek Corporation and Government of Singapore Investment

Corporation to buy 10 percent more equity in Indian companies than other investors. Also, several Singapore banks will be granted licenses to set up branches in India over the next four years. Financial services investors upgrade India from 4th to 2nd most attractive FDI location. The emergence of local players, ICICI Bank and HDFC Bank, along with foreign investors, has helped restructure India's underdeveloped financial sector and spur competition. Deutsche Bank (Germany) is launching a range of savings, investment and loan products as well as investment and financial planning services inseven major Indian cities.

Telecom and utilities investors rank India their 3rd most attractive destination. One reason for the interest is the relaxation of ownership restrictions. In October 2005, the Indian government raised foreign ownership levels to 74 percent (from 49 percent), a move that will add fuel to India's booming IT and software industry. According to NASSCOM, the Indian IT software and services exports have grown from $5.3 billion in 2000 to $16.5 billion in 2005. Also, estimates suggest that India has the world's fastest-growing mobile phone market, growing at 35 percent per year until 2006. Immediately following the relaxation of restrictions, Vodafone Group (U.K.) acquired a 10 percent stake in Bharti Tele-Ventures, India's largest mobile phone operator. Investors in the heavy and light manufacturing sectors are optimistic about India. The country's largest FDI commitment was won when Pohang Iron & Steel (South Korea) confirmed a $12 billion deal to build a steel plant and develop iron ore in Orissa.

The success of this deal will be a test case for future large-scale, long-term foreign investment in India. In 2004, India had the fastest growing large-passenger-car market in the world, which will likely continue to expand given the country's low loan rates, rising incomes and flourishing middle class. FDI in the retail sector continues to be the subject of heated political debates. Almost 50 per cent of investors have a positive outlook on India's wholesale and retail sector, despite strict regulations.

III Cointegration Analysis by Johansen and Juselius

In this section our interest is to establish a long run relation between FDI, gross domestic product and labour productivity in manufacturing sector between China and India.

Importance of labour productivity in manufacturing sector

It is also possible to examine the relative performance of the manufacturing sector in China and India in the form of labour productivity, defined as value added per person employed. Comparative labour productivity for Chinese and Indian manufacturing is very interesting considering their very large populations and labour force sizes. Annual data on the number of persons employed in manufacturing and labour productivity in both countries over the period 1980-2002 are provided in Table 10). Fig.5 highlights the trends in labour productivity over the review period.

Fig. 5 shows that China consistently performed better than India throughout the review period. This impressive manufacturing sector productivity growth in China occurred despite a 41% increase in the number of persons engaged in manufacturing during the 1980-2002 period. Fig. 5 shows that the labour productivity performance of the Chinese manufacturing sector improved greatly as the economic reform processes accelerated throughout the late 1980s into the 1990s and beyond. As also argued above, the reform process introduced in India in the early 1980s was much less focused on open economy liberalization and was pursued with much less vigor than in China. The practice of over manning, failure to adopt new technology, the problems of bureaucratic bottlenecks in program implementation all slowed down public investment and resulted in poor efficiency in factor usage (Ahluwalia, 1991; Mookherjee, p.8 in Mookherjee (ed) 1995). These were the main reasons for India's manufacturing growth lagging behind China's.

As Fig.5 shows, this was reflected in a poor manufacturing sector labour productivity performance.

Indeed labour productivity improved only from the early 1990s as India moved to accelerate export led growth and development policies. Even here, the growth trend in labour productivity levels flattened from the late 1990s onward. Clearly, China's success has been related to its vast increase in manufactured exports. Manufacturing accounts for 39% of China's output while in India the figure is 16%. China appears to be excessively dependent on manufacturing and has a somewhat underdeveloped service sector. In part this is a legacy of communism which encouraged industrial output and failed to recognize the value of services. In part it is also due to the encouragement of large-scale investment by foreign manufacturing companies. The result is an export-related manufacturing industry characterized by high productivity, high quality, and low costs which failed to recognize the value of services.

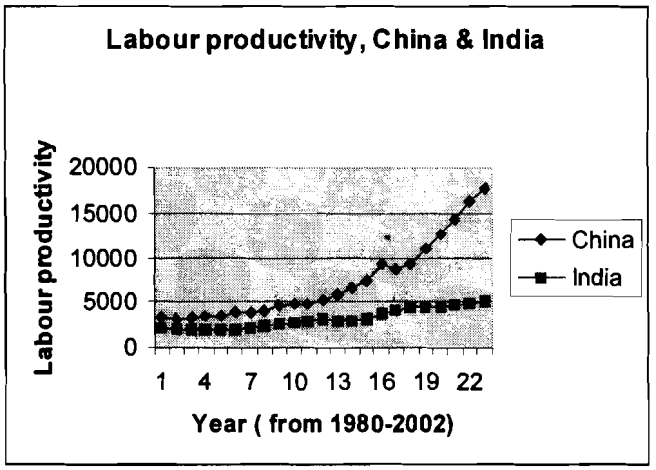
In India, on the other hand, goods production is relatively low by global standards. This is, in part, due to the legacy of regulations that discouraged economies of scale in manufacturing. Most such rules have been rescinded in the past 15 years. Still, the economic climate in India has been advantageous to small startups (such as service oriented companies) rather than large-scale manufacturers.

Table 10: Employment and labour productivity in manufacturing sector, China and India

	Employment in manufacturing(' 000')		GVAof manufacturing (million 1995 Yuan)		Labour productivity (Yuan per person engaged)	
Year	China	India	China	India	China	India
1980	58990	26996	189539	58937	3213	2183
1981	61220	29309	194126	58849	3171	2008
1982	63290	31788	207367	63601	3276	2001
1983	65080	34707	223738	67845	3438	1955
1984	70290	37468	249696	74542	3552	1989
1985	74120	40709	284400	79781	3837	1960
1986	80190	39196	308872	82214	3852	2067
1987	83590	37961	348278	87960	4167	2317
1988	86520	37124	398621	93978	4607	2531
1989	85470	38274	409484	102251	4791	2672
1990	86240	39701	414589	115999	4807	2922
1991	88390	40457	460880	123917	5214	3063
1992	91060	41403	528746	119638	5807	2890
1993	92950	42689	618831	124446	6658	2915
1994	96130	43585	707664	135158	7362	3101
1995	98030	40992	915627	149811	9340	3655
1996	97630	42382	862318	172257	8833	4064
1997	96120	42638	893371	191086	9294	4482
1998	83190	43549	918162	192441	11037	4419
1999	81090	44021	1029255	198494	12693	4509
2000	80430	44397	1154375	204617	14353	4609
2001	80830	44929	1313622	220395	16252	4905
2002	83070	45391	1475069	228560	17757	5035

Source: Lee, Rao, Shepherd (2006)

Fig(5)



Methodology

Before we conduct cointegration tests, we need to examine the univariate time-series properties of data and confirm that all the series are non-stationary and integrated of the same order. To test the null hypothesis of non-stationarity against an alternative of stationarity, we have applied Augmented Dickey - Fuller tests. The test is based on the statistics obtained from applying the Ordinary Least Squares (OLS) method to following regression equation:

$$Y_t = \mu + \beta t + \theta Y_{t-1} + \sum_{i=1}^{k} c_i ? Y_{t-i} + e_t \qquad \text{.....(1)}$$

Where Y_t is the value of any variable; t is time trend;

$? Y_{t-i} = Y_{t-i} - Y_{t-i+1}$, $e_t \sim$ i.i.d $(0, \sigma^2)$. To determine whether Y_t is non-stationary, the unit root test statistic is calculated. If the unit-root null is rejected for the first difference of the series but can not be rejected for the level, then we say that the series contains one unit root and is integrated of order one, I(1). . After examining the non-stationarity of price series, we test cointegration using Johansen and Juselius (1990). Following Johansen and Juselius (1990), the ML method of cointegration may be described here. If Y_t denotes an $(n \times 1)$ vector of I(1) prices, then the k-th order vector autoregressive (VAR) representation of Y_t may be written as :

$$Y_t = \sum_{i=1}^{k} \Pi Y_{t-i} + \mu + \beta t + \varepsilon_t ; \qquad (t = 1,2, \text{————} T \text{————————} \text{(2)}$$

The procedure for testing cointegration is based on the error correction (ECM) representation of Y_t given by

$$\Delta Y_t = \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \Pi Y_{t-k} + \mu + \beta + \varepsilon_t \quad \text{_____(3)}$$

Where, $\Gamma_i = -(I - \Pi_1 - \ldots\ldots - \Pi_i)$; i=1,2,.....k-1; $\Pi = -(I - \Pi_1 - \ldots\ldots - \Pi_k)$. Each of Π_i is an n×n matrix of parameters; ε_t is an identically and independently distributed n dimensional vector of residuals with zero mean and variance matrix, Ω_ε; μ is a constant term and t is trend. Since Y_{t-k} is I(1), but ? P_t and ? P_{t-i} variables are I(0), equation (2) will be balanced if ΠY_{t-k} is I(0). So, it is the Π matrix that conveys information about the long-run relationship among the variables in Y_t The rank of Π, r, determines the number of cointegrating vectors, as it determines how many linear combinations of Y_t are stationary. If r =n, the prices are stationary in levels. If r=0, no linear combination of Y_t is stationary. If 0<rank (Π)=r<n, and there are n ×r matrices α and β such that $\Pi = \alpha \times \beta'$, then it can be said that there are r cointegrating relations among the elements of P_t. The cointegrating vector β has the property that $\beta' Y_t$ is stationary even though Y_t itself is non-stationary. The matrix α measures the strength of the cointegrating vectors in the ECM, as it represents the speed of adjustment parameters. Two likelihood ratio test statistics are proposed. The null hypothesis of at most r cointegrating vector against a general alternative hypothesis of more than r cointegrating vectors is tested by the Trace Statistic (λ trace) = $-T \Sigma \ln(1 - \hat{\lambda}_i)$ .The null of r cointegrating vector against the alternative of r+1 is tested by the maximum eigen value statistic (λ max) = $-T \ln(1 - \hat{\lambda}_{r+1})$. $\hat{\lambda}_i$ s are the estimated eigen values (characteristics roots) obtained from the Π matrix, T is the number of usable observations (For details, see, Johansen and Juselius, 1990). The number of cointegrating vectors indicated by the tests is an important indicator of the extent of co-movement of the series.

Data: We have taken data on FDI from World Investment Report, 2005, UNCTAD for the period 1980-2002 in China and India. Labor Productivity is derived by dividing GVA Manufacturing by Employment (Yuan per person engaged). Employment is in 'ooo' (Registered plus unregistered) for the period 1980--2002 at current prices.

Empirical Results:

Table 11: Unit root test on FDI, GDP and LP in China and India

Variable	Level	First difference	Second difference
CFDI	2.55(3.64)	2.87(3.65)	4.08 (3.67)
CGDP	0.88 (3.64)	3.31(3.65)	5.87(3.67)
CLP	0.84(3.64)	3.60 (3.65)	5.30 (3.67)
IFDI	2.26 (3.65)*	3.55 (3.67)*	4.07(3.69)*
IGDP	2.11(3.65)*	2.29 (3.67)*	3.98 (3.69)*
ILP	2.80 (3.65)*	2.72 (3.67)*	4.64 (3.69)*

Notes: CFDI represents China's Foreign Direct Investment

CGDP represents China's Gross Domestic Product

CLP represents China's Labor Productivity

IFDI represents India's Foreign Direct Investment

IGDP represents India's Gross Domestic Product

ILP represents India's Labor Productivity

Figures in the () denotes CV at 5% level when lag difference is 1.

Figures in the ()* denotes CV at 5% level when lag difference is 2.

It is observed from Table 11 that the variables like FDI, GDP and Labour productivity in manufacturing sectors in China and India are non-stationary at the level and stationary at the second difference. This means that the variables are integrated of order 2 i,e, I(2).

Table 12 Cointegration Results for FDI, GDP and LP in China Trace test

Eigen value(λ_i)	Null hypothesis	Alternative hypothesis	λ-trace value	95% CV	90%CV
0.929	r=0	r>0	96.29	29.68	35.65
0.775	r≤1	r>1	38.21	15.41	20.04
0.219	r≤2	r>2	5.43	3.76	6.65
		λ-max test	λ-max value		
0.929	r=0	r=1	58.08	21.89	19.79
0.775	r=1	r=2	32.78	15.25	13.78
0.219	r=2	r=3	5.43	9.09	7.56

Table 12 shows the cointegration results for three variables namely, FDI, GDP and LP in China. We have calculated λ-trace and λ-max statistic for showing cointegration among the variables concerned. Now we are interested in the Hypothesis that the variables are not cointegrated (r=0) against the alternative of one or more cointegrating vectors (r>0), we calculate λ-trace (0) statistic. Since 96.29 exceed the 95% critical value of λ-trace statistic, it is possible to reject the null hypothesis of no cointegrating vectors and accept the alternative of one or more cointegrating vectors. Next we have used the λ-trace (1) statistic to test the null hypothesis of r =1 against the alternative of two or three cointegrating vectors. In this case the value of λ-trace statistic is 38.21.This value is also greater than the 95% critical value. We can reject the null hypothesis of no cointegration. The λ-trace (2) statistic indicates no more than two cointegrating vectors at both 95% and 90% level of significance. The second statistics, say λ-max, tests the null that the number of cointegrating vectors is r against the alternative of r+1 cointegrating vectors. Here the null hypothesis of no cointegrating vectors (r=0) against the specific alternative r=1 is clearly rejected. Because the calculated value λ-max (0,1) = 58.08 that exceeds the 95% and 90% critical value. It is noted that the test of null hypothesis r=1 against the specific alternative r=2 cannot be rejected at both 95% level and 90% level. This shows that the actual data generating process contains only one cointegrating vector. It is also observed that the λ-max (2,3) statistic

indicates no more than two cointegrating vectors at both 95% and 90% level of significance. We may conclude from Table 10 that the variables like FDI, GDP and LP in China are cointegrated.

Table 13 : Cointegration Results for FDI, GDP and LP in India

			Trace test		
Eigen value (λ_i)	Null hypothesis	Alternative hypothesis	λ-trace value	95% CV	90%CV
0.750	r=0	r>0	50.40	29.68	35.65
0.599	r≤1	r>1	21.12	15.41	20.04
0.104	r≤2	r>2	2.10	3.76	6.65
		λ-max test	λ-max value		
0.750	r=0	r=1	29.11	21.89	19.79
0.599	r=1	r=2	19.11	15.25	13.78
0.104	r=2	r=3	2.10	9.09	7.56

Table 13 shows the cointegration result for three variables like FDI, GDP and LP in India.. The result in Table 6 represents that all three variables are cointegrated on the basis of λ-trace and λ-max statistic values.

IV Concluding remarks

The following points emerge from the above analysis. First, China and India have reached a dramatic position in the world in Foreign Direct Investment (FDI). In terms of FDI Confidence Index, China and India emerging markets have achieved unprecedented levels of investors' confidence. Second, about 43% of FDI in China has come from Hong Kong. The United States is the second largest overall investor in China, accounting for 8.5% ($48.0 billion) of total FDI, followed by Japan ($46.8 billion), Taiwan ($39.6 billion), and the British Virgin Islands ($36.9 billion) and South Korea ($25.9 billion). The biggest contributing countries are Mauritius (34.48 percent) followed by USA (16.56 percent), Japan (7.63 percent), Netherlands (7.04 percent) and U.K. (6.88 percent). Third, in China about 60% FDI goes into the manufacturing sector which ranks first in FDI investment while in India the highest amount of FDI inflows go into electrical equipment including Computer and software industries. Fourth, China's success has been related to its vast increase in manufactured exports. Manufacturing accounts for 39% of China's output while in India the figure is 16%. China appears to be excessively dependent on manufacturing and has a somewhat underdeveloped service sector. Fifth, there is a cointegrating relation (long-run) between Foreign Direct Investment (FDI), Gross Domestic Product (GDP) and Labor productivities of manufacturing sector in China and India. The analysis has important policy implications. For China, implementation of World Trade Organization (WTO) requirements is fueling investor interest, as is continued liberalization and deregulation in banking, insurance, telecommunications, and wholesale and retail segments. Similarly, India is also implementing the economic

reforms in opening up the service sector to the foreign firms mainly in telecommunications and transportation sector.

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