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Impact of Central Funds on the Economic Development of Arunachal Pradesh

Nirod Chandra Roy June 2020



Centre for Development Studies Department of Economics Rajiv Gandhi University Rono Hills, Arunachal Pradesh Working Paper No. CDS/05/2020

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PREFACE

The Centre for Development Studies (CDS) was set up as a research adjunct at the Department of Economics, Rajiv Gandhi University (RGU), Itanagar, Arunachal Pradesh, with a generous grant from the Ministry of Finance (Department of Economic Affairs), Government of India. The objectives of the Centre include the creation of high-quality research infrastructure for students and researchers and faculty members, in addition to sponsoring and coordinating research on various developmental issues having policy implications both at the regional and national level. Publishing working/policy papers on the research outcome of the Centre, monographs and edited volumes are among the key activities of the Centre. The present working paper by Prof. N.C. Roy, titled, 'Impact of Central Funds on the Economic Development of Arunachal Pradesh', is the research outcome of a project on the inflow of funds from the Centre in Arunachal Pradesh. It is the *fifth* in the series of working paper published by the Centre for Development Studies.

The working paper primarily highlights the processes that has resulted in the improvement in the quality of life of the people in the state, as an outcome of the overall economic development witnessed in recent times. The study attempts to quantify the role of the inflow of funds from the Centre to the State and its impact on the development process. Arunachal economy has witnessed a trajectory of growth which is well marked by its noticeable gradient. Unlike other states of the country the development programme in the state was launched only after independence. Till 1962, the year of Indo-China war, a gradualist approach towards development was undertaken. The war, drastically altered the vision of development towards the borderlands and the Government of India reoriented its policy to accelerate the growth of the Arunachal economy. This has resulted in the steady flow of funds from the Central Government to the State. The study by Prof. N.C. Roy is an attempt to quantify the effects of central funds upon the growth of income and other development indicators of the State.

This working paper, with its focus on the impact of central funds on the economic development of the State, will be interest and use to policy planners, academics, researchers and students. I congratulate the author for the excellent time bound work.

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Date: June, 2020

Vandana Upadhyay Coordinator, Centre for Development Studies Department of Economics, Rajiv Gandhi University

ACKNOWLEDGEMENTS

The process of transformation of the many heterogeneous insular tribal economies into a single economy, the Arunachal economy and its slow but steady ascendancy on the trajectory of growth began with the launch of the development programme by the Government of India in the days following the independence of the country. The dynamic forces unleashed by the operation of the development programme which was crafted with all care by people like Pandit Nehru and Verrier Elwin, the famous anthropologist, effected a gradualistic transformative process which worked through both horizontal and vertical dimensions. Horizontally, the barter-fed insularity of the different jhum-based tribal economies was lifted by the introduction of money which created the inter-tribal transactional space. Vertically, the monetising traditional economies took on the path of integration with the national economy. However, the changes experienced by Arunachal Pradesh are not only translative and transformative but also ameliorative. The magnitude of ameliorative content in the transformational process can be gauged by the fact that the quality of life of the people has improved markedly.

This study highlights the process of the improvement in the quality of life as captured by economic development in the State and tries to quantify the role of the inflow of funds from the Centre in it. True that the role of the Central funds is not confined to effecting changes in the economic domain only; the limitation of this study is that it focuses only on the economic development. The non-economic dimensions of development though highly relevant to the understanding of the process of economic development are kept beyond the scope of the study. In order to quantify different relationships, a model of growth of the Arunachal economy is formulated. In fact for the last one decade I have been trying to construct a growth model of the Arunachal economy. The efforts however, lacked continuity. Then the sponsorship came form the Indian Council of Social Science Research (ICSSR), New Delhi. It is the financial grant of the ICSSR which enabled me to engage research assistants, collect adequate secondary and primary information and take the theoretical model to the testing ground. The theoretical model performs reasonably well in the empirical testing.

At the very onset, I would like to thank the Centre for Development Studies (CDS), Department of Economics, Rajiv Gandhi University (RGU), Rono Hills for accepting my research study and deciding to publish it as a working paper of the CDS. I am thankful to Prof. Saket Kushwaha, Vice Chancellor of Rajiv Gandhi University for his support and encouragement to the CDS and the Department of Economics. Special thanks are due to Prof. Vandana Upadhyay, Coordinator, Centre for development Studies for taking the trouble and the initiative to publish this study as a working paper. My sincere thanks goes to Prof. Tamo Mibang, former Vice Chancellor of Rajiv Gandhi University for his continuous support. I would also like to thank all my colleagues in the Department of Economics, Rajiv Gandhi University for their support and encouragement in this long academic journey of mine.

In carrying out this research I have got advice, suggestions, and help from many people and institutions. I should start expressing my gratitude to the ICSSR, New Delhi which sponsored this study. While carrying out this study I consulted JNU and Gauhati University Libraries. I am thankful to the staff members, officials and reprographers of these libraries. Prof. Atul Sarma, fromer Vice-Chancellor, Arunachal University extended me advice on many occasions. In fact, some of the ideas got filtered into this Report out of discussions which, formally and informally, I had with him. I remain deeply grateful to him.

My thankfulness goes to all my colleagues in the Department of Economics especially to Prof. S. K. Nayak who advised and helped me in the estimation of the growth model. Ms. Sreeja Sathisen provided secretarial assistance, to whom I express my thankfulness. Two research assistants Dr. Brojen Das, and Mr. Kirnya Eshi worked in the project. Both of them provided invaluable service to the successful completion of the project. Mr. Vijay Kumar Prasad did the typing work, Dr. Jawan Singh Rawat did some computational work including provision of computer lessons to me and Dr. Bedabrat Saikia helped me in the development of some ideas of technological change in agriculture of Arunachal Pradesh. I remain thankful to them all. Last but not least, I must express my gratitude to all those people belonging to both the autochthonous and migrant categories, whom I have interviewed formally as well as informally and developed my ideas about the workings of the Arunachal economy. In fact, it is these people who supplied the basic information which forms the kernel in the empirical part of this study.

> **Nirod Chandra Roy** Rajiv Gandhi University, Itanagar June 2020

SUMMARY

The growth trajectory of the Arunachal economy trapped long in a growthless lowlevel equilibrium shifted upward in the years following the independence of the country when the Government of India launched the development programme. This programme, inspired by the national desire to lift the disadvantaged to the level of the better-off, and to bring about regional parity, was operationalised by a steady inflow of resources and new technology in an area which, then a part of Assam, was one of the least developed regions of the country. It will be germane to provide a glimpse of the situation prevailing at the time of independence: in the entire area of 83743 sq km forming now Arunachal Pradesh there were only three primary schools with an enrolment of 30 students and so the overall literacy rate of an estimated population of 268 thousand was just a little above zero. There were no modern hospital facilities, nor were there much infrastructural facilities such as roads and highways. The vast expanse of the land with a very sparsely-settled population – the density was then as low as three people per sq km-lacked any connectivity. The overwhelming majority of the people of this State which is 96 per cent hilly and only 4 per cent plains practised the swidden cultivation, the slash-and-burn method which is known as jhum cultivation or jhuming in the North-East India.

The level of technology used in production was very low. There was no modern industry, nor was there modern tertiary sector except a security outpost in Pasighat, now the headquarters of the East Siang district. The jhum-dominated agriculture and home-based handicrafts kept the level of productivity of the economy so low that there was hardly any net surplus to be accumulated into capital. Lack of modern health services, the low level of income, illiteracy and a very low level of road connectivity are the image of a society trapped in stagnation. There was a high incidence of morbidity and mortality. A high death rate matching with a high birth rate kept Arunachal Pradesh in the pre-transitional demographic regime. Associated with the stagnating condition of the economy was the seclusion of the society brought in by the imposition of the Inner Line Regulation (ILR). Enacted by the British Indian Government in 1873, the ILR restricted the free movement of people between the area forming now Arunachal Pradesh and other parts of the country. Because of the seclusionist British policy, the people of Arunachal Pradesh could not participate in the socio-cultural and political movements of the pre-independence period.

The launch of the development programme by the Government of India loosened the grip of inertia in the economy and brought in it dynamics. The Arunachal economy started growing, the social mobility began and the political configuration changed. The focus of this study is, however, narrow. It sheds light only on the economic development; political or social aspects of development lie beyond its scope.

Modeling Economic Growth

A model of growth for the Arunachal economy is formulated. The model is based less on a priori or axiomatic relations and more on empirically verifiable economic relations informed largely by historical facts. To repeat this point, the model is formulated by incorporating in it the 'stylist' facts of Arunachal's history of economic development. As already mentioned, the basic thrust of development came from the inflow of funds from the Centre. The inflow from outside the State was not composed of only funds. The local market being absent, the funds brought in other inputs of development – labour force and physical inputs – from other parts of the country. The Central inflow is an endogenous variable in the model. The inflow of these funds tended to produce a wage-differential; raising the wage rate of Arunachal Pradesh above that prevailing in other parts of the country. This induced the flow of workers in this State. The Central funds were used, among others, in the development of infrastructural facilities such as schools, hospitals, roads and highways, etc. Specifically the establishment of educational institutions paved the way for the growth of human capital.

The cumulative growth of human capital and the migration of workers skilled in wet-rice cultivation were instrumental in the extension of permanent cultivation in the State. The capital formation is hypothesised to be related to the inflow of Central funds and extension of permanent cultivation. The aggregate production function is specified in terms of capital, labour and technology.

Empirical Testing of the Model

The theoretical growth model is estimated with the data collected largely from the secondary sources. It is found that the grants-in-aid constitute the major part of the Central inflow; the next in importance is the State's share of the Union taxes and the least important component of inflow is the loan from the Centre. In Arunachal Pradesh the Central funds constituted on average 84.41 percent of the Government receipt during 1986-2004 and the rest 15.59 percent came from the State's tax and non-tax revenue and loans from sources other than the Central Government. In recent years, the State's relative dependence on the Central funds has decreased to some extent, but its absolute dependence on it is still high.

The auto-regressive structure of the Central inflow is estimated and it is found that the current year's inflow is related positively to the previous year's inflow and negatively to the change in inflow that took place two years before. Using Cochrane-Orcutt method the coefficients of the determinants of the Central inflow are estimated. It is found that the State's per capita income relative to the per capita national income has a positive effect and the square of this relative income has a negative effect upon the inflow of funds from the Centre. The relative size of the State's population has a positive effect upon the inflow. The inflow of funds induced the migration of workers, both skilled and unskilled, in Arunachal Pradesh from other parts of the country. A labour market came into existence. The supply side of this market was initially dominated by the workers from other parts of the country. The development activities tended to monetise the traditional economies which were based on barter. The insularity of these economies was lifted and they became integrated among themselves and also with the national economy. The Arunachal economy did not depend long only on the migrant workers.

The educational institutions established by the Government proved highly effective in the spread of education. The overall literacy rate in the State rose from almost zero in 1947 to 54.74 per cent in 2001. It can be noted that there are three states in the country – Bihar, Jharkhand and Jammu and Kashmir whose literacy rates are lower than Arunachal's. The growth in education is indicative of the growth in manpower in the State, a development which has spear-headed the technical change in agriculture and replaced to some extent the migrant workers in the State.

Both capital and labour (employment) are first estimated to construct a time series for the period 1970-2003. Technology is estimated using Verdoorn's learning model which takes cumulative output as a measure of learning. We take cumulative manufacturing output as a proxy for technological progress in the State. The production function is estimated by Cochrane-Orcutt method of least squares. In the context oa Arunachal Pradesh capital, labour and technology can be regarded as the immediate, and not the basic causes of growth, because it was the inflow of funds which created the conditions for the expansion of capital, enlargement of the size of labour force and the upward shift of the technological frontiers of the economy. In the growth of the Arunachal economy, capital's contribution is 52.51 percent, technology's contribution is 40.78 and only 8.94 percent came from the expansion of the labour force. The total factor productivity in the State is, however, negative. Its relative contribution is -2.23 percent.

Inflow and Government Expenditure

The size of the Government expenditure relative to that the economy is very large in Arunachal Pradesh. During 1986-2003 the Government expenditure was on average 91.20 percent of the State's Net Domestic Product (NSDP). In some years the Government expenditure exceeded the NSDP by a wide margin. In spite of the Government expenditure being high, the income generated by the public expenditure is very low. Moreover, the major portion of the Government expenditure is used for consumption purposes, and a small portion is used in the accumulation of capital. Had the major part of the Government expenditure, which to a considerable extent is financed by the inflow of funds, been invested then Arunachal economy's growth rate might have been higher than what has actually been achieved. One reason, among others, behind the small effect of the Government expenditure upon the growth of the economy is the absence of multiplier effect. The local productive capacity being highly limited, the Government expenditure boosts demand for goods produced in the rest of the country.

Productivity of Capital

Based on the data collected by conducting a primary survey the productivity of capital is estimated. The survey covered 100 units in the secondary and tertiary sectors of the economy. While proposing this project it was my hypothesis that the productivity of capital was low in the State and that is why private capital did not flow in. But the data did not support this hypothesis. While industrial capital was not flowing in, but the trade capital in small amounts were flowing in the State. The productivity of the trade capital was found to be higher than that of the industrial capital. The institutional factors responsible for the industrial capital not flowing into the State are identified. It is found that the non-issuance of licence to the people not belonging to the category of Arunachal Pradesh Scheduled Tribes (APST) is one important factor restricting the flow of industrial capital in the State.

Economic Inequality and Unemployment

In the traditional tribal economies of Arunachal Pradesh agricultural land was community-owned and the individual enjoyed only usufructuary rights in the land that he cultivated. This checked the growth of inequality to a large extent. In the land-abundant Arunachal Pradesh labour was the scarce input and this made unemployment an unknown phenomenon. However, with individualisation of community-owned agricultural land and establishment of property rights in the earned income, the inequalities in the distribution of income emerged. In the 1950s and 1960s Arunachal Pradesh suffered from scarcity of local manpower; this scarcity decreased in the 1970s and 1980s. the reversal took place in the 1990s with the appearance of unemployment among the local youths. Both inequalities and unemployment are estimated on the basis of data yielded by a primary survey. It is found that the economic inequalities are quite high in the State and the rate of unemployment among the educated youths is also high.

Both inequalities and unemployment, the new phenomena in the State, are not accommodated in the traditional values and norms. The people find it difficult to internalise them. So, in order to ensure the stable growth, the Government should take measures to reduce the degree of inequality and solve the problem of unemployment. Appropriate policy measures are suggested in the study.

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CHAPTER 1 INTRODUCTION

The Arunachal economy's growth trajectory which, for centuries, had been lying low in the neighbourhood of the time-axis shifted upward and took a definite shape in the years following the independence of the country. This upward shift of the growth path was caused mainly by the factors associated with the launch of the development programme by the Government of India. Calibrated in a well-planned manner to ensure the institutional continuity, this programme was operationalised through a steady inflow of resources and new technology in an area which, then a part of Assam, was one of the least developed regions of the country. From a very low base, Arunachal Pradesh has made significant achievements in different dimensions of development. However, when its level of development is compared with those of other states in the country, Arunachal's achievement does not appear to be very impressive – it is still one of the states remaining at the lower end of the scale of development.

1.1 Background

Given the differential bases and beginnings of the process of development in Arunachal Pradesh and in the rest of the country, a comparative approach focusing only on the present is less satisfactory than one which can draw on the past constraints and highlight the contextual factors conditioning the State's development. It is therefore appropriate that we should have a glimpse of the unique characteristics of Arunachal Pradesh in its historical perspectives. Home to twenty five major tribes and more than 100 sub-tribes and minor tribes, Arunachal Pradesh has a very rich ethnic, linguistic and cultural diversity. Embedded in the culture of a community are its socio-economic institutions. Politically Arunachal Pradesh is one unit, a State bound by a homogeneous administration which is based on the national legal-judicial system. However, the traditional administrative systems were diverse varying widely from one tribe to the other. The customary laws which, to a great extent, are used by the judiciary are also different and diverse sets of institutions guide the economic life of different tribes. At the time of independence the areas now forming Arunachal Pradesh were called North-East Frontier Tracts (NEFTs) implying that it was not a single geographical entity but a set of different entities. These different entities (tracts) formed parts of adjacent districts of Assam.

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Though parts of districts of Assam, the different tracts were not brought under the direct administration prior to 1947. To the British, the administration of the tracts was too costly to be covered by any tax imposable in these areas. So, guided by the economic- cost benefits analysis – not by social or humanitarian cost-benefit analysis – the British Government did not introduce direct administration in these areas. The control was exercised indirectly through political means which may be called political administration.

No policy action was taken by the Government to improve the living conditions of the people. The British indifference to these bordering areas was due not only to its hilly topography and remoteness but also its strategic sterility. Prior to the Second World War these areas were strategically dull. As the Second World War progressed and spilled over from Burma into Manipur, the strategic importance of these areas increased and this created the British attraction. In 1944 the British Government deputed Haimendorff, the famous anthropologist, to study the Apatanis, the people living in the Ziro valley of the Lower Subansiri district. Haimendorff's is the first major field study on what came later to be known as Arunachal Pradesh.

The degree of overall seclusion of the administratively-secluded areas was enhanced by the enactment of the Inner Line Regulation (ILR) by the British Indian Government in 1873. This regulation restricted the entry of the outsiders to these tracts. The provisions of the ILR drastically scaled down the interactions of the people of these tracts with the other parts of the country. The ILR which is still in force has deeply influenced the growth of markets, especially the factor market in these areas. The main provisions of the ILR are: (a) Indian citizens can enter in Arunachal Pradesh only after securing permission from the Government, foreign citizens are normally barred from entry; (b) a migrant (from other states) cannot purchase any land or immovable property in this State; (c) no licence or permit can be issued to the migrants (from other states) for any business or establishment of any industry; and (d) preaching of any alien religion is prohibited. The ILR made the stay of the migrants in Arunachal Pradesh from other parts of the country temporary usually co-terminus with their working in this State. Of course, workers can be engaged from any part of the country with the permission of the Government. Because of ILR and the British policy of seclusion, the people of these frontier tracts could not participate in any national movement.

1.2 Basic characteristics of the Tribal Economies

Prior to the independence of the country there were enormous diversities among the different tribal economies. There was no single economy; there were many

economies – in fact as many economies as the number of tribes. All these economies were largely insular with the major proportions of transactions carried intra-tribally (Roy and Kuri 2001). It is difficult to present the characteristics of all the individual tribal economies and so in what follows only a few fundamental characteristics common to most of the tribes and having bearing on the process of development are given:

Swidden Cultivation

Most of the people practised, prior to independence, swidden or shifting cultivation which is known in North-East India as jhum cultivation. In a few river valleys and most prominently in the Apatani plateau of the Lower Subansiri district permanent cultivation, especially the wet-rice cultivation was practised. Mainly food crops were produced.

Technology

The general technological environment of production was very low. In most of the areas bullock-driven plough was unknown, only in a very few areas adjacent to Assam plough was used ⁽¹⁾. In permanent cultivation the use of plough was not the general practice; even today in Apatani plateau which is highly developed in fishcum-paddy cultivation plough is not used. In jhuming the implements used are axe, hoe, bill hook (a kind of dagger), sickle and spade. The use of chemical fertilizers was unknown. So the capital intensity or more appropriately the technology intensity of production was extremely low. Mechanised industrial production in preindependence days was almost unthinkable. Home-made products such as clothes, baskets, utensils, etc. were usually used. Pottery in general was absent. Utensils, cooking pots, etc were made of bamboo abundantly available in this area.

Agrarian Institutions

Except in some river valleys and specifically in Apatani plateau land was communally owned. The individual cultivating family was given the usufructuary rights over the land operated by it. These rights were co-terminus with the operation of the land. Jhuming passes through cycles. When a piece of land is cultivated for two or three years consecutively, the fertility of the soil is exhausted. In order to recharge its fertility, the land is left fallow for several years. During the fallow period the land reverted to the community.

Unlike other parts of the country, there was no tax on cultivable land in Arunachal Pradesh, nor is there any even today. The cadastral survey of agricultural land is old

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elsewhere in the country, but in Arunachal Pradesh the agricultural land has not yet been cadastrally surveyed.

There was no labour market in agriculture. Of course there was the institution of social mobilisation of labour. A person in need of labour could ask for the assistance of his neighbours who spontaneously extended their help. The person using such help repaid it in future in terms of labour. This constituted a system of labour exchange, a surrogate labour market, in the absence of a formal labour market.

Mutual Insurance

The exchange of labour among the community members is just one aspect of the general institution which evolved through ages to mitigate the sufferings caused by many risky events affecting income. The traditional agriculture is subjected to many risks such as drought, flood, pest-attacks, etc. Some of these risks are not positively co-variant. This enabled the people to cover each other's risk to a significant extent. This method of risk-coverage led to the evolution of mutual insurance, an institution which reduced the intensity of poverty so common in the society dependent on jhum-based agriculture and other primary activities.

Traditional Consumption and Saving Patterns

A binary classification of consumables will help to illuminate the consumption patterns in the traditional Arunachal Pradesh: the produced consumables and those collected or obtained through hunting. The produced commodities, agricultural crops or home manufactured goods, met parts of the consumption need. An important part of the needs was met from common property resources (CPR) abundantly available in the State. Uncultivated vegetables, edible roots, fruits, game animals, fuel woods, etc. were and still are an important source of income for many people especially those living in the remote areas of the State. In general the remoter the areas, the simpler is the process of production. There are people living in the remote areas who, even today, depend mainly on collection and hunting activities ⁽²⁾. Food grains such as wheat or rice or maize, are not very popular with them.

Milk, sugar, gur, edible oil, etc. do not constitute the items of traditional consumption. Rearing of cattle is a very old avocation elsewhere in the country, but in Arunachal Pradesh cattle were not reared as domestic animals. There are hill cattle (bos frontalis) called mithun which are not fully domesticated. The semi-domesticated mithun were not valued for their milk because people were not habitutated to consuming it. Mithun are not milked even today ⁽³⁾. They are valued

for their sacrificial use in many traditional religious festivals and their meat is a delicacy to the people. Mithun are not used as draft animals. They are neither stall-fed nor kept in a shade or house. They range freely in the forest and manage their own food.

In the absence of precious metals, mithun were an important medium of accumulation process. Its general acceptability turned it into a kind of money, a numeraire which could be bartered for any commodity. Another important medium of accumulation was bead made of precious stones. Apart from these, Tibetan bells, utensils, swords, etc. were also used for accumulation of surplus. So whatever little surplus was generated was accumulated in the forms of assets which could hardly be called productive investment. Considering the purposes of accumulation they could be called consumer durables.

Human Capital

The correlate of physical capital is human capital. The very low level of technology which is simple and requires a little learning for its use did not create any demand for human capital. So no formal institutional infrastructure was established to build up human capital. Before independence only three primary schools were established⁽⁴⁾. The number of students enrolled in these schools were around thirty. So the overall literacy level was extremely low. No data are available on the literacy rate among the population prior to 1961. Based on enrolment it can be gathered that the literacy rate in Arunachal Pradesh at the time of independence was less than one percent.

Social Overhead Capital

In the pre-1947 Arunachal Pradesh the social overhead capital was very low. The paucity of this capital can be gauged by the fact the public space spanned a single or a maximum of several villages bound by clanship or community membership. So there were many public spaces coinciding with clan or tribal spaces which were mutually exclusive. There being no inter-tribal space, establishment of large scale social facilities (provision of public goods) was not possible in the traditional communities. Prior to 1947 the length of motorable roads in this State was extremely low. The vast expanse of land was not connected by any road with the plains of Assam. No modern hospitals were established. Only a few health units located in foothills or in what is now Assam extended medical services. The majority of the people living in the hills had no access to the modern health services.

High Mortality

Lack of modern health services and illiteracy kept the mortality rate high in Arunachal Pradesh. In other parts of the country the mortality rate was also high in pre-independence days. But it was declining. Since 1921, the year which is known as 'the great divide' in the country's demographic history, the population has been increasing in the rest of the country, but in Arunachal Pradesh population, in all probability, could not increase in a sustained manner prior to independence because of the high non-declining mortality. In this State population started growing in a sustained way only after the independence of the country.

Bartering

A low capital-intensity in production, absence of human capital and traditional method of production generated a little surplus. In the absence of adequate marketable surplus monetised transactions did not appear. There was no generalised money in use; bartering was the usual practice. In general, the frequency of transactions was low. The economies were insular with hardly any linkage with the outside world. The insularity characterised not only the economy but also the administration centred in a village with its perimeters covering a maximum of a few villages tied by kinship or clanship. The sparsely-settled villages enjoyed a high amount of autonomy. In pre-independent days the Government of Assam did not interfere in the internal affairs of a village. Only when the inter-tribal or inter-village conflicts spilled over into the plains of Assam, the Government intervention took place.

Inception of Development

The launch of the development programme by the Government of India brought about far-reaching changes in Arunachal Pradesh. The inflow of funds injected money in different insular tribal economies hitherto practising barter. The injection of money initiated the process of monetization and lifted the insularity of the economies. Commercial crops were introduced; grants were liberally provided to develop land for permanent cultivation and wean away the people from jhum cultivation. With the extension of permanent cultivation and application of new technology the frontier of the production function got expanded. Schools were set up, hospitals were built, roads and highways were constructed, rivers and streams were bridged and communication systems were established. Workers, both skilled and unskilled, were brought in from different parts of the country. The outcome of these steps some of which are really gigantic is very obvious. Different communal economies have to a large extent been integrated with the national economy. With the expansion of educational institutions literacy has spread. The extension of health services and the provision of food-grains through public distribution system have lengthened the expectancy of life. Development has brought not only unmixed blessings, it has also created some problems. The subsequent chapters of this Report try to highlight the development achieved in different areas. The role of the Central funds in initiating and sustaining the development is studied with a substantial amount of depth. The Report also sheds some light on the problems created in the process of development, especially unemployment, inequality and relative poverty. Given the paramount importance of a stable socio-economic environment in sustaining growth, efforts are made to suggest appropriate policy measures to achieve stability in the part of the country where instability is the rule rather than the exception.

Notes

- (1) Generalisation is risky in Arunachal Pradesh. Plough was used in the areas bordering Assam, but it is not true to say that plough was unknown in all interior areas of Arunachal Pradesh. In the Monpa area of West Kameng and Tawang yak-driven plough was used and still it is in use. But in preindependence days the technology of wooden plough did not spread in the major part of Arunachal Pradesh.
- (2) This type of classification is not economically tenable. The elementary definition of production is in terms of the creation of utility through changes in the form of a thing, its location or time of use. So hunting, fishing or gathering activities are productive. A better definition is in terms of the amount of round-aboutness of production. At the empirical level, round-aboutness of production can be measured by the capital-output ratio. But this ratio may not illuminate what is being stressed. In jhuming very little amount of capital is used, but in hunting costly traps, nets nowadays guns may be used. Instead of capital output ratio, if Bohm Bawark's original round-about concept of production with capital is added to the concept of catallectics or the principle of exchange a better illumination can be achieved.

Production involves a gestation period. The length of the gestation depends on the type of goods being produced. The production of social overhead capital or designing and making a new commodity may require years together while simple production may involve a short gestation period. In agricultural production the process starting with ploughing and seed-bed preparation may require three months to harvest the crops. A kind of exchange mechanism develops in production: the application of inputs results in the output with a period of gestation. As we move from the simple production in agriculture to the sophisticated production in industry, we see the presence of a complex exchange mechanism between the input-supplier and the output-receiver. In hunting and gathering activities gestation period is either non-existent or very short and the exchange mechanism does not arise. Uncultivated fruits when ripe are collected, animals not reared or cared are hunted and trees not grown are cut and collected. So these activities involve no reciprocity; these are unilateral actions: something is obtained without paying for it.

- (3) In Tawang and West Kameng, the districts where the people belonging to the Monpa, a Buddhist community are predominating, yak milk and its products are very popular. Yak is a variant of mithun.
- (4) The majority of the tribes had no literary tradition. Indigenous languages of Arunachal Pradesh belong to the Tibeto-Burman language family. Except Khamti and Monpa languages no other language has any script. Though formal secular schooling did not appear prior to the 1918, among the Buddhists in West Kameng, Tawang and Lohit districts traditional religious education was imparted to train the young for monkhood. It may be noted that the first primary school in Arunachal Pradesh was established in Pasighat in 1918, but the number of students remained so low that it could not be upgrades to a high school before 1947.

CHAPTER 2

OVERVIEW OF LITERATURE, OBJECTIVES AND METHODOLOGY OF THE STUDY

2.1 Review of Literature

The seminal research laying the foundation for and shaping the Government of India policy in Arunachal Pradesh, then called North East Frontier Agency (NEFA), was done by Verrier Elwin. His A Philosophy for NEFA was taken to be the bible of the policy makers and officials associated with the administration of NEFA (Rustomji 1983). Apart from building a model of development of NEFA, Elwin who called himself the missionary of 'Mr Nehru's gospel for the tribes' (Guha 119, p. 326) played a leading role in the implementation of the policy. Elwin's overwhelming influence on fashioning NEFA policy and its implementation in the 1950s was due partly to the high admiration in which Prime Minister Nehru held his anthropological works and partly to his official position as an adviser on tribal affairs to the Government of India. With a deep understanding of tribal society - its economy, culture and institutions - and inspired by an ardent desire to protect and uplift the tribal communities, Elwin prescribed a gradualist approach to development. The basic thrust of this approach was to avoid - in realms of technology and institutions abrupt changes, the changes which in the special circumstances of NEFA (Arunachal Pradesh) were supposed to carry disruptive potentialities.

In order to put the development policy followed in Arunachal Pradesh into the national perspective, the Elwin model, better known as Nehru-Elwin model of tribal development can be compared with the Mahalanobis model incorporated in the country's second five year plan. The second five-year plan strategy of development based on the priority of basic and heavy industries, the commanding heights of the economy, is also known as Nehruvian model or Nehru-Mahalanobis model. The Nehru-Elwin model intersects the Nehru-Mahalanobis model on a number of points, but there are a number of points of disjointness between them.

An important point of intersection between Nehru-Elwin and Nehru-Mahalanobis models is their inward orientation – both are closed economy models. Export pessimism, widespread in the 1950s, motivated Mahalanobis to model an insular economy and the fear of exploitation of tribals by the non-tribals through the

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medium of trade and money-lending (usury), so common outside the North-East, is the motivation behind Elwin's modelling an insular tribal economy. Nehru-Mohalanobis model aims at the achievement of autarky in the production of capital goods, an objective to be achieved through import-substitution and Nehru-Elwin model stresses the achievement of autarky at local or community level through promoting the traditional tribal industries – cottage or household industries – and restricting the non-tribals' trade and commerce with the tribals. Thus both the models use protectionism – not competition – as the instrument of goal achievement.

Another point of intersection is that these models do not provide any room for priceguided resource allocation. In Nehru-Mahalanobis model capital goods sector receives top priority because of its relatively high contributions to growth in the long run; in the assignment of priority, expected profit and international market potentiality play hardly any role. In Nehru-Elwin model price mechanism does not play any role. Production in a tribal economy is seen not being motivated by profit but mainly by demand for home consumption and partly by the possibility of sale locally.

Both Nehru-Mahalanobis and Nehru-Elwin models recognize an active government role in the economic sphere. In Nehru-Mahalanobis model the economy remains slow-moving till the government boosts investment and directs it towards basic industries, the prime mover which propels the economy to a higher growth path. In Nehru-Elwin model the economy – a typical tribal economy – remains in stagnation and it is the enlightened intervention of the government which breaks the vicious grip of stagnation and sets the economy in motion.

As to the points of difference, Nehru-Mahalanobis model is forward looking – it tries to break with the past. Big industries, modern technology and government efforts are the sine qua non for a rapid growth. Nehru-Elwin model is Janus-faced, looking always forward and backward. It wants to build the future on the tradition of the past. It rules out the possibility of pursuing a path of rapid modernisation. By prescribing the exercise of utmost caution and restraint in undertaking administrative and development projects and allowing only small changes, Nehru-Elwin model pre-empts the possibility of rash and hasty decisions.

An evaluation of Nehru-Mahalanobis is irrelevant here but a very brief evaluation of Nehru-Elwin model is a necessary step to put the later works on Arunachal economy in order. North-East Frontier Tracts, now Arunachal Pradesh, which was till 1947 administered only politically with almost all offices situated in the plans of Assam saw in the 1950s an extension of regular administration right up to the McMahon Line. The peaceful spread of administration, the smooth consolidation of the tracts into a unit called North-East Frontier Agency (NEFA) in 1954 and successful launch of development programme causing no adverse reaction are the fruits yielded by the Nehru-Elwin approach. This approach was followed without being questioned till 1962, the year which witnessed NEFA being invaded by China. The Indian reverses in the war with China tended to discredit the Nehru-Elwin model of gradualism and least interference and gave rise to an activist-integrationist policy (Das 1995).

After 1962 the Government of India commissioned National Council of Applied Economic Research (NCAER) to conduct a techno-economic survey of NEFA (NCAER 1967). The spirit of the time - the integrationist mood - coloured NCAER's study. Apart from this, the conceptual framework of the study was based on pre-Solow growth models which place singular importance on physical capital as the determinant of growth. Though by the time - the middle of the 1960s - NCAER's study was conducted, a good number of studies on growth-accounting (for example, Solow 1957; Denison 1962, etc.) had showed that the contribution of physical capital to growth was much less than what was expected in traditional growth models and consequently human capital model as formulated by Schultz (1961) and Becker (1964) had become a new paradigm of development, yet the study was not informed by this paradigmatic shift. With an in-built bias towards physical capital, the study neglected the problems of human capital formation in the State. Moreover, being techno-economic in scope, the study did not find it necessary to take into account contextual factors of mainly socio-cultural origins having bearing on economic behaviour. The freedom from context enabled the study to depend less on primary data and utilize data from secondary sources - census, government reports, etc. In this respect its approach was quite opposite to Elwin's which is thoroughly contextbound. (NCAER's study differs from Elwin's on suggestion also. While Elwin suggested a reduced investment for Arunachal Pradesh, NCAER (1967) suggested an enlarged flow).

NCAER (1967) made an appraisal of the resources available in the State. Considering sparseness of population, the study suggested settlement of farmers from outside the State in order to raise agricultural production and modernise agriculture dominated by jhum cultivation. It did not ponder over the plight of the jhum cultivators, and ways of improving their conditions.

On the industrial front the study suggested establishment of two pulp and paper mills and a few timber mills based on vast forest resources available in the State. Being context-free, the study did not take into consideration the legal status of the tribal land, the scarcity of locally available labour, the immaturity of local market, the

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Inner Line Regulation and the general socio-economic factors at the local level, and made suggestions which, if accepted and carried out by the Government, might create results more undesirable then desirable. However, the Government showed its wisdom in rejecting most of its suggestions.

A study similar in approach to, but deeper in scope than NCAER's was carried out by Tata Consultancy Services (TCS) in the middle of 1990s. This study (TCS 1997a, 1997b) is more a detailed feasibility report for different potential industries than an objective description of the economic conditions of this State. The feasibility is based mainly on financial and technical considerations of individual projects and this makes the study micro-oriented. A thorough social cost-benefit analysis is not carried out to base the feasibility of individual projects on a firm ground. The problems of development are multi-dimensional and incapable of being reduced to techno-financial dimensions only. Such reduction as attempted by NCAER (1967) and TCS (1997a, 1999b) is an exercise which warps the issue of development instead of representing it in its true perspective.

The studies on the development issues of Arunachal Pradesh suffer from being either too much context-free or too much context-bound. The techno-economic studies reviewed above are the best examples of the context-free studies. The studies dealing with the problems of development of North-East India which touch on Arunachal Pradesh peripherally also belong to this category (Agarwala 1985, for example among others). The context-bound studies are mainly anthropological dealing with ethnicity, culture, etc. of Arunachal Pradesh. But anthropological approach has not yet been applied to the study of economic problems of this State – the exception, of course, is Verrier Elwin (1957). There is a dearth of studies dealing with the aggregate economic relations in Arunachal Pradesh.

Agarwala (1985) is an economic study of North-East including Arunachal Pradesh. It is descriptive and uses no theoretical framework. Its approach is basically economic geography. It looks at the different segments of the economy not in an integrated way. It sheds light on the population problems, the problems of agriculture, utilisation of natural resources, industrialisation, etc. in a disjointed way. The approach of study by Yogi (1991) is similar to Agarwala (1985) but their main difference is that the former uses more upto date information than the latter.

Roy (1996) studies the growth and structural transformation of the Arunachal economy. It shows that the structural transformation of the economy is lopsided in view of the fact that the tertiary sector of the economy grew rapidly while the manufacturing sector shows no sign of growth. Roy (1999a) deals with the problems

of growth of the Arunachal economy with the particular stress on the problem of negative savings. Roy (1999b) is a study of Arunachal economy with a specific attention on the problems of industrialisation. It argues that the basic problem of Arunachal economy is the development of market, the institution which has not yet fully developed in any hill areas of the North-East. Some other studies deal with particular sectors only. Talukdar (1995) studies the land tenure and land use patterns in Arunachal Pradesh based on agricultural census data. He shows that the distribution of landholdings is highly unequal. He enumerates the causes of growing inequality in the distribution of landholdings and suggests land reform measures to check its growth. Roy and Kuri (2001) is an in-depth study of the problems of land reform and agricultural development in Arunachal Pradesh. None of these studies however, deal with the causes of growth of Arunachal economy or of any of its sectors.

2.2 Objectives

The conventional technique of growth accounting which tries to quantify the relative contributions emanating from labour, physical capital, human capital, technology, etc. cannot reveal the true causes of economic growth in Arunachal Pradesh. In this State the steady inflow of Central funds has been instrumental in the growth of both physical and human capital, and in the induction of new technology, the factors which in growth-accounting literature are taken to be immediate causes of growth. This study highlights how the inflow of Central funds brought into being the growth-causing factors and set the Arunachal economy on a dynamic growth path. The specific objectives of the study are:

- (1) To estimate a time-series of the flow of Central funds in Arunachal Pradesh and shed light on the factors determining the inflow.
- (2) To find out the sectoral allocation and mode of utilisation of the Central funds.
- (3) To estimate the productivity of capital and identify the factors responsible for the low productivity of capital in the State.
- (4) To account for causes of growth of the Arunachal economy. Specifically, to quantify the relation between (i) inflow of Central funds and capital formation in the State, and (ii) inflow of Central funds and the migration of labour force and its growth in the State.
- (5) To estimate the magnitude of economic inequality and unemployment in the State, and suggest policy implications based on both positive and normative considerations.

2.3 Methodology

The study is largely empirical. However, a model of economic growth is constructed and empirically tested. In testing the growth model, mainly secondary data are used. In Arunachal Pradesh, the estimation of State domestic product began in 1970-71. So the study of growth is confined to the period 1970-71 to 2000-03. The detailed budgetary information for the State is available from 1986-87 and this makes our analysis of the public expenditure confined to the period 1986-2003. The study of inequality and the productivity of capital requires primary data which are collected by a survey.

The sample size for the primary data is 300 having three components with three universes not all being mutually exclusive. The sub-sample concerned with estimation of the productivity of capital has one universe with units of observation being the production units – firms or any service producing unit. The estimation of economic inequality requires another sub-sample whose universe is all autochthonous households of Arunachal Pradesh. The estimation of unemployment requires a sub-sample with an universe consisting of all autochthonous labour force. The technique of stratified random sampling is used to draw the sample from these three non-mutually exclusive universes – (i) all production units, (ii) all autochthonous households, and (iii) all labour force of the State.

The secondary data are collected mainly from Government offices in Itanagar. No structured questionnaire is used for this. For conducting the primary survey, three structured questionnaires are constructed: (i) one questionnaire for production units, (ii) one questionnaire for households, and (iii) one questionnaire for working-age people working or not working.

The collection of data in rural Arunachal Pradesh is a problem because of accidented topography and lack of all-weather roads. After being thoroughly acquainted with the study villages through participant observation, the questionnaires are filled in through interviews. It will be pertinent here to mention a few limitations arising mainly from the deficiencies in data. Our sample size is small which necessarily weakens our abilities to generalise. The data on capital formation are estimated on the basis of insufficient information. The time-series data on relative wage rates (wage rates in Arunachal Pradesh vis-à-vis other states) are estimated on the basis of information provided by a very limited number of people. However, the strengths of the study consist of modelling the growth and empirically testing it. The study also adds insights to the theory of capital productivity.

CHAPTER 3

ADMINISTRATIVE AND TECHNO-INSTITUTIONAL FOUNDATION OF DEVELOPMENT

3.1 Administrative Foundation

The long night of callous indifference of the Government and stagnating seclusion passed away after independence when the Government of India initiated direct administration in Arunachal Pradesh then called North-East Frontier Tracts (NEFTs). The administration introduced in NEFTs was not the traditional type which is concerned with the maintenance of law and order. It could be better called 'development' administration because of its focus on bringing economic transformation and improving the quality of life of the people. The maintenance of law and order continued to be the responsibility of the traditional village councils. The Government did not interfere in the functioning of the traditional administrative institutions except the extension of disinterested guidance whenever needed.

The appellation of NEFTs was changed to North-East Frontier Agency (NEFA) in 1954⁽¹⁾. However, the administrative responsibility of NEFA remained under the ministry of external affairs, Government of India. The administration was transferred to the ministry of home affairs in 1965. Previously the head administrator of a tract was called political officer. The tracts were named districts and the designation of political officer was changed to deputy commissioner. The administrative setup went on getting deepened, of course, gradually and in 1972 NEFA was made a Union Territory. Since 1972 the new appellation, Arunachal Pradesh, has replaced the old one, NEFA. The subsequent politico-administrative development was rapid. In 1987 Arunachal Pradesh attained statehood.

The administrative machinery of the Government was pushed closer to the people. Prior to 1947 the Government Offices dealing with NEFTs were located in the present day's Assam and only one administrative outpost – more properly security outpost – was located in this area, in Pasighat now headquarters of the East Siang district. Pasighat's outpost came into being in 1918. After independence the Government took sustained efforts to shift the offices in Arunachal Pradesh. It was a challenging task because of the hilly terrains. It may be noted that Arunachal Pradesh is 96 percent hilly and only 4 percent plain. The response of the Government proved equal to the challenges. In a slow but steady pace roads were constructed

and communications system was established. In this way a foundation was laid for the socio-economic and political development of this State. In what follows a synoptic presentation is made of the different foundations of development before going into a detailed analysis of the economic growth.

3.2 Population Growth

The semi-stationary population received the impulse to growth after independence. In 1947 the estimated population of Arunachal Pradesh was only 268 thousand in an area of 83743 sq km which is 6.76 percent larger than Assam and the density of population was very low -only 3 persons per sq km ⁽²⁾. The growth of population in this State since the 1960s has been quite high, in fact much higher than that at the national level. During 1961-91 the population of Arunachal Pradesh increased at the average exponential rate of 2.98 percent per annum against the national level growth of 2.13 percent. The growth rates of population, 3.29 percent per annum, in Arunachal Pradesh. In the country also the growth of population (2.22 percent per year) was the highest in this decade. In the next three decades the growth of population declined in Arunachal Pradesh as well as in the country. During the 1991s Arunachal's population grew only at the yearly rate of 2.39 percent. The country's growth rate dropped to 1.95 percent.

Size of Population		Growth of population		Population Density		Ar. P population	
rear	Ar.P	India	Ar.P	India	Ar.P	India	as /o maia
1961	337	439235	-	-	4	139	0.077
1971	468	548160	3.29	2.22	6	173	0.085
1981	632	683329	3.01	2.20	8	216	0.092
1991	865	846303	3.14	2.14	10	266	0.103
2001	1098	1028610	2.39	1.95	13	325	0.107
Average yearly growth of population			2.98	2.13			

Note: Size of population is in thousand; density is no. of people per sq km. Ar. P means Arunachal Pradesh. Average yearly growth rate is the value of b*100 obtained by estimating the equation log p = a + bt, where p is the population and t is time measured in years.

Data source: Different Population Censuses of India (Arunachal Pradesh).

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Year	Size of P	opulation	Growth o	f Population	Percentage of	
	ST	Non-ST	ST	Non-ST	ST	Non-ST
1961	299	38	-	-	88.67	11.33
1971	370	98	2.13	9.45	79.02	20.98
1981	441	191	1.78	6.65	69.82	30.18
1991	551	314	2.21	4.99	63.66	36.34
2001	705	393	2.48	2.23	64.22	35.78
Average ye	arly growth of	population	2.12	5.83	-	-

Table 3.2: Migrant Population in Arunachal Pradesh

(Size of population is in thousand and the growth is yearly exponential in percentage)

Note: Estimated on the basis of data from different population censuses of India (Arunachal Pradesh).

In Arunachal Pradesh the natural growth rate of population is not much higher than that of other parts of the country. In fact prior to the 1980s the natural growth rate of population in this State was lower than that of other states. A significant part of growth in this State was due to migration from other parts of the country. The data on the Scheduled Tribe (ST) and non-ST population and their growth in table 3.2 provide an idea of the extent of migration-fed component in the overall growth of the population in Arunachal Pradesh. ST population is largely autochthonous and non-ST population consists of migrants or their non-migrant dependents ⁽³⁾.

At the time of independence the estimated non-ST component was only 3.16 percent of the total population. The percentage of the non-ST population rose to 11.33 in 1961 and went on increasing; it reached the peak percentage of 36.34 in the 1991 census. The non-ST segment lost 0.56 percentage points and came down to 35.78 percent of the total population in 2001. The growth of the non-ST component was significantly higher than that of the ST component of the population during 1961-91. In the 1990s growth rate of the non-ST population fell to 2.23 percent, which was for the first time since 1961, lower than the growth of the ST population. In the four decades ending in 2001 the growth of the ST population was 2.12 percent per annum almost the same as that of the population of the country. In contrast, the growth of the non-ST population during the same period was as high as 5.83 percent per annum.

The increasing growth rate, in the last two decades, of the ST population which is, in the state of Arunachal Pradesh, relatively closed is indicative of an accelerated decline in the mortality rate in a demographic regime where the fertility rate is on

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the way to fall. In fact mortality rate has been declining, though not rapidly, since the 1950s. Table 3.3 shows the time-path of the infant mortality rate (IMR) in Arunachal Pradesh, in a few other states and in India. IMR is not a measure of overall health status, but it captures, to a great extent, the conditions of socio-cultural and medical technology of a society. So far as the level of IMR is concerned there is a clear under - estimation in case of Arunachal Pradesh. However, our interest is not the absolute level of IMR, but its change over time. The fall in mortality rate has been more rapid in this State than many other states in the country. Given a strong positive correlation between the IMR and the overall mortality rate, we can safely conclude that the health status of the people in Arunachal Pradesh has improved markedly over the decades.

Shaha / Coursehme	1061	1981	2002	Decline	
State / Country	1901		2002	1961-81	1981-2002
Arunachal Pradesh	126	107	40	19	67
Assam	NA	92	70	NA	22
Tamil Nadu	86	54	44	32	10
Kerala	52	42	10	10	32
India	115	77	64	38	13

Table 3.3: Infant Mortality Rate During 1961-2002

Note: NA means not available.

Source: Economic Survey 2003-04, Government of India (Estimated by the office of the Registrar General of India, Ministry of Home Affairs.)

The sustained reduction in the mortality rate has been made possible by the expansion of medical facilities, the enhanced availability of food and the spread of literacy. Of particular interest is the steady growth of health services in a State where not a single modern hospital existed prior to 1947. Now in all districts modern hospital facilities are available. In a State with an estimated population of 1152 thousand (as on 31st March 2003), the number of hospital beds were 2218 of which the share of the rural areas was 61.14 percent. The number of hospital beds per 10,000 people in Arunachal Pradesh work out to be 19, which is much higher than the national average (9 beds per 10,000 people). The doctor-population ratio in this State is still low; the number of doctors per 10,000 people is only 4 against a national average of 6.

3.3 Educational Infrastructure

From only three schools with an enrolment of thirty students at independence Arunachal Pradesh made a series of breakthroughs in building up an educational infrastructure from the primary to the university level and from the general to the technical education and training. At the first stage primary schools were opened with teachers recruited from outside the State. As the students were passing into higher grades, some of the primary schools with more students and higher potentialities were upgraded to the middle, then secondary and higher secondary levels. The first college in the State was founded in 1964 and when a number of colleges were already functioning a university was established in 1984. A Regional Institute of Science and Technology also came into being in 1984.

S1.N	Type of Institutions	Number	Enrolment		
0	Type of institutions		ST	Non-ST	Total
1	University	01	389	154	543
2	Arts and Science Colleges	07	3820	1473	5293
3	Engineering Institute*	01	-	-	-
4	Higher Secondary School	74	8263	3465	11728
5	Secondary School	130	17870	6718	24588
6	Middle School	348	40908	15199	56107
7	Primary School	1325	126257	40426	166683
	Total	1886	197507	67435	264942

Table 3.4: Educational Institutions in Arunachal Pradesh as on 31st March 2003

*North-Eastern Regional Institute of Science and Technology. Dash means not available

Source: Statistical Abstract of Arunachal Pradesh, 2003, Directorate of Economics and Statistics, Government of Arunachal Pradesh, PP 34-37.

The data in table 3.4 show the number of educational institutions and students under each type in Arunachal Pradesh. The total enrolment in the State was as high as 265 thousand with an estimated population of 1152 thousand as on 31st March 2003. The students constituted 23.00 percent of the State's population. This is higher than the national average. In the country students constituted 19.36 percent of the total population in 2000. In the State ST students constituted 74.55 percent of the enrolment though the estimated ST population was 64.34 percent of the total. The ST students were as high as 26.65 percent of the ST population. In case of general category students, the percentage was much lower at only 16.42 of the population. The relatively low enrolment population ratio among the general category is due to the fact that the working age-group is proportionately higher among the migrant-dominated non-ST than among the total as well as ST population.

Instead of enrolment-population ratio if gross enrolment ratio is considered we get a clear picture. During 2001-02 the gross enrolment ratio at the primary level (classes I-V) for the 6-11 age group was as high as 114.43 per cent in Arunachal Pradesh against the national average of 96.30 per cent (Government of India 2004, P.S-100). In case of girls the gross primary enrolment ratio was 103.84 per cent in the State against the national average of only 86.91 per cent. Arunachal's relative position does not change if the gross enrolment ratio for the classes VI-VIII is considered. In this case Arunachal's gross enrolment ratio is 70.02 per cent against the national average of 60.20 per cent.

3.4 Growth in Literacy

From almost a total illiteracy Arunachal Pradesh has moved up in the literacy scale with a considerable speed. In 1961 only 7.13 per cent people of Arunachal Pradesh were literate against the country's 28.30 per cent. In the subsequent decades, the literacy rate in Arunachal Pradesh rose rapidly to reach 54.74 per cent in 2001, a rate which does not compare very badly with the national average of 65.38 per cent. During 1961-2001, Arunachal's literacy rate rose by 47.61 percentage points against the country's 37.08 percentage points. The yearly rise in literacy rate in Arunachal Pradesh was 1.17 per cent points which, however, does not appear to be high. However, the national performance was much low even than Arunachal's. In the country the yearly rise in literacy was only 0.93 percent points during this period. If literacy rate continues to grow at the rate experienced during 1961-2001 then it will take this State 38.68 years to reach total literacy.

Year	Literacy	rate (%)	Difference	Changes in Literacy rate	
	Ar.P	India	Difference	Ar.P	India
1961	7.13	28.30	21.17	-	-
1971	11.30	34.45	23.15	4.17	6.15
1981	25.55	43.57	18.02	14.25	9.12
1991	41.59	52.21	10.62	16.04	8.64
2001	54.74	65.38	10.64	13.15	13.17

Table 3.5: Growth of Literacy in Arunachal Pradesh and in the Country

Source: Different Population Censuses of India (Arunachal Pradesh).

N.B: Ar. P means Arunachal Pradesh.

As shown in table 3.5 the growth in literacy was lower in Arunachal Pradesh than in the country during the 1960s. In the 1970s and 1980s Arunachal's performance surpassed the national standard and in the 1990s Arunachal's relative achievement dropped almost below the national average. In spite of a considerable growth in literacy Arunachal Pradesh remains to date one of the least literate states in the country. Among the 35 states and Union Territories in the country, Arunachal's rank in literacy was 32 in 2001. Only three states –Bihar, Jharkahand and Jammu and Kashmir– had a literacy rate lower than that in Arunachal Pradesh. With a male literacy rate of 64.07 percent Arunachal's rank is 34 surpassing Bihar's. However, in female literacy Arunachal's rank in 2001 was 30. The five states which are below Arunachal Pradesh in female literacy include Uttar Pradesh, the state which has a long literacy tradition.

3.5 Institutional Changes

The changes in the institutional configurations laid the foundation for investment, better allocation of resources, induction of new technology and economic growth. The main institutional changes are:

Individual Property Rights

Prior to 1947 the ownership of natural resources including agricultural land was, with a few exceptions, community-based. The individual (or family) rights over these resources were subservient to and derivative of the community rights. The right to use natural resources was derived from the community-membership. The community ownership did not generate incentives for investment in natural resources, especially in agricultural land. However, this type of ownership provided the security of livelihood, but at a cost – in the absence of incentives for investment the habits of accumulation could not grow, a lapse which hampered the growth in productivity.

The monetisation of transactions, spread of literacy, appearance of secondary and tertiary sectors, the migration of workers from other states, etc. were instrumental in the emergence of individual property rights in land. The most potent factors in the creation of property rights over income were the employment opportunities in the non-agricultural sectors. Employment in the expanding non-agricultural sectors required educational qualification which is an individual level characteristic. Education empowered the individual and its spread worked as an individualising force. The achievement in education placed one in a separate milieu, the modern sectors, which reduced his dependence on his community. So, in the process of

creation of individual-centred rights and obligations, more appropriately, in the emergence of legal personality in individuals as against the legal personality of the community, the objective conditions (monetisation, emergence of market, inception and expansion of non-traditional sectors, etc.) operated through an individual-level factor, the human capital accumulated through being educated, being skilled and being able to work in the non-traditional sectors of the economy.

The individual property rights involved a change in the social relation. Previously, the kinship occupied the most of the space of human relations; the changes in property rights from being community-centred to being individual-centred created the space for contractual relations. Since contracts weave much of the relations in the modern sector, the emergence of property in land and other resources entailed a transition of the tribal community towards the path of modernisation and urbanisation. In the language of Henry Maine it is a movement from status to contract, a movement which is experienced by all progressive societies (Maine 1906).

Market

The process of monetisation entailed by trade and commerce which grew in as the counterpart of the inflow of Central funds aided the individualisation of the agricultural land and other resources. It was not an unilateral causation; rather there was a mutual causation. The individual property rights facilitated the inception of the market. However, market is still immature in this State. Market for goods and services has developed to some extent but the factor market is still in its infancy. The organized credit market appeared in the State during the 1970s. The beginning was made by the State Bank of India which opened its first branch in the State in December 1971. In the course of several years a good number of branches of nationalised banks were opened in different district headquarters. The Government of Arunachal Pradesh initiated the establishment of a Rural Bank and a Cooperative Bank in order to extend the banking facilities in the rural areas of the State. In order to extend finance to the industrial and service sectors, the Government established Arunachal Pradesh Industrial Development and Finance Corporation in 1977. The urban areas of the State are now well-banked and even in some rural areas banking services have been extended, but the organized credit market is not in a healthy condition. The recovery of bank loans is in general low and the State has the lowest credit-deposit ratio in the country.

Wage Labour

A kind of slavery existed sporadically in Arunachal Pradesh, which was banned by the Government of India after independence. Slavery, the property in man did not
appear in the classic form in this State. The degree of property rights in man was not high. There was no market for slaves. Normally slaves were not saleable and they enjoy many rights. When development activities were initiated after independence, there was no local wage labour. So labourers were brought from other parts of the country and this led to the evolution of labour market in the State.

Land Market

With the emergence of property rights in land, market has appeared in some areas especially for the permanently-cultivated land. However, the property rights in land have got a number of features which limit the extent of commoditisation of land. Some of these features are:

- (a) Land is not alienable to the non-tribals.
- (b) Land can usually be sold to the people belonging to the same tribe; there is a limitation in the transfer of land from people belonging to one tribe to people belonging to the other tribes. Inter-tribal transfer of land is found, of course, in the urban areas, and rarely in the semi-urban areas. In the rural areas it is not normally found.
- (c) The cadastral survey having not been conducted, there is no title deed to the land owned by an individual. In the absence of documentary evidence land cannot be used as collateral for bank loans. This has limited the provision of the bank loans to the farmers. In recent years the Government of Arunachal Pradesh has started issuing land possession certificates. But the problem of disbursing bank loans based on land as collateral still remains. The nonalienability of land drastically reduces its collateral value to the banks.
- (d) Land as property is still highly encumbered. It cannot be freely willed away. The inheritance of land is more or less guided by traditional practices which prefer a particular order of sons, too often, the eldest one, to others. Daughters normally do not inherit the paternal landed property.

In spite of being encumbered the new property rights regime has been able to separate the ownership from the operation of land resulting in its rental market. Land can now be leased out to others for cultivation. Two types of tenancy have appeared: one is fixed cash rental and the other is share-cropping. The rental market has appeared not only in case of land, it is common in other areas. This will be discussed in the chapter on the productivity of capital.

3.6 Technological Changes

Synchronous with the changes in the institutional configurations were the changes in the technological dimension of production, the induction of tools and machines

which entailed changes in the organisation of production, the patterns of employment and growth in the productivity of both labour and non-labour factors of production. The initial operators of the newly-introduced tools and machines were the migrant labourers. In many plain areas of Arunachal Pradesh the bullock-driven plough represents a new technology in agriculture. The jhum cultivators were not accustomed to using it. The agricultural labourers who are considered elsewhere unskilled appeared in the plains of Arunachal Pradesh highly skilled and they became the operators of the bullock-driven plough. Their know-how in wet-rice cultivation was highly demanded. They were employed either as wage labourers or share croppers. Apart from wet-rice cultivation these labourers from other states introduced dairying, especially the rearing and caring of cattle and the milking of cows, the techniques which the autochthonous people of Arunachal Pradesh were not accustomed to using.

The bullock-driven plough and the migrant plough-man spearheaded the permanent cultivation, the agricultural practice which has gradually reduced the relative importance of jhum cultivation. In order to reduce further the incidence of jhum cultivation, efforts were made to popularise the plantation of tea, coffee, medicinal plants, etc. A special emphasis was given to the plantation of different fruit trees. Orange, apple, pear, pineapple, etc. were introduced. In agriculture commercial crops such as mustard, ginger, clove, pepper, etc. were popularised. Thus the induction of new crops and fruits, the introduction of new tools and techniques and the migration of labour with skill in all these tended to create local skill, which in course of time reduced the dependence on migrant labour. The new technology was thus instrumental in the diversification of agriculture.

The agricultural technology brought in Arunachal Pradesh is no doubt new but it did not create much technological discontinuity. In recent years power tiller and tractors have been introduced; but their spread is highly limited. The use of power tillers / tractors in jhum fields is technically not feasible and in the plans also their use does not appear to be economically very attractive. The use of chemical fertilisers, pesticides, etc. has not made much headway. Organic farming remains the most popular practice. The discontinuous technological induction has taken place in the non-agricultural sectors, the sectors which are totally new to the State. Mechanised production system is indeed a quantum jump in technology in a land where cement and mortar were unknown, bullock-cart or horse-driven cart was not used. Perhaps it was the state's topographical condition s preventing the appearance of bullock-cart which has been popular in the plains of the country for more than 2000 years. The non-agricultural sectors propelled by the new technology have paved the way for urbanisation and modernisation which brought in the forces of social dynamics, the basis of economic growth, a subject which is dealt with in the next chapter.

Notes

- (1) Transition from being diverse geographical entities to being a politicoadministrative entity is a major development well cherished by the people of this State. The appellations, NEFTs and NEFA, created some misgivings among many people. To them NEFA sounds bizarre. Arunachal Pradesh, being an integral part of the country, cannot be its agency. Similarly many object to North-East India being called North-Eastern Region, an appellation which exudes only geographic essence, probably a product of dichotomous classification of the country into a heartland and a periphery. North-East India is India, not its agencies or peripheral regions. At every point and at every region of the country exists India and so the preferable appellation is North-East India or North-East Frontier India. (Ideas incorporated here were generated by a discussion with Mr.Tana Showren, a history teacher of Arunachal University).
- (2) The first Population Census in Arunachal Pradesh (then NEFA) was conducted in 1961. Prior to that, census operations could not be conducted in this State because of lack of transport and communication systems and in the absence of an adequate administrative infrastructure. The 1961 population census used two types of questionnaires one all-India questionnaire and the other a truncated one. For the population in the administrative centres the all-India questionnaire was canvassed and for others a simple truncated questionnaire was used. In 1961 census there was no census town. The first full census in the State with the all-India questionnaire was conducted in 1971, almost a century after the first population census in other parts of the country was conducted (of course,1872 census, the first one in the country, was neither synchronous nor its coverage was full and so the first full synchronous census was 1881's).
- (3) Usually the Government of Arunachal Pradesh does not recognise the tribals of other parts of the country as ST in this State. A person belonging to the ST category elsewhere in the county but living in Arunachal Pradesh as a migrant cannot claim ST status from the State Government. Except a few random inclusions, ST category consists of people who are considered indigenous and locally called Arunachal Pradesh ST or APST.

CHAPTER 4

GROWTH AND STRUCTURAL CHANGES

4.1 Structure of Arunachal Economy

One notable characteristic of the Arunachal economy is the rapid evaporation of the primacy of the primary activities, the activities with which the tribal economies are often identified. In the traditional tribal economies of Arunachal Pradesh, the major part of income flowed from the lands, forests and rivers: the slopes of the hills provided the space for jhum cultivation, and the densely-wooded forests rich in game and the perennial rivers abounding with a variety of fishes provided ample opportunities for the harvest of nature⁽¹⁾. Hunting of animals, catching of fish from rivers and lakes, collection of wood, bamboo, edible roots, tubers, vegetables, etc. from forests supplemented income from jhum cultivation. With the launch of the development programme by the Government of India, the picture changed gradually. The dependence on the primary activities decreased: during 2002-03, the primary sector contributed only 36.33 per cent of the State's Net Domestic Product (NSDP). Among the primary activities, agriculture is the most important yielding 29.69 per cent of NSDP in the same year. Forestry and logging contributed only 4.09 per cent of NSDP and fishing yielded as low as 1.15 per cent of NSDP. In Arunachal Pradesh mining and quarrying was never an important income-yielding activity. Till today it has not assumed much significance in spite of the State having been endowed with a variety of mineral resources. During 2002-03 the contribution of mining and quarrying was just 1.40 per cent of NSDP.

Like mining and quarrying, the industrial activities in the State are relatively unimportant. During 2002-03 manufacturing industries contributed only 3.02 per cent of NSDP. The overall contribution of the secondary sector was however, significantly high at 16.23 per cent of the State's net output. Much of this contribution came from the construction activities. The primary and secondary sectors together contributed 52.56 per cent of NSDP during 2002-03, and the rest 47.44 came from the tertiary sector. In the tertiary sector, the public administration is most important. During 2002-03 public administration alone contributed 17.80 per cent of NSDP, a contribution which is higher than that of the entire secondary sector. Trade, transport, storage and communication contributed 6.81 per cent and other services 11.30 per cent of NSDP during 2002-03. The detailed information on the structure of NSDP of Arunachal Pradesh is provided in table A 4.1in the Appendix.

The tertiary sector in the State has emerged as the most important sector in terms of the contribution to NSDP. In this regard, the Arunachal economy bears a similarity to the national economy where the contribution of the tertiary activities marginally exceeds the half of the Gross Domestic Product (GDP). The structure of domestic product in the State and in the country as a whole is shown in table 4.1. In the country the contributions of the primary and secondary sectors are almost the same being about one fourth of the GDP. The average contribution of the primary sector during the three years ending in 2002-03 was 25.60 per cent of the GDP and that of the secondary sector was 24.72 per cent. The tertiary sector's average contribution during this period amounted to 49.68 per cent of the GDP. In Arunachal Pradesh the primary sector carries a significantly higher weight than the secondary sector. During 2000-03, the average contribution from the primary sector was 36.43 per cent and from the secondary sector only 17.08 per cent of the NSDP. Taken together, the contribution of these sectors amounted to 53.51 per cent of the NSDP, the rest 46.49 per cent having been contributed by the tertiary sector.

		SECTORS				
Year	Primary		Secondary		Tertiary	
	Ar. P	India	Ar. P	India	Ar. P	India
2000-01	37.45	26.25	18.54	24.90	44.01	48.85
2001-02	35.47	26.33	16.45	24.37	48.08	49.30
2002-03	36.33	24.31	16.23	24.89	47.44	50.80
Average	36.43	25.60	17.08	24.72	46.49	49.68

Table 4.1: Arunachal and National Economies: A Comparison of Structure of Domestic Product

Note: Relative sectoral contributions of the Arunachal economy are calculated from NSDP and those of the national economy from GDP. Arunachal's Gross State Domestic Product (GSDP) prior to 1990s being not available, NSDP is used throughout this Report. Average is obtained by dividing the sum of absolute sectoral contributions by the sum of NSDP / GDP for three years, 2000-03 and expressing the result in percentage. Ar. P means Arunachal Pradesh.

Source: Estimates of State Domestic Product, Directorate of Economics and statistics, Government of Arunachal Pradesh, 2004 and Economic Survey 2003-04 Government of India.

4.2 Changes in the Structure of the Domestic Product

In the past five decades the Arunachal economy has undergone a substantial structural transformation. At the time of independence the primary sector was all important and the tertiary sector was almost non-existent. It is estimated that during 1947-48 the primary sector contributed 84.95 per cent, the secondary sector 13.05 per

cent and the tertiary sector just 2 per cent of the NSDP (details about the estimation of the sectoral shares of the NSDP for 1947-48, 1950-51 and 1960-61 are given in Note 2 at the end of this chapter). As shown in table 4.2, at the national level the primary sector's share in the composition of GDP was 58.89 per cent against Arunachal's 80.69 per cent in 1950-51. In the same year the size of the tertiary sector in the country was quite substantial being 27.89 per cent of its GDP, but in Arunachal Pradesh this sector was as small as 4.72 per cent of the NSDP. The relative size of the secondary sector was similar in the State and in the country as a whole: Arunachal's 14.59 per cent and the country's 13.22 per cent. During 1950-51 to 2002-03 the share of the primary sector declined in the State from 80.69 to 36.33, the yearly decline being 0.85 percentage points and in the country the decline of the share of the primary sector was less marked being 0.66 percentage points per annum. The most marked expansion took place in case of Arunachal's tertiary sector. This sector contributed 4.72 per cent of the NSDP during 1950-51 and found its share rising by 0.82 percentage points per year to reach 47.44 per cent of the NSDP in 2002-03. In the country the tertiary sector gained by 0.44 percentage points per annum to reach 50.80 per cent of the GDP in 2002-03. The least growing sector in Arunachal Pradesh is the secondary sector whose yearly gain in share is not significantly different from zero.

Table 4.2: Changes in the Structure of Domestic Product: A Comparison of Arunachal Pradesh with the Country

	SECTORS					
Year	Prin	nary	Secondary		Tertiary	
	Ar. P	India	Ar. P	India	Ar. P	India
1950-51	80.69	58.89	14.59	13.22	4.72	27.89
1960-61	70.77	54.55	16.99	16.55	12.23	28.90
1970-71	59.19	48.02	20.33	19.87	20.47	32.11
1980-81	47.28	41.82	22.21	21.59	30.51	36.59
1990-91	46.19	34.93	21.56	24.49	32.25	40.58
2000-01	37.45	26.25	18.54	24.90	44.01	48.85
2002-03	36.33	24.31	16.23	24.89	47.44	50.80

(sectoral shares are in %)

Note: Calculated from the estimates of Domestic Product, Directorate of Economics and Statistics, Government of Arunachal Pradesh different years and Economic Survey 2003-04, Government of India.

* The sectoral shares of Arunachal Pradesh are estimated for 1950-51 and 1960-61. The methods of estimation are detailed in Note 2 at the end of this chapter.

In fact the share of the secondary sector in Arunachal Pradesh rose in the 1950s and 1960s and reached the plateau in the 1970s. In the 1990s the share of this sector fell so that the data of table 4.2 fits well a quadratic time-path as below:

 $SS = 13.233 + 0.548t - 0.0089t^2 \dots (4.1)$ (12.7) (6.2) (5.8) $R^2 = 0.91 \text{ N} = 7$

In equation (4.1), SS is the share of the secondary sector, t is time measured in years with the origin at 1949-50 and the figures in parentheses are t-values which are all significant. The coefficients of t and t^2 show that at small values the effect of t is significantly higher than that of t^2 , but with the rise in t, the effect of t is outweighted by that of t^2 . At the national level the share of the secondary sector rose steadily but in the 1990s it slackened at the face of rising share of the tertiary sector.

When the time-paths of the shares of different sub-sectors are considered, it is found that the shares of all the sub-sectors in the tertiary sector have risen but the picture is different in the sub-sectors of the primary and secondary sectors. The time-paths of the shares of the main sectors of the Arunachal economy are shown in table 4.3.

In the primary sector, the agricultural share as well as the share of forestry and logging has declined significantly, but the shares of fishing, and mining and quarrying have risen. The picture is most dismal in the secondary sector: the rise in the share of manufacturing is insignificant. Manufacturing industry has never been an important sector in the Arunachal economy. However its share in the economy was rising in the 1970s and the 1980s but it declined in the 1990s. In the 1970s the manufacturing share in the NSDP was on average 1.45 per cent. It rose to 6.30 per cent in the 1980s and then declined to 3.97 per cent in the 1990s. In the decade ending 2002-03 the average share of the manufacturing sector in the NSDP was just 3.20 per cent.

As shown in table 4.3 the linear function cannot represent the behaviour of the manufacturing share over time. A quadratic function fits better as shown below:

 $MS = -1.18 + 0.73 t - 0.02 t^{2} \dots (4.2)$ (1.7) (8.0) (7.5) $R^{2} = 0.69 N = 33$

Sl.No	Sectoral Shares	Α	В	R ²	Ν
1	Agriculture	40.76	-0.30	0.53	33
2	Forestry and Logging	19.86	-0.47	0.74	33
3	Fishing	-0.23	0.04	0.92	33
4	Mining of Quarrying	0.19	0.03	0.20	33
5	Primary Sector	60.59	-0.69	0.76	33
6	Manufacturing	2.69	0.07	0.10	33
7	Construction	19.02	-0.07	0.06	33
8	Electricity, gas, etc	-1.35	0.01	0.00	33
9	Secondary Sector	20.36	0.003	0.00	33
10	Transport, storage, etc.	-0.11	0.15	0.44	33
11	Trade, hotel, etc.	3.25	0.09	0.59	33
12	Real estate, etc.	2.45	0.06	0.05	33
13	Banking, etc.	-0.10	0.08	0.86	33
14	Public administration	8.78	0.13	0.17	33
15	Other services	4.78	0.19	0.67	33
16	Tertiary Sector	19.04	0.68	0.79	33

Table 4.3: Time-paths of Sectoral Shares in Arunachal Pradesh: 1970-71 to 2002-03

Note: The values of A and B are obtained by estimating the equation, Y = A+Bt, where Y is the sectoral share (in percentage) and t is time measured in years with origin at 1969-70. N is the number of observations (years).

In equation (4.2), MS is the manufacturing share (in percentage) in the NSDP and all symbols have the same meaning as before. The intercept is significant at 10 per cent level and other coefficients at 1 per cent level. The time-derivative of the estimated function (2) is a decreasing function of time vanishing at t = 18.25. The function is positive when t lies between 1.70 and 34.80 and is negative if t goes beyond this range. This property of the function makes it unrealistic. When terms involving higher powers of t are included in the function the explanatory power of the specification rises but the intercept diminishes into insignificance. It is shown below:

 $MS = 0.0322 + 0.0728 t^2 - 0.0033 t^3 + 0.000001 t^5.....(4.3) (0.08) (8.9) (7.7) (5.8)$

 $R^2 = 0.81 N = 33$

All the coefficients in equation (4.3) are significant except the intercept. The estimated five-degree polynomial is not shown because the coefficients of t and t^4 are

insignificant. The insignificance of the intercept renders the estimation unacceptable. Under the circumstances it is better to accept the trendlessness of the manufacturing share as shown in table 4.3. That is, in the course of the thirty three years, 1970-71 to 2002-03, the manufacturing industries could not expand its relative space in the Arunachal economy. The construction activities have also behaved almost in the same way as the manufacturing industries, showing trendlessness.

The activity which has seen its relative share increasing continuously is the public administration. As shown in table 4.3 the linear trend of the share of the public administration is insignificant. If a convex function is taken to represent the trend, the estimation yields a significant result, as shown below:

 $PA = 13.362 - 0.659t + 0.023t^2$ (4.4) (12.2) (4.4) (5.4)

 $R^2 = 0.58$ N = 33

The second time -derivative of PA is positive which indicates that the time rate of increase in the share of public administration in the NSDP has been increasing over time.

The structural transformation of the Arunachal economy is indeed substantial, but it is loft-sided: the relative importance of the primary activities has declined but this has not been accompanied with a rise in the relative share of the secondary activities. The manufacturing industries have not flourished in the State. It is the expansion of the tertiary sector, more specifically, of the public administration which has been instrumental in the overall structural transformation of the economy.

4.3 Changes in the Sectoral Distribution of Workers

The data of the sectoral distribution of workers in Arunachal Pradesh are available only for three census years: 1971, 1981 and 1991. This limits our analysis to a period of two decades only. During 1971 the workers of all categories numbering 270 thousand formed 58.19 per cent of a population of 464 thousand in the State. The proportions of workers were quite high. In a closed population such a high proportion is less likely. In case of Arunachal Pradesh the migrant workers constituted a significant proportion of total workers. In 1971 about 21 per cent of the population in the State was non-ST, the people who were largely migrant workers of different categories with relatively few dependents. It may be noted that because of temporary nature of their stay, many migrants from other parts of the country do not bring their families in Arunachal Pradesh.

Sl. No	Sectors	1971	1991	Changes	Growth rate
1	Primary Sector	80.44	67.44	-13.00	0.98
2	Cultivators	78.34	60.36	-17.98	0.56
3	Agricultural labourers	1.96	5.13	3.17	6.66
4	Livestock, fishing, hunting forestry and logging	0.14	1.77	1.63	14.70
5	Mining and Quarrying	0.00	.18	.18	24.77
6	Secondary Sector	.44	8.66	8.22	16.72
7	Household industry	0.30	.19	11	-0.56
8	Non-household industry	0.04	2.49	2.45	22.74
9	Construction	0.10	5.98	5.88	22.44
10	Tertiary Sector	19.12	23.90	4.78	2.98
11	Trade and Commerce	0.58	3.30	2.72	10.60
12	Transport, Storage, Communications, etc.	0.00	1.13	1.13	29.98
13	Other Services	18.54	19.47	.93	2.11
	Total	100.00	100.00	.00	1.86

 Table 4.4: Changes in the Sectoral Distribution (in percentage) of Workers

 in Arunachal Pradesh

Note: The distribution of workers is given in percentage. The changes in percentage points are for two decades. Growth rate (in per cent) is average yearly exponential growth rate of the workers obtained by regressing log of workers for three census years (1971, 1981 and 1991) on time. The data used are from population censuses of India (Arunachal Pradesh), Economic tables, 1971, 1981 and 1991.

In 1971 the most dominating sector absorbing the labour force was agriculture. As high as 80.30 per cent of all workers were engaged in this sector. Table 4.4 shows that cultivators were 78.34 and agricultural labourers were 1.96 per cent of all workers. The non-agricultural primary activities were not a significant provider of employment. Livestock rearing, fishing, hunting, forestry and logging employed only 0.14 per cent of the total workers. With the employment in mining and quarrying being almost nil, the primary sector's share in the overall employment in the State amounted to 80.44 per cent. In the course of 20 years the primary sector lost its share by 13.00 percentage points, employing 67.44 per cent of the workers in 1991.

The absolute size of the employment in this sector, however, increased: the yearly average exponential growth of workers being 0.98 per cent during 1971-91.

In the primary sector, the sub-sectoral behaviour differed markedly. The agricultural share in employment declined by 14.81 percentage points to 65.49 per cent of total employment in the economy, but the share of other primary activities increased. In agriculture the share of cultivators declined but the share of agricultural labourers rose. In 1971 the agricultural labourers constituted 1.96 per cent of the total workers in the State. By 1991 their share rose by 3.17 percentage points to reach 5.13 per cent of the total workers. The absolute number of agricultural labourers rose at an average rate of 6.66 per cent per annum during 1971-91. The employment in livestock, fishing, hunting, forestry and logging, mining and quarrying, etc. rose sharply and their relative share in the overall employment in the economy also rose.

During 1971-91 the number of workers in the secondary sectors increased at a rate which was significantly higher than that of the primary or tertiary sector. The average growth rate at 16.72 per cent per annum in the secondary sector employment raised the share of this sector from 0.44 per cent in 1971 to 8.66 per cent in 1991. Among the secondary activities, the employment in the household industry lost its importance both absolutely and relatively. The share of employment in nonhousehold industry and construction rose sharply. In 1971 only 0.04 per cent of all workers were employed in the non-household industries, the industries which were in the process of being established in the 1970s. Most of these industries were smallsized, very few medium and none of them were of large-scale. It may be noted that not a single large-scale industry has yet been established in this State. From being a non-significant source of employment in the 1970s, the non-household industries broadened their employment base in the 1980s. The rate of expansion of employment in this sub-sector was as high as 22.74 per cent per annum during 1971-91. However, in spite of a high expansion, its share in the absorption of workers was still low only 2.49 per cent in 1991. The employment generating capacity of the construction activities, which was also low in 1971, expanded rapidly in the 1970s and slowly in the 1980s. By 1991 construction workers formed 5.98 per cent of the total workers in the State.

The categories of activities which are most non-traditional predominate in the tertiary sector, the sector which has been expanding its employment capacity since independence. In 1971 this sector was a large employer; 19.12 per cent of the workers in the State were employed in this sector. The employment in this sector grew modestly at 2.98 per cent per annum during the 1970s and 1980s and enlarged its

share to 23.90 per cent of overall employment in the economy. In this sector trade and commerce was the highest absorber of workers. From a mere 0.58 percent in 1971, its share in employment rose to 3.30 per cent in 1991 showing a gain of 2.72 percentage points. The workers in other services which include public administration constituted 18.54 per cent of the total in 1971 and saw their numbers rising at the modest rate of 2.11 per cent during 1971-91 to reach a share of 19.47 per cent of all workers in 1991. The working population in the State rose during 1971-91 at an average rate of 1.86 per cent per annum, a rate standing much lower than the growth of the population which was 3.11 per cent per annum. The sectoral distribution of workers decade-wise is provided in table A 4.2 in the Appendix.

4.4 Growth of the Economy

The Arunachal economy grew during 1970-71 to 2002-03 at the average yearly rate of 7.16 per cent. This growth rate is quite high, especially when compared with the national standard. During the same period the national economy grew at the average rate of 4.93 per cent per annum. The growth profiles of the Arunachal and national economies are shown in table 4.5. The Arunachal economy achieved a high growth rate of 7.07 per cent in the 1970s. Compared with this, the GDP grew during this period at only 3.39 per cent per annum.

Daviad	Growth of				
Period	NSDP	NSDP per head	GDP	GDP per head	
1970-2003	7.16	4.26	4.93	2.83	
1970-1980	7.07	4.14	3.39	1.13	
1980-1990	7.81	4.69	5.24	3.10	
1990-2000	4.81	2.40	6.00	4.03	
1993-2003	2.35	-0.0004	5.82	3.96	
1998-2003	1.99	-0.004	4.93	3.16	

Table 4.5: Growth of Arunachal's Income and National Income: A comparism

Note: The growth rate, b, is obtained by estimating the equation, $\log y = a + bt$, where y is NSDP or GDP and t is time measured in years. The growth rate estimated is average yearly rate expressed in percentage. The data on Gross State Domestic Product (GSDP) being not available, NSDP is used.

In spite of a high growth of population in the 1970s – as high as 2.93 per cent per annum – Arunachal's per capita NSDP grew at the rate of 4.14 per cent against a per capita GDP growth of 1.13 per cent only. The growth of NSDP peaked up to 7.81 per cent and the growth of GDP also rose to 5.24 per cent in the 1980s. However, in the

1990s the growth of NSDP declined to 4.81 per cent, while GDP growth rate increased to 6.00 per cent per annum, the highest growth rate ever achieved in any decades. In the decade ending 2002-03 Arunachal's NSDP growth declined further to 2.35 per cent. GDP growth rate during this period also fell, but the fall was only marginal. In this decade Arunachal's NSDP per capita stopped growing; it rather showed the tendency of falling which was, however, statistically insignificant. In the half-decade ending 2002-03 the per capita NSDP fell marginally at 0.004 per cent per annum.

4.5 Sectoral Growth

During 1970-2003 the tertiary sector experienced the highest rate of growth among all the broad sectors of the Arunachal economy – its average yearly growth rate was 9.37 per cent against the primary sector's growth of 5.70 per cent and the secondary sector's 7.14 per cent. In the tertiary sector, the growth of banking and insurance at 17.08 per cent per annum exceeded with a wide margin the growth of all other services. The next in growth was the transport, storage and communication which expanded at the rate of 11.85 per cent per annum. The sectoral growth rates, sectoral shares in the composition of the NSDP and the sectoral contributions to the growth of NSDP are shown in table 4.6.

In the tertiary sector all the sub-sectors grew at a rate which is higher than that of the NSDP. In this sector the least growing sub-sector was the public administration whose growth rate at 8.07 per cent exceeded the growth rate of NSDP by a margin of 0.91 per centage points.

In terms of growth the secondary sector stands in-between the tertiary and primary sectors. Its growth rate of 7.14 per cent is very close to the NSDP's growth of 7.16 per cent. Among the secondary activities, manufacturing expanded most with a growth rate of 10.51 per cent per annum surpassing the growth of the construction activities by a margin of 3.75 percentage points. In Arunachal Pradesh, electricity and gas were purchased from other States and so the overall share of these activities including the water supply is negative in the composition of the NSDP. During 1970-2003 the absolute value of the negative contribution was decreasing and this resulted in a positive growth rate of 1.58 per cent per annum.

In the primary sector fishing expanded at the highest rate: its yearly growth rate at 19.52 per cent surpassed the growth rate of not only all the sub-sectors of the primary sector but also all the sectors and sub-sectors of the Arunachal economy. The next in growth was the mining and quarrying which grew at the rate of 16.74 per cent. The

agricultural growth was moderate being 6.29 per cent per annum. The least growing primary activity was forestry and logging expanding only at the rate of 2.66 per cent per annum.

4.6 Sectoral contributions to the Growth of NSDP

As shown in table 4.6, the highest amount of contribution to the growth of NSDP has come from the tertiary sector. The sectoral contribution to the growth of NSDP being a product of the sectoral share and sectoral growth rate, the tertiary sector's highest contribution despite its share in the composition of the NSDP being not highest, is due to its highest sectoral growth. Compared with the tertiary sector's contribution of 44.19 per cent of the growth of NSDP, the primary sector contributed only 35.00 per cent. The rest of the contribution amounting to 20.81 per cent came from the secondary sector. Among all the sub-sectors two can be singled out in terms of their contributions to the economic growth: agriculture in the primary sector and construction in the secondary sector. Agriculture contributed as high as 27.75 per cent compared with the construction activity's contribution of 15.49 per cent. The third contributor was public administration from which came 11.46 per cent of the growth of NSDP. Though fishing topped all sectors and sub-sectors in terms of growth, yet its contribution to the growth of NSDP was small – just 1.93 per cent. This is because of its small share in the composition of the NSDP. Moreover, the high growth of fishing, and mining and quarrying is due to their small base. Even after growing at high rates, the shares of these activities in the aggregate level of the economy remain small. Similarly, in spite of a high growth of manufacturing, its contribution to the growth of NSDP remains small – only 5.54 per cent. Like fishing, and mining and quarrying, the manufacturing activity's high growth was due to its small base.

The only sub-sector which contributed negatively to the growth of NSDP is the electricity, gas and water supply. Of course the amount of negative contribution is small, being only -0.22 per cent of the growth of the NSDP. The sectoral contributions to the process of economic growth show that the tertiary sector has played the leading role. In this sector the role of the public administration has been the highest. The secondary activities, especially the manufacturing industry remains very small in its contribution to the formation of the NSDP as well as its growth. Almost everywhere the manufacturing industry is found to act as the leading sector in the process of economic growth. The situation in Arunachal Pradesh is atypical; here the expansion of the secondary sector has not led to the growth of the tertiary sector.

Rather the expansion of the tertiary activities has taken place autonomously without being supported by the secondary and primary sectors.

Sl. No	Sectors	Growth rate	Share of NSDP	Share of Growth of NSDP
1	Agriculture	6.29	33.83	27.75
2	Forestry and logging	2.66	9.43	3.27
3	Fishing	19.52	0.76	1.93
4	Mining and quarrying	16.74	0.94	2.05
5	Primary Sector	5.70	44.96	35.00
6	Manufacturing	10.51	4.04	5.54
7	Construction	6.76	17.58	15.49
8	Electricity, gas, etc.	1.58	-1.06	-0.22
9	Secondary Sector	7.14	20.56	20.81
10	Transport, Storage, etc.	11.85	3.36	5.20
11	Trade, hotel, etc	9.26	5.15	6.21
12	Real estate, etc.	11.71	3.48	5.32
13	Banking, etc.	17.08	1.64	3.65
14	Public administration	8.07	11.73	12.35
15	Other services	9.63	9.12	11.46
16	Tertiary sector	9.37	34.48	44.19
	NSDP	7.16	100.00	100.00

Table 4.6: Sectoral Contributions to the Growth of NSDP in Arunachal Pradesh: 1970-2003

Note: Growth rate is yearly average expressed in percentage. The share of NSDP and that of growth of NSDP are also expressed in percentage.

Notes

(1) When the common property resources (CPR) are available in abundance the harvest of nature involves the least effort in obtaining the necessary consumables. As the scarcity of CPR creeps in, production becomes necessary. Das (2004) found that the catching of fish from the rivers, lakes and other natural water bodies is very popular in Arunachal Pradesh and in spite of favourable conditions many people do not go for pisciculture – they prefer the naturally-grown fish to the cultivated one.

(2) The estimation of domestic product in Arunachal Pradesh began from 1970-71, so the sectoral shares for 1950-51 and 1960-61 are estimated in order to make a comparison with the national average. The trend equations are used in estimation. Using the data on the domestic product and its sectoral composition for the period 1970-2003, the trend equations are estimated as

P = 60.594 - 0.688t;	$R^2 = 0.76$	N = 33
S = 20.364 - 0.0031t;	$R^2 = 0.00$	N = 33
T = 19.042 – 0.685t;	$R^2 = 0.79$	N = 33

Here P is the percentage share of the primary, S is that of the secondary and T of the tertiary sectors, t is time measured in years with the origin at 1969-70, N is the number of observations (years) and the period covered is 1970-71 to 2002-03. The fitness of P and T are reasonably good but S has not behaved linearly at all.

Based on these equations, the estimated values for 1950-51 are

P = 73.67; S = 20.31 T = 6.01

The value of P is too low and that of S is too high. Given this problem, a solution is obtained by considering the trend of the 1970s. The estimated equations for the decade 1970-71 to 1980-81 are

P = 63.103 - 1.295t	$R^2 = 0.50$
S = 19.142 + 0.239t	$R^2 = 0.70$
T = 17.755 + 1.056t	$R^2 = 0.71$

The estimated values for 1950-51 are

P = 87.72 S = 14.59 T = -2.31

The estimated value of T is absurd but the value of P is too high. However the value of S is plausible. As a way out, the arithmetic mean of the underestimation of P (73.67) and its overestimation (87.72) is taken. This yields 80.69 which, added on to 14.59, the plausible value of S, gives 95.28. As a residue the value of T is then obtained (100 - 95.28 = 4.72). The same method is applied to obtain the estimated sectoral shares of 1960-61.

A little exercise further enables us to have an idea about the sectoral shares in 1947-48. The estimated values for this year are

	A	В
Р	75.73	91.60
S	20.30	13.05
Т	3.97	-5.48

The values under A are obtained by using the trend lines for the period 1970-71 to 2002-03 and those under B are obtained from the trend lines for the 1970s. The value of T under B is absurd. Here we can use the information that at the time of independence the modern tertiary sector was almost non-existent. It may be noted that the banking services in the State began during the 1970s with the establishment of the branches of the State Bank of India in December 1971. So we can assume safely that in 1947-48 the share of the service sector was at best 2 per cent of the domestic product. Using this value for T and the value of S under B we obtain 2+13.05 = 15.05. As a residue, P's share turns out to be 84.95. All these values appear realistic. The arithmetic mean of values of P under A and B is 83.67 which differs from 84.95 by 1.28, not a very significant difference. So we can accept 84.95 as the share of the primary sector in 1947-48. The estimated sectoral shares for this year are

$$P = 84.95$$
 $S = 13.05$ $T = 2.00$

CHAPTER 5

A MODEL OF ECONOMIC GROWTH WITH THE CENTRAL GRANTS AS THE CAUSE OF CAUSES OF GROWTH

Though the search for identification of the sources of economic growth is as old as economics, the initial efforts had to remain satisfied, in the absence of data, with the qualitative description and the specification of the functional forms relating the different factors involved in the process of growth. It was only after the Second World War that the availability of data on national income entailed many efforts to quantify the contributions to growth emanating from different sources. The outcome of these efforts is the growth of a vast literature which is commonly known as the growth-accounting (Abramovitz 1993, Solow 2000). The seminal work on growth accounting came from Solow who based his accounting on the neo-classical model formulated by him earlier (Solow 1956, 1957). Solow's estimation, based on the U.S. data for the period 1909-49, showed that the capital per man-hour contributed a meagre 12.5 per cent of growth and the rest came from other sources. These 'other' sources remained for some time unidentified and this gave rise to speculations as to whether the huge amount of unaccounted contribution could be attributed to human capital or technology or total factor productivity. Denison's subsequent works included a good number of variables apart from capital and labour, and it was found that the area of unidentified sources had shrunken significantly (Denison 1995).

Growth accounting is formulated to quantify the relative contributions to growth rendered by various factors such as physical and human capital, technology, etc., and its standard unit is a country. At the national level the growth-contributing factors are the ultimate sources originating indigenously. However, what is ultimate for a national economy may not be so for a sub-national or State economy. In a federal system, the central government may effect the transfer of resources horizontally in order to reduce the inter-State economic disparities. In the presence of the centrally-effected resource transfer a State with a low income and a very low rate of savings may find its rate of accumulation relatively high. Moreover, the free flow of factors especially labour among the States may sever the relationship between the natural growth of population and the growth of the labour force which may, to a large extent, be affected by migration. Given this situation, it may not be illuminating to just relate the growth of income to the accumulation of capital, expansion of

labour force, etc. In order to complete the task the sources of growth of capital and labour should be highlighted. Keeping this in view efforts are made to prepare a model of growth for the Arunachal economy. Naturally the specificities of the Arunachal economy are incorporated in the model. However, with a few changes, the model develops a fair measure of generality which makes it suitable for application to other special category hilly States heavily dependent on the Central funds not only for their economic growth but also for their sustenance.

In Arunachal Pradesh, it was the inflow of Central funds after independence, which stirred its traditional static economy into the dynamic world of growth. The Central funds mainly in the form of grants were instrumental in monetizing the economy hitherto practising barter and raising the capital-intensity of production. The creation of different infrastructural facilities induced the migration of skilled, semi-skilled and even un-skilled labourers into this State from other parts of the country. So the growth-initiating factors were shaped by the Centrally-effected resource transfer and in subsequent years the economic growth was sustained by the inflow of funds from the Centre. The growth-stirring as well as growth-sustaining role of the Central funds demands that in modelling the economic growth of the State, the determination of this inflow should be highlighted.

The flow of Central funds to a State is determined by the complex interplay of a host of factors involving the constitutional provisions, political process and development needs. In case of Arunachal Pradesh, its strategic location, hilly terrains, tribal population and relatively backward conditions are important factors in the determination of the Central grants. However, geographical location and ethnicity are not time-variant and so it is the relative socio-economic conditions of this State which appear to be more relevant than others in controlling the Centrally-effected resource transfer. The criteria used by different finance commissions vary and the fund-allocation criteria of the different plans are also not fully invariant. What is desirable is deriving a stable relationship between the Central grants and its determinants. A simple function specifying the grants from the Centre (G) is

$$G = F_1 (Y_a / Y, P_a / P, U)$$
(5.1)

where Ya is the per-capita State income, Y is the per capita national income, Pa is the State's, P the country's population and U is the error term. The relationship between G and Pa/P is a simple one: the first partial derivative of G with respect to Pa/P should be positive. But the relationship between G and Ya/Y is involved: as long as Y>Ya, G and Ya/Y should be positively related; once Ya exceeds Y the rate of growth of G should be negatively related to Ya/Y. So the relationship between the rate of

growth of G and Ya/Y may not be linear; a functional form quadratic in Ya/Y may better capture the relation. The specific functional form of G is discussed in the next chapter dealing with empirics.

The inflow of funds induced the growth of a proto labour market populated mainly by the migrants from other States of the country. In the traditional economy of the State there was no wage labour. The development activities created labour demand which raised the wage rate in the State above what obtained in other parts of the country. This is captured in the function:

 $Wa/W = F_2 (G, Li)....(5.2)$

where Wa is the wage rate in Arunachal Pradesh and W is the national wage rate, more appropriately, the wage rate in the areas from which migrant labourers came to the State. Li is the local labour force, more properly wage labour. Wa/W is positively related to G and its relation to Li is negative. As the local labour force grows, the wage differential between Arunachal Pradesh and other parts of the country should decrease. It is better to be more precise. G induced the growth of a wedge between Wa and W in the absence of local wage labour in Arunachal Pradesh. As the flow of grants continues, boosting investment and the local wage labour grows, Wa and W vary, with the direction of variation depending upon the rates of growth of labour force in and outside the State in relation to their rates of investment. As the rate of growth of wage labour (li) in the State catches the rate of accumulation of capital effected mainly by the inflow of Central funds, its wage rate stops growing which reduces the differential between Wa and W.

The initial development works of the Government were manned largely by the inflow of the migrant labor (Lm) which is related to Wa/W:

 $Lm = F_3 (Wa/W).....(5.3)$

The relation of Lm to Wa/W is positive – a rise in Wa/W leads to a flow of workers from other States of the country. The relation between G and Lm is not direct; G affects Lm through the medium of Wa/W. A part of Lm constitutes the skilled manpower such as teachers, technicians, etc.

The inflow of funds is used to finance the construction of infrastructural facilities: roads, transport system, hospitals, schools, etc. The important infrastructural factor which spear-headed the process of human capital formation in the State was the establishment of schools. The function relating the educational institutions (S) to its determinants is

 $S = F_4 (G, Lm)....(5.4)$

S is hypothesized to have positive relationship with both G and Lm. So far as Lm is concerned a mutual causation seems to be plausible. The demand for teachers was created by the establishment of schools. The schools could be opened, on the other hand, because the migrant teachers were available. The Central funds made possible both of these – the establishment of schools and financing their running. So multicollinearity between G and Lm exists but it may not be serious.

The outcome of the establishment of the schools is the spread of education (E) captured in the relation:

 $E = F_5 (S, YP)....(5.5)$

where YP is the per capita State income. Both S and YP are related positively to E.

The migration of labour from other States along with spread of education led to the changes in the agricultural practices. The technology of agriculture tended to change, albeit at a slow pace, with the extension of permanent cultivation resulting in the relative decline in the importance of jhum cultivation. The next function relates permanent cultivation to the migration of labour and the growth of human capital in agriculture (H):

 $P_L = F_6 (H, Lm)....(5.6)$

It is the inflow of grants (G) and the agricultural modernisation as captured in the extension of permanent cultivation (P_L) which determined the accumulation of capital (K) in the State:

 $K = F_7 (G, P_L)....(5.7)$

The total labour force (L) in the State consists of the migrant workers (Lm) and local workers (Li):

L = Lm + Li......(5.8)

Lastly, the production function for the State is set as

 $Q = F_9(K, L, T)....(5.9)$

where Q is the State's domestic output and T is technology.

The model establishes a chain-like relation. With eight equations and one definition (equation no. 5.8) it determines the time-paths of eight endogenous variables, *G*,

Wa/W, Lm, S, E, PL, K and Q. Exogenous in the model are the national income, population of both the State's and the country's and the wage rate in other States. Of course, the migrant component of the labour force (Lm) is determined in the model. Since the local component of the labour force (Li) is exogenous in the model, the determination of the aggregate labour force remains outside its scope. The model is empirically tested and the results appear in the next chapter.

CHAPTER 6

EMPIRICAL TESTING OF THE MODEL

6.1 Forms of Inflow from the Centre

Inflow of funds from the Centre which placed the Arunachal economy on the growth-path took various forms. All these can be classified into three broad categories: (a) the Central grants-in-aid, shares of Union taxes and loans which flow into the consolidated fund of the State Government, (b) Central Government's direct expenditure in the State, and (c) the expenditure of the autonomous bodies under the Central Government. Because of the very few offices of the Central Government or of the Central account or on account of autonomous institutions of the Centre is relatively small. In a strategically-located State with a long international border, there is substantial military presence involving a good amount of Central expenditure but accounting for it is indeed a highly complicated task. So we focus only on the Central funds flowing into the hands of the State Government to be spent by it. Table 6.1 shows the composition of the Central funds flowing to the State Government. The proportions of three main inflows – the State's share of Union taxes, grants-in-aid and loans appear in table 6.1 for selected years.

Year	Percentage of the inflow					
i cui	Tax	Grant	Loan	Inflow		
1987-88	25.18	67.87	6.95	100		
1989-90	17.76	70.11	12.13	100		
1990-91	22.72	66.85	10.43	100		
1994-95	23.00	70.75	6.25	100		
2002-03	11.52	82.17	6. 31	100		

Table 6.1: Composition of Inflow in Arunachal Pradesh from the Centre

Note: Estimated on the basis of data from different years' budgets of the Government of Arunachal Pradesh.

The composition of inflow of funds from the Centre for all the years available is shown in Table A 6.1 in the Appendix. During 1986-2004, the period for which

detailed information on the composition of inflow is available, Arunachal's share of Union taxes constituted on average 19.72 per cent of the Central funds flowing into the hands of the State Government. The lowest percentage of the share of Union taxes was 3.32 in 1987-88 and the highest percentage was 34.01 in the year 1999-2000, showing variations within a range of 30.69 percentage points. The percentage of the Central tax component in the inflow has no linear trend as shown in equation (6.1).

$$CT = 22.45 - 0.29t \dots (6.1)$$
$$R^{2} = 0.04$$
$$CA = 71.11 + 0.25t \dots (6.2)$$
$$R^{2} = 0.02$$
$$CL = 6.44 + 0.04t \dots (6.3)$$
$$R^{2} = 0.002$$

In these equations, CT is Arunachal's share of Union taxes as the percentage of the inflow from the Centre, CA is grants-in-aid and CL is the loan from the Centre, and the number of observations (years) is 18. The grants-in-aid, the predominant part of the inflow, formed on average, during 1986-2004, 73.48 percent of the total. The loan component during the same period was, on average, 6.80 per cent of the inflow from the Centre. Thus the taxes and grants-in-aid were together 93.20 per cent of the Central funds flowing to the State Government. Like the proportion of the share of Central taxes, the proportions of grants-in-aid and loans show trendlessness as provided in equations (6.2) and (6.3). Thus the relative importance of the different components of the Central funds has remained more or less the same during the period being studied.

6.2 Central Funds and State Finance

The three components – share of Union taxes, grants-in-aid and loans – together constitute the most important part of the total receipt of the Arunachal Government. During 1986-2004 the inflow from the Centre was on average 84.41 percent of the total receipt of the State Government and the rest, 15.59 percent came from the State's own taxes, non-tax revenue and loans from sources other than the Central Government. The part derived from the Central sources varied from a high of 90.73 per cent to a low of 75.71 per cent of the State finance during 1986-2004. The relative importance of the Central Funds in the State budget has been declining but the rate of decline is very slow. As the estimated equation (6.4) shows, the share of the

Central funds in the State finances fell, during 1986-2004, on average by only 0.48 percentage points per annum.

CF = 88.99 - 0.48t(6.4) $R^2 = 0.35$ N = 18

where CF is the percentage share of the Central funds in the total receipt of the Arunachal Government, t is time measured in years with the origin at 1985-86 and N is the number of years covered. In the triennium 1986-89, the Central funds formed 88.53 per cent of the State finance and in the last triennium of our study 2001-04, the centre financed 79.06 per cent of the State budget. The year-wise data on the share of the Central funds in the Arunachal Government's finance is shown in table A 6.2 in the Appendix.

6.3 Sources of Arunachal Government's Finance

The imposition of tax is a recent phenomenon in Arunachal Pradesh. The agricultural land still remains untaxed; nowadays only urban land has been brought under the tax net. Sales tax in the State has only passed its infancy. Its coverage is very low. Now, of course, its scope is being widened to achieve the norm of minimum rate parity with other States. The widening of the tax net in the State is reflected in the rise of the proportion of tax in the revenue.

Receipt	Growth rate	Mean r	Mean y	P r	Ру
Tax	16.84	3.43	2.93	0.46	0.39
Non-tax	-0.02	8.55	7.43	-0.31	-0.39
Revenue	4.74	11.98	10.36	0.15	-0.00
Other loan	14.95	3.61	3.06	0.33	0.28
State Res.	6.60	15.59	13.42	0.48	0.28
Central tax	2.13	16.68	14.53	-0.33	-0.56
Central Grant	3.48	62.05	53.46	-0.13	-1.12
Central loan	0.05	5.68	5.23	-0.02	-0.05
Central funds	3.15	84.41	73.22	-0.48	-1.73
Total Receipt	3.73	100.00	86.64	0.00	1.45

Table 6.2: Changes in Relative Importance of different Revenues in
Arunachal Pradesh: 1986-2004

Note: All receipts are in real terms. State Res is the sum of tax, non-tax and other loan. Other loan is the sum borrowed by the State Government from sources other than the Central Government. Growth rate is relative in percentage per year. Mean r is the arithmetic mean of a particular receipt as the percentage of the total receipt and Mean y is the arithmetic mean of a receipt as the percentage of the NSDP. Pr is the time-rate of change in the proportion of different receipts (given in percentage) and Py is the time-rate of change of receipt-NSDP ratio (expressed in percentage).

During 1987-88 the taxes constituted 7.04 per cent of the revenue (both tax and nontax) collected in the State. The proportion of tax increased steadily to reach a percentage of 67.57 during 2002-03. During the 18 years ending in 2003-04 the percentage of tax in total revenue collected by the State Government averaged 26.94 and the rest 73.06 percent was contributed by the non-tax revenue. The yearly rise in the percentage of tax in the total revenue was on average as high as 3.11 as shown in equation (6.5).

> TR = -2.58 + 3.11t(6.5) R² = 0.71 N = 18

where TR is the percentage of tax in total revenue collected by the State Government.

In spite of a significantly high growth in tax revenue the relative importance of taxes in the total receipt of the State Government remains very small. As shown in table 6.2 the State's tax revenue during 1986-2004 constituted on average just 3.43 per cent of total receipt of the Government. The tax and non-tax revenue together formed during the same period an average of 11.98 per cent of the total. The State's loans from sources other than the Central Government constituted 3.61 per cent of the receipt. The total collection from non-Central sources – tax and non-tax revenue, and loans – by the State Government amounted to an average of 15.59 percent of its finance and the rest 84.41 per cent came from the Centre during 1986-2004. The tax-NSDP ratio was, on average, 2.93 percent, the non-tax revenue-NSDP ratio was 7.43 percent, and the total receipt-NSDP ratio stood as high as 86.64 percent during the same period. This shows the magnitude of the weight carried by the Government in the economy. Of the total receipt-NSDP ratio of 86.64 percent the grants-in-aid by the Central Government constituted as much as 53.46 per cent and the other Central sources contributed 19.76 percent.

6.4 Growth in Finances

During 1986-2004, the real tax revenue in the State grew at the yearly average exponential rate of 16.84 per cent which is the highest rate of growth among all sources of revenues to the Government. The loan from sources other than the Central Government also showed a very high growth (14.95 per cent per annum). The receipts from all sources show positive growth, except the non-tax revenue which in real terms declined at the rate of 0.02 per cent per annum. Because of the high growth in tax and loans from non-Central sources, the State Government's resources (from non- Central sources) grew at the yearly rate of 6.60 percent, as shown in table

6.2. In comparison to this, the funds from the Centre grew only at the rate of 3.15 percent per annum. Of all the three Central components, the grants-in-aid showed the highest growth – its yearly average growth rate being 3.48 per cent. During the period 1986-2004, the State Government diversified its sources of borrowings reducing its dependence on the Central Government. As shown in table 6.2, the percentage of Central loan in the total receipt declined at the yearly average rate of 0.02, and the Central loan as the percentage of NSDP declined at the rate of 0.05 per year.

6.5 Reduced Relative Dependence on the Centre

The relative importance of the Central funds in the State budget has declined markedly in recent years but it still remains high. As shown in table A 6.2 in the Appendix the funds from the Central Government constituted as high as 75.71 percent of the total receipt during 2002-03 and in the triennium ending 2003-04, the three components of the Central funds formed 79.06 percent of the receipt side of the State budget. Of this percentage the contribution from the grants-in-aid was 64.01 and the rest 15.05 was almost equally divided between loans and advances from the Central Government (7.31) and the share of Union taxes (7.74).

6.6 Enhanced Dependence on Loan

In the past, loans and advances were not an important element of the Arunachal Government's finance. In 1987-88 the loans from both the Central and non-Central sources constituted only 5.67 per cent of the total receipt. In the triennium ending in 1988-89 the loan component was 6.76 per cent of the State finance. In the following years the relative importance of the loans increased and in the triennium ending in 2003-04, the loan component formed as high as 13.08 percent of the total finance of the State Government. During 1986-2004 the loans and advances constituted, on average, 9.29 per cent of the State finance, and the growth in the share of loans and advances averaged 0.31 percentage points per annum.

6.7 Diversification of Loan-Finance

Arunachal Government's singular dependence on the Central funds has reduced – of course, in the relative, not in the absolute sense–not only in case of non-loan finances, but also in loan finances. During the triennium 1986-89 the loans and advances from the Central Government were 79.74 per cent of the total loans and the rest 20.26 per cent came from other sources, mainly financial institutions. In the course of the next 18 years the share of Central loans was reduced to almost half. During 2001-04, the

Central loans formed 54.51 per cent of total loans and the rest 45.49 percent came from other institutions. The trend of the share of the Central loans and advances is shown in the following estimated equation:

CLP = 86.48 - 2.49t....(6.6) $R^2 = 0.41$ N = 18

where CLP is the Central loans and advances as the percentage of the State's total loan finances, t is time measured in years with the origin at 1985-86, and N is the number of years covered. The fall in the share of loans and advances from the Centre is quite high as the estimated coefficient of t shows in equation (6.6). The Central share in the Arunachal Government's loan-finances averaged during 1986-2004 at 62.82 per cent. It is quite high. It is only in the recent years that the State Government has enhanced its borrowings from the non-Central sources.

The analysis above is based on the Arunachal Government's budgets. It covers a period of 18 years from 1986-87 to 2003-04. Arunachal's Statehood came in 1986-87. Detailed financial information relating to Arunachal Government prior to 1986-87 is not available. The Central funds in a combined form are available with some breaks from 1970-71 to 1985-86. By estimating the figures for the missing years, a continuous time-series for the Central funds flowing to the Arunachal Government has been constructed. These funds do not include loans and advances from the Central Government. The estimation of missing data for a number of years weakens, to some degree, the analytical force but the alternative was not available. The period 1986-2004 becomes too short to carry out an in-depth statistical analysis. Moreover, for the year 2003-04, the budgetary data of the Arunachal Government are provisional and the income data for the State are non-available. This reduces further the utility of the period 1986-2004 which offers detailed information. So at the cost of the details and by accommodating the estimated information, the period of analysis is extended to 1970-71 the year which saw the beginning of domestic product accounting in Arunachal Pradesh.

The Central funds being considered now do not include, as Stated before, the Central loans and advances. Taxes whose shares are included in the Central Funds have a very slender base in Arunachal Pradesh. In the first place income tax is not imposed on the tribal people of the State and the manufacturing industry being insignificant, the Union excises collected from it are too low to carry much weight. So the Central funds represent mainly grants. Henceforth, for brevity we call Central Funds 'grant' and inflow synonymously and use the symbol G for it.

6.8 Time-shape of the Central Inflow

The inflow of funds from the Centre had a very healthy growth during the 1970s and 1980s. In the 1990s the growth rate declined markedly. The growth rate of the real inflow (the nominal inflow divided by the NSDP deflator) during 1970-2004 was 4.71 per cent per annum. The growth rate of the grant per capita was 1.84 per cent. The growth in per capita terms turned low because of the high growth of population in the State, which amounted to 2.87 percent per annum during this period. Table 6.3 shows the decadal growth rates of the grant and of the population in Arunachal Pradesh.

The grant climbed a new height in the 1980s, rising at the rate of 6.42 per cent per annum, a rate which surpassed the rate of the 1970s by a wide margin of 1.21 points. The 1990s witnessed the grant expanding slowly at a rate almost half the previous decade's. The growth rate declined further in more recent years. During the decade ending 2002-03 the growth rate was reduced to 2.28 percent and in the half decade ending in 2002-03 the growth rate turned into almost insignificance. If the year 2003-04 whose data are provisional is included then the growth rate turns significantly high for the last decade / half decade.

In spite of a high growth rate of population in the State, the grant per head increased during the 1970s and 1980s at a high rate. In the 1990s the per capita grant seemed reluctant to grow; the decadal growth rate was as low as 0. 85 percent per annum. In the decade ending in 2002-03, the per capita grant declined by 0.11 percent per annum. If the year 2003-04, is included, then during 1994-2004, the negativity of the growth rate is replaced by an insignificant positive rate of 0.05 per cent per annum. The data for 2003-04 change the half decadal growth very drastically. Its exclusion makes the last half decade end in 2002-03 and during this period, the grant per head has a steep fall of 2.16 per cent per annum. The inclusion of 2003-04 so that the half-decade coincides with 2000-04 pulls the growth rate of the grant per head not only from negativity but pushes it to a high positive value of 1.52 per cent per annum.

Period	Annual Growth Rate (in percentage) of		
	Grant	Per Capita Grant	Population
1970-2004	4.71	1.84	2.87
1970-80	5.21	2.28	2.93
1980-90	6.42	3.30	3.12
1990-2000	3.27	0.85	2.42
1993-2003	2.28	-0.11	2.39
1994-2004	2.44	0.05	2.39
1999-2003	0.23	-2.16	2.39
2000-2004	3.91	1.52	2.39

Table 6.3: Growth of Grant, Per Capita Grant and Population in Arunachal Pradesh

Note: The growth rate is relative, estimated by fitting the equation, $\log y = a + bt$, where y is the variable whose growth rate is to be estimated, b is the growth rate and t is time in years. The projected population of the years beyond 2001 is estimated by using the inter-censal growth rate of 1991-2001.

6.9 Auto-Regressive Structure of the Inflow

The inflow of funds from the Centre is path-dependent with a significant autoregressive structure. More specifically, the current year's inflow (Gt) shows a strong relationship with the previous year's inflow (Gt-1) as provided in equation (6.7).

$$Gt = 1190.08 + 1.01 Gt - 1 \dots (6.7)$$

$$(0.8) (25.2)$$

$$R^{2} = 0.95 N = 33$$

The figures in parentheses are t-values and N is the number of observations, spanning the period 1970-2003. The intercept in equation (6.7) is insignificant but the coefficient of Gt-1 is highly significant. Its value in the neighbourhood of unity and the high value of R^2 indicate that the inflows of the two consecutive years are closely related. Measured by the value of R², the fitness improves if the inflows are transformed into their logarithms, as shown in the estimated equation (6.8).

log Gt = 0.27 + 0.98 log Gt-1(6.8) R² = 0.97 N = 33 As before, the intercept is insignificant, and the coefficient of log Gt-1 is highly significant. The coefficient of log Gt-1 gives a simple interpretation. It being a measure of elasticity implies that a one-per cent change in current year's inflow will entail a 0.98 per cent change in the next year's inflow.

The current year's level of inflow is related to the previous year's level, and also the logarithms of their levels are significantly related. But the current year's absolute changes do not carry any significant relationship with the previous year's absolute changes. This is show in equation (6.9).

 $\Delta Gt = 1527.05 - 0.11\Delta Gt-1$ (6.9) R² = 0.02 N = 32

The coefficient of Δ Gt-1, the previous year's absolute change in the inflow, is insignificant. The very low value of R² indicates the independence of the current year's change with the previous year's (the negative coefficient of Δ Gt-1 may tempt one to conclude that the current year's large increase in the inflow will exert a concretionary effect on the next year's inflow, but this conclusion is not warranted by the insignificance of the coefficient of Δ Gt-1). This implies that the absolute changes in the inflow do not follow a simple time-path. This is shown in the estimated equation (6.10).

$$\Delta Gt = 602.16 + 58.07 t$$
(6.10)
R² = 0.03

The arithmetic mean of Δ Gt is Rs. 1647.4 at the constant prices of 1993-94. That is, during 1970-2003, the average yearly expansion of the inflow was to the tune of Rs. 1647.4, but the yearly changes did not follow a linear trend. In fact, the changes have a more complicated time-structure, as shown in equation (6.11).

$$\Delta Gt = 2791.77 - 0.24 \Delta Gt - 1 - 0.55 \Delta Gt - 2 \dots (6.11)$$
(4.0) (1.2) (2.9)
$$R^2 = 0.24 \qquad N = 31$$

The coefficient of Δ Gt-1 is insignificant but that of Δ Gt-2 is significant at 5 per cent level. The very low value of R² does not enable us to make any conclusion but what seems to be alluring is that the changes of the two consecutive years are not related strongly but the change has a negative lagged effect. The current year's changes do not affect much the next year's changes but they tend to affect negatively the changes

that take place after two years. Given the complicated nature of time-structure of changes, which is not captured properly in equation (6.11), it is pertinent to relate the current year's level of inflow with several year's levels. This is done in equation (6.12).

$$Gt = 3225.21 + 0.75 Gt - 1 - 0.33 Gt - 2 + 0.55 Gt - 3 + 0.02 Gt - 4....(6.12)$$

$$(2.2) \quad (3.6) \quad (1.4) \quad (2.3) \quad (0.1)$$

$$R^{2} = 0.97 \qquad N = 29$$

The coefficient of Gt-4 is not significantly different from zero and the significance level of the negative coefficient of Gt-2 is 17 per cent. A slashing of Gt-4 seems to improve the specification and this is done in equation (6.13).

$$Gt = 2850.35 + 0.77 Gt-1 - 0.34 Gt-2 + 0.56 Gt-3 \dots (6.13)$$

$$(2.1) \quad (4.8) \quad (1.6) \quad (3.5)$$

$$R^{2} = 0.97 \qquad N = 30$$

The significance level of the coefficient of Gt-2 has now improved to 12 per cent. As shown by equations (6.12 and 6.13) the current year's level of inflow is strongly influenced by the previous year's level but the inflow that took place two years ago has a negative influence upon the current year's inflow. (Because of high significance level (12 per cent), this statement requires a tone-down). However, the inflow that took place three years ago has a definite positive influence upon the current year's inflow. The opposite sign of the coefficients of Gt-2 and Gt-3 tends to make the interpretation somewhat difficult. A simplification is achieved by taking the difference of Gt-2 and Gt-3. This is done in the specification (6.14).

$$Gt = 3032.00 + 0.98 Gt - 1 - 0.52 (Gt - 2 - Gt - 3) \dots (6.14)$$

$$(2.1) \quad (27.2) \quad (3.2)$$

$$R^{2} = 0.97 \qquad N = 30$$

The intercept and the coefficients are now significant at 5 per cent level, and so this specification is acceptable. The current year's grant affects the grants in subsequent years in two ways: one is through its level and the other is through its change. The level effect is positive and the change effect is negative

6.10 Pure Level Effect

The current year's level effect upon the next year's level is not, of course, full; it is 98 per cent. Its effect upon the 2^{nd} year's level will be $(0.98)^2$, upon the 3^{rd} year's $(0.98)^3$, and so on. The effect is transmitted through a geometric progression, its effect after t years is $(.98)^t$, and t > 0. The current year's level effect upon the 10^{th} year's level will be $(0.98)^{10} = 0.8171$ or 81.71 per cent and upon the 20^{th} year's level, the effect will be 66.76 per cent. So the level effect declines rather very slowly. Its rate of decline, the first derivative of $(0.98)^t$ with respect to t is $(0.98)^t * \log (0.98)$ which can be reduced to $-0.0202 \ (0.98)^t$, -0.0202 being the natural logarithm of 0.98. The rate of decline is indeed small. The mathematical derivation of the level and change effects appears in Noteat the end of this chapter.

6.11 Change Effect

The change effect transmits itself through a lag. A rise in the current year's grant has no change effect upon the next year's level of grant. It will have negative effect upon the level of second year's grant. As a part of the level of the second year's grant, it will have effect upon the third year's and so on. If the current year's change is X, then in the second year, the effect is -0.52 X, in the third year, the effect is -0.98 * 0.52 X, and in the nth year, the effect will be $-(0.98)^{n-2} * 0.52 X$ and $n \ge 2$. If X is positive, all its chain-like effects will be negative. So an expansion has a negative, and a contraction a positive effect upon the subsequent years' levels of grants.

The autoregressive structure of the inflow of funds from the Centre seen in terms of its level and change effects tends to reflect the basic problems of the utilisation of the fund in a State which has a low absorption capacity. A rapid absorption of funds received from outside requires the availability of many complementary inputs including a well-developed administrative apparatus and efficient institutional infrastructure. In Arunachal Pradesh, some important complementary inputs, such as man-power, especially the organizational and technical skill, physical inputs such as raw materials, etc. were not readily available. The administrative and institutional infrastructure was in the formative stage. All these factors stood in the way of rapid utilisation of the Central funds. A delayed utilisation of a higher allocation resulted in a cut in the subsequent allocations. The cut came not immediately, only after a lag. A reduced allocation, on the other hand, made a noticeable effect on the running of the existing projects in the absence of local resources. So a reduction in allocation resulted in the enhancement of the subsequent allocations with, of course, a lag. The lag is also partly the effect of time-taking nature of decision-making which automatically causes some delay especially in financial matters. Thus a positive

change causes a negative, and a negative causes a positive change in the subsequent inflow of funds.

The positive level effect is to be explained by factors which go beyond the State. The level of funds allocated to a state depends on its socio-economic conditions compared with those of other States of the country. A rising national income, among many others, is an important factor raising the level of grants to a state which is lagging behind. In what follows the determinants of the inflow of Central funds are highlighted.

6.12 Determinants of Grants

The specific functional form of 5.1 (chapter 5) selected to determine the inflow of funds from the Centre during 1970-2003 is as follows:

$$G = \exp(b_0 + b_1(y_a/y) + b_2(y_a/y)^2 + b_3(p_a/p) \dots (6.15a)$$

The selection of this functional form is dictated by two factors: firstly, the independent variables are ratios; the magnification of the effect of a ratio is possible through an exponential function and secondly, to reduce the intensity of auto-correlation. We have seen before how strongly the inflow of Central funds is autocorrelated. Equation (6.15a) can be rewritten as

$$\log G = b_0 + b_1 (y_a/y) + b_2 (y_a/y)^2 + b_3 (p_a/p), \dots (6.15b)$$

The least squares estimation of equation (6.15b) gives

$$\begin{array}{l} \log \, G_t = 4.05 + 0.021 \, (y_a/y)_t - 0.00010 \, (y_a/y)_t^2 + 54.45 \, (pa/p)_t, \dots \dots (6.15c) \\ (16.8) \ (3.1) \qquad (2.6) \qquad (20.4) \\ R^2 = 0.99 \qquad N = 33 \end{array}$$

All the parameters of (6.15c) are significant at 5 per cent level. In spite of a suitable functional form the estimated equation suffers from a serious autocorrelation. The first order autocorrelation of the error term is as high as 0.995 and the first order autoregression is

 $e_t = -0.344 + 1.02 e_{t-1}$,(6.16) $R^2 = 0.991$ N = 32

where et is the estimated error of Gt ($t = 1, 2, \dots, 32$).

The autoregressive structure of the error term reflects that of the Inflow of funds (G) as shown in equation (6.17).

All the parameters except the coefficient of et-2 is significant at 5 per cent level. In a higher order auto regression all terms beyond et-3 are insignificant. Since the coefficient of et-2 is insignificant, but that of et-3 is significant, we can take the difference of et-2 and et-3 in the auto regression. This yields

All the parameters of (6.18) are now significant. Apart from the problem of autocorrelation there is some multicollinearity between ya/y and pa/p. The simple correlation coefficient between these two is 0.83, significant at 5 per cent level. However the problem of multi-collinearity is not as severe as that of the autocorrelation. In order to avoid the problem of autocorrelation, the Cochrane-Orcutt method is used in the estimation. The suitablility of this method is found in the fact that the coefficient of et-1 is much higher than those of others. The Cochrane-Orcutt method yields the following estimation:

$$log Gt = 3.95 + 0.025 (y_a/y)_t - 0.00012 (y_a/y)_t^2 + 54.01 (p_a/p) \dots (6.15d)$$
(13.8) (3.0) (2.6) (18.1)
$$R^2 = 0.98 \qquad D.W. = 1.83 \qquad N = 32$$

As indicated by the value of Durbin-Watson (D.W.), the autocorrelation of the disturbance term has been reduced to insignificance. The ratios are all given in percentage, and all the parameters are significant at 5 per cent level. The growth of the inflow with respect to ya/y is positive, but with respect to $(ya/y)^2$ is negative. This implies that as ya/y increases from a low level, the overall effect of (ya/y) and $(ya/y)^2$ combinedly is positive because of the coefficient of (ya/y) being higher than that of $(ya/y)^2$. As the ratio ya/y becomes higher and higher, the effect of $(ya/y)^2$ exceeds (ya/y) and their combined effect becomes negative. As expected, the coefficient of Pa/P is positive.

It will be more illuminating if the time-derivative of log Gt is taken. Indicating the time-derivative of Gt by \dot{G} and leaving aside the subscripts in order to avoid clumsiness, we have

$$\frac{\dot{G}}{G} = 0.025 \text{ ya/y} \left[\frac{\dot{y}a}{ya} - \frac{\dot{y}}{y} \right] = 0.00024 \left[\frac{ya}{y} \right]^2 \left[\frac{\dot{y}a}{ya} - \frac{\dot{y}}{y} \right] + 54.01 \frac{pa}{p} \left[\frac{\dot{p}a}{pa} - \frac{p}{p} + \frac{\dot{y}a}{p} \right]$$

The impact of the quadratic term can be seen now clearly. If ya/ya < y/y, the first term will be negative and the second term positive so that the combined effect will be negative because of the low value of the coefficient of $(y_a/y)^2$. Empirically, the relationship between \dot{G}/G and y_a/y_a is not a one- but a two-way process. Through the medium of a number of factors, \dot{G}/G affects y_a/y_a positively. In the next sections the impact of G will be dealt with.

Grants in Action

The initiation of the development activities by the Government of India created the demand for various inputs, but there was no local market to supply the provisions. Even local wage labour was not available in the initial stage. So all provisions including labour had to be brought by the Government from other parts of the country.

6.13 Emergence of Labour Market and the process of Monetisation

In order to induce the outside labourers to migrate to Arunachal Pradesh, incentives had to be given. The Government provided the workers the incentives in the form of allowance, rent free accommodation, etc.

The Data

The secondary data on the wage-differential between Arunachal Pradesh and the other states being not available, a mini-survey was conducted in the Itanagar-Naharlagun region of the State. A total of 25 migrant workers from Assam and North Bengal, who have been living in Arunachal Pradesh at least since the 1980s were interviewed. All these people were basically agricultural labourers in their origins, Assam and North Bengal. Now many of them are engaged as share-croppers. Some of them work as agricultural labourers during the peak season and in slack seasons they work as rickshaw pullers/porters or construction workers. We collected information not only relating to the interviewees but also to other migrant people who, by now have left Arunachal Pradesh. Since the data relate to the past, the recall
lapse was common. Moreover, the interviewees provided information for a period covering more than a year. After conjoining the data of overlapping periods, the time-series covering all the years from 1970-71 to 2002-03 was constructed. The quality of the data is reasonably good but the usual caveat on the dependability of the regionally-confined small sample remains.

The survey shows that in the beginning of the 1970s the yearly wage income of a migrant agricultural labourer was around 24 per cent higher in Arunachal Pradesh than in Assam and North Bengal, the areas from where most of the migrant labourers of Arunachal Pradesh had come. With the passage of time local people tended to participate in the infant labour market. With the steady growth of the migrants and the local workers the wage differentials between Arunachal Pradesh and Assam / West Bengal declined over the years. In 2003 the wage earnings of a typical migrant agricultural labourer was around 6 per cent higher in Arunachal Pradesh than that of his counterpart in Assam. The wage-differentials in other sectors and activities agree with that in the agricultural sector. In the public sector, the employees are given the inner-line allowance and rent-free accommodation and it is this extra allowance which keeps the wage / salary rate higher in Arunachal Pradesh than in the plains. To a certain extent the higher wage rate in this State is matched by a higher price level. Even after allowing for the price-differential, wage rate (real wage / salary rate) appears higher in Arunachal Pradesh than in the plains of Assam, West Bengal or Bihar.

Monetisation

The development activities monetised the barter economies of this State in two ways: (a) local workers and suppliers of other inputs received payments in cash, and (b) the migrant people mainly workers spent part of their income on locally produced goods. In both ways cash went to the hands of the local people. Gradually the extraction of resources especially forest resources was started and those were sold outside the State, which also acted as an important channel of inflow of currency and accelerated the process of the monetisation of the different tribal economies and their integration into what is now the Arunachal economy. In the whole process of monetisation and emergence of market, specially the labour market, the Government expenditure played the primary role. The behaviour of the relative wage rate (Wa*100/W), Wa being the wage rate in Arunachal Pradesh and W in the plains of Assam / West Bengal is captured in the following equation:

 $Wa/W = 1117.84 - 85.18 \log li + 5.10 \log G \dots (6.19a)$ (7.4) (5.9) (5.10) $R^{2} = 0.91 \qquad N = 33$

In (6.19a), li is the size of local workers. There is some autocorrelation whose value at 0.85 gives a D.W. value of 0.30. Using Cochrane-Orcutt method, the following estimates are obtained:

 $Wa/W = 891.09 - 63.94 \log li + 1.60 \log G \dots (6.19b)$ (5.4) (4.4) (0.8) $R^{2} = 0.49 \qquad D.W. = 1.58$

All parameters except the coefficient of log G are significant at 1 per cent level. The extraction of autocorrelation leads to the coefficient of log G being insignificant. The growth of local labour force appears to be highly significant in the determination of the relative wage in Arunachal Pradesh. The emergence of the labour market is, no doubt, related to the inflow of funds and in that sense the growth of the labour force may be related to the inflow but that relation is not explored in the model developed – the growth of autochthonous population and labour force is treated throughout this Report exogenously.

The specification (6.19a) is simplistic, and incorporates the situation prevailing in the 1950s and 1960s but its parameters are estimated using the data for the period 1970-2003. The non-availability of data prior to the 1970s creates the mismatch between what is asserted in the theoretical relationship and what data are fed to yield its parameters. Another variable not included is the effect of the migration from the rest of the country upon its relative wage rate. It is this variable, more appropriately the cumulative migration which might have reduced the wage differential between this State and others.

6.14 Migration of Workers

The effect of the inflow-generated wage-differential entailed the migration of workers from other parts of the country. The estimated relation is

$$\Delta \log Lm = 0.344 + 0.0032 (W_a/W) \dots (6.20)$$
(6.4) (7.4)
$$R^2 = 0.62 \qquad N = 32$$

Here Lm is the estimated number of migrant workers in Arunachal Pradesh (migrant workers are from other parts of the country). The coefficient of (W_a/W) is significant at 1 per cent level.

6.15 Establishment of Educational Institutions

The inflow of Central funds was used to create the infrastructural facilities in this State. The segment of infrastructure which played the most basic role in the socioeconomic changes in the State is the educational facilities. In the estimation, the educational institutions are proxied by the number of pre-primary and primary schools (S). The estimated equation is:

$$log S = -2.29 + 0.88 log G + 4.27 \Delta log Lm \dots (6.21)$$
(3.6) (15.24) (3.3)
$$R^{2} = 0.94 \qquad N = 32$$

All parameters of (6.21) are significant at 1 per cent level. G, the inflow from the Centre and Lm, the migrant manpower from other parts of the country which are arguments in equation (6.21) are related, but their relation is not direct. G raised the wage rate in Arunachal Pradesh above what existed elsewhere and it is this higher wage rate which acted as the pull factor for migration of workers of various types of skill. In the initial stage almost all the teachers in the State were migrants from other parts of the country. Equation (6.21) shows that the establishment of educational facilities in the State was determined largely by the factors which are of supply origin – the demand factors remained passive at least in the initial stage.

6.16 Spread of Education

With the expansion of educational facilities, literacy in the State started growing. With hardly any literary tradition, the State found its newly-founded educational institutions attracting the students even from remote areas. The establishment of hostel facilities in what is called the inter-village school and provisions of stipends to the students staying in the hostels were instrumental from the supply-side in the spread of education in this State⁽²⁾. The demand for education came from a number of sources. The establishment of direct administration created a strong demand base for educated local people. The opening of the facilities in the secondary sector added another dimension to the job opportunities for the educated local people. All these demand-side factors are proxied by per capita income (Y_P). Measured by literacy rate (E), the spread of education in the State is related to the schooling facilities (S) and per capita income in the following way:

log E = 5.81 + 0.75 log S + 0.47 log Y_p(6.22) (25.3) (7.9) (5.9) $R^2 = 0.98$ N = 33

All the parameters in equation (6.22) are significant. This is neither a supply nor a demand function; it is a 'mongrel' containing both the demand and supply factors.

6.17 Improvement in Agricultural Practice

The major change which took place in the agricultural practice in the State is the steady expansion of the permanent cultivation and the relative decline in the low productive and technologically stagnant jhum-production. Permanent cultivation which can accommodate new technologies, both bio-chemical and mechanical, has opened new possibilities in the Arunachal economy. The spread of this agricultural practice has been more or less rapid which is relatively new in the State. In 1970-71 only 24.31 percent of the net sown area of 115 thousand hectares was under permanent cultivation and the rest under jhum cultivation. The area under permanent cultivation rose by 186.34 per cent in the next 35 years to reach 48.84 per cent of the State's net sown area in 1995-96. The net area sown under jhum cultivation declined in this period by 3.69 per cent to form 51.16 per cent of the total net sown area in 1995-96. Because of the cyclical nature of jhum cultivation, the net sown area under this practice constitutes a small part of the total area operated under it. In 1995-96, the net sown area under jhum cultivation was just 35.92 per cent of the operated area under this practice. Compared with this, the net sown area under permanent cultivation was in the same year as high as 73.00 per cent of the total permanently-cultivated area under operation.

In the construction of conceptual framework in the previous chapter, the expansion of permanent cultivation was functionally related to the growth of human capital and the migration of labour skilled in permanent cultivation. The measurement of human capital is a difficult task; the literacy rate may be a proxy, one which is not quite satisfactory, but in some cases, capable of serving the purpose at hand. In Arunachal Pradesh educational spread and its deepening in different directions such as engineering, medical and public health, etc. have been the main vehicles of human capital formation. However, agriculture in this State has not been able to attract human capital, the educated local manpower. Human capital has deserted agriculture to be employed mainly in the fast-expanding tertiary and partly in the slowly expanding secondary sector. Instead of generalised human capital whose effect upon agricultural modernisation in the form of the expansion of permanent cultivation is no doubt deep, but difficult to quantify, a specific type of human capital accumulated through learning not only at the educational institutions and at the demonstration centres or the extension centres of the Government but by gaining practical experiences in the field is taken. So human capital in agriculture (H) is measured by cumulative learning and experience in this area. There are many ways of measuring learning achieved in any particular activity.

The most illustrated and widely-used methods in the measurement of learning are Verdoorn's cumulative output and Arrow's learning-by-doing (Verdoorn 1956; Arrow 1962). Arrow took cumulative gross investment as the measure of learning. As a measure of learning Arrow's method seems to be more sophisticated than Verdoorn's in view of the fact that investment activity generates learning more than any other part of income. Investment and consumption are final activities originating from output, but the part of outcome devoted to consumption may not generate much learning. So the cumulative gross investment as a measure of learning appears more acceptable than Verdoorn's cumulative aggregate output. However, the nonavailability of data on investment in the Arunachal agriculture stands in the way of adopting Arrow's elegant approach. So Verdoorn's cumulative output method of learning is used. Again the data on gross value added in agriculture being not available the cumulative net value added in agriculture is used. Two problems beset this measurement. One, already mentioned, is the consumption part of output which is included in the measurement of learning. The second one is the inclusion in the measure the output from jhum cultivation. When jhum cultivation is considered a non-progressive practice, the method which not being capable of accommodation much technological innovations invites its replacement by a better method, the settled cultivation, inclusion of its output in a device of learning measure weakens the exercise. But the output of permanently-cultivated land is not available and this restricts the choice.

The cumulation of value added is done from 1970-71, the year of beginning of domestic product accounting in the State. So the cumulation is highly truncated. The estimated equation is

$$log PL = 7.72 + 0.28 log H + 0.77 (\Delta log Lm) \dots (6.22)$$
(5.6) (2.6) (0.13)
$$R^{2} = 0.35 \qquad N = 32$$

In equation (6.22) the coefficient of log H is significant but that of (Δ log Lm) is not. The overall explanatory power of the specification is also low, as shown by R² carrying a value of only 0.35. The main reason for a low fitness of (6.22) seems to be the crude nature of both the arguments. The crudity of H, the variable measuring learning has been discussed above; the crudeness in the measure of labour skilled in permanent cultivation requires some mention. Lm is the number of non-ST (migrant) workers in Arunachal Pradesh (all non-ST workers are not migrants; some non-ST workers are non-migrants, born of migrant parents in Arunachal Pradesh). A refined measure of migrant workers engaged in permanent cultivation could perhaps explain better, but the agricultural labour force / cultivators are not classified in the census along the lines of agricultural practice, the permanent and jhum. Lm consists of all non-ST workers ranging from the high-level technologists to the cleaners. In spite of Lm being statistically insignificant, it is to be emphasized here that in the extension of permanent cultivation the migrant workers have been instrumental; it is these people who in many plain areas of the State worked as sharecroppers and agricultural labourers. They introduced the varieties of seeds suitable for permanently-cultivated land and diffused the improved agricultural practices in this State. So the agricultural modernisation has been inseparably connected with the migrant agricultural workers.

6.18 Capital Accumulation

The growth of permanent cultivation, the spread of banking facilities, and the deepening of administration along with the inflow of funds from the Centre are hypothesised to promote the capital accumulation. To date no estimate of the growth of capital in the State has been made. In the absence of data an attempt is made to estimate the quantity of capital and its growth over time. As mentioned already, the amount of capital used in production prior to the launch of the development programme by the Government of India was extremely small in Arunachal Pradesh. With the induction of new technology, improved methods of production and especially with the emergence of the secondary and tertiary activities, the capital intensity in production increased gradually.

Estimation of Capital

In the estimation of capital, the Government's capital expenditure is taken into account. In the 1950s and 1960s the Government's capital expenditure was high. No continuous time series is however available. So information of a discontinuous time series is taken into account to estimate the quantity of capital for the year 1969-70. The amount is five times the estimated NSDP of that year. For the subsequent years, the period for which NSDP data are available, the value of net investment is derived from the net value added in some selected sectors as follows:

Investment = 0.9 * C + 0.8 * M + 0.7 * (MQ) + 0.75 * (OS) + 0.8 * (THR)(f 6.1)

where C is net value added in construction; M is net value added in manufacturing; MQ is net value added in mining and quarrying; OS is net value added in other

services and THR is net value added in trade, hotels and restaurants. The value of net investment estimated for 1970-71 is added to the value of capital estimated for 1969-70. A yearly depreciation of 4 per cent is used to derive the current year's value of capital from the previous year's. The value of investment obtained by formula (f 6.1) is used for the period 1970-86. Since 1986-87 the detailed budgets and continuous series of capital expenditure by the Government are available. So for the period 1986-2003 investment-NSDP ratio and Government's capital expenditure-NSDP ratio are combined by using weighted average.

The data on capital, investment, etc. for the selected years are presented in table 6.4. The complete data set can be found in table A6.3 in the Appendix. The estimated investment was on average 29.47 per cent of the NSDP during 1970-2003. The Government expenditure on capital account was on average 29.69 per cent of the NSDP during 1986-2003. The question may arise as to why the two investment ratios, one obtained from the value added in some sectors and the other from the Government's capital expenditure, are not added to derive the investment-NSDP ratio. This is not tenable in view of the fact that the Government's capital expenditure is unlikely to add directly to production capacity of the economy. Its effect is rather indirect and diffused. The investment figures obtained by using formula (f6.1) seem to be quite plausible as it represents the part of output which is saved and invested to enhance the production capacity of the economy.

Year	I-Ratio1	Kexp- Ratio	I-Ratio ₂	Invest	Capital
1970-71	24.51	-	24.51	3220	63980
1974-75	22.04	-	22.04	3422	67998
1980-81	30.84	-	30.84	7677	86747
1986-87	29.50	35.83	30.77	12906	125223
1990-91	34.32	32.88	34.03	20038	169933
1994-95	29.64	29.95	29.70	23634	230382
2000-01	29.80	19.94	27.83	27582	330676
2002-03	30.93	20.86	28.92	28990	360062

Table 6.4:	Capital	Estimation	for A	runachal	Pradesh:	1970-71	to	2002-0	3
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Note: I-Ratio is the investment-NSDP ratio (in percentage) and Kexp-Ratio is the capital expenditure of the Government as the percentage of the NSDP. I-Ratio² is the same as I-Ratio¹ for the period 1970-71 to 1985-86. For the period 1986-87 to 2002-03, I-Ratio² is the weighted average of I-Ratio¹ and Kexp-Ratio with 80% weight assigned to I-Ratio¹ and 20% to Kexp-Ratio. Invest is the volume of investment in lakh of Rs at the constant prices of 1993-94 and capital is in lakh of Rs. at the constant prices of the same year.

The process of capital formation has been facilitated by the institutional development – the monetisation of the economy, the financial intermediation, etc. – and this aspect is taken care of by the percentage of NSDP originating from public administration, banking and insurance. The estimated equation is as follows:

$$log K = 0.54 + 0.031 (PA) + 1.15 log G - 0.055 log (PL) \dots (6.23)$$

(0.1) (14.8) (3.7) (0.9)
$$R^{2} = 0.96 \qquad N = 33$$

In equation (6.23), K is the estimated value of capital, (PA) is the percentage of NSDP contributed by public administration, banking and insurance, and (PL) is the permanent land (net sown area in hectares). The intercept is not significant nor is the coefficient of (PL), the variable which is the measure of modernisation of agriculture in the State. Rather surprisingly, the coefficient of (PL) has a non-positive value. This is unexpected. It seems that the process of agricultural modernisation has not served the purpose of accumulation of capital; the relationship between them has not been complementary. Instead of boosting capital accumulation, the extension of permanent cultivation seems to have rather compressed it. The reason is the rising value of plain land in the State. The establishment of individual property rights in land and its emergence as an income-earning asset has rendered it a substitute for capital. Many people with the investable surplus have tended to purchase land or invest in the improvement of community-owned land which, in due course, became their property.

6.19Estimation of Aggregate Production Function

The method of capital estimation for Arunachal Pradesh has already been discussed. In order to estimate the aggregate production function for the State two more variables are to be estimated. One is labour and the other is technology; both have grown in the State substantially. Like capital, the estimation of aggregate employment and technology is quite involved. Here efforts are made to arrive at some estimates which may not be fully satisfactory, but can serve the purpose at hand.

Estimation of Employment

The only source of data on workers in Arunachal Pradesh is the population census. The number of workers and their occupational classification are available for the State from 1971 to 2001. These data are used as the basis to estimate the labour years, the person years spent on working. First, the inter-censal growth rate is used to estimate the number of workers for all intervening years. This way the size of working population for all inter-censal years between 1971 and 2001 is found out. Then the growth rate of workers during 1991-2001 is used to estimate their numbers for 2002 and 2003. This yields a unbroken time-series from 1971 to 2003. The next step is to derive a time-series of employment.

The census data on workers are their head counts, a measure of their stock which does not shed light on their efficiency, intensity and the distribution on the basis of the duration of work requirung different qualities. The census total is, therefore, a statistical magnitude, a sum of heterogeneous units, the units which belong to different occupational categories with different levels of productivity. The use of aggregate number of workers without transforming them into person years or worker years through a homogenisation process is a gross error. Two different problems stand united here. One is the transformation of workers into some standard units of homogeneous quality and the other is the conversion of these homogeneous units into person years of employment. The task is tough. It requires detailed information on the productivity of different categories of workers. In the absence of data on productivity, their wages and salaries can be used. But wages / salaries reflect productivity (more appropriately marginal productivity) only in a perfectly competitive environment. In an economy dominated by the public sector, the wages and salaries can hardly reflect productivity.

In order to show a sample of complexities involved, workers are classified into three broad categories corresponding to their sectoral employment status – which, however, are not their occupational categories. If now a worker of one sector is selected and his productivity is known, then the workers of other sectors can be converted, on the basis of their productivity, into the selected sector's equivalent workers. This is illustrated with the 1991 census data of workers and sectoral distribution of NSDP in Arunachal Pradesh in that year. The workers refer to a point in time, on 1st March 1991 and NSDP refers to the fiscal year ending 31st March 1991. The numbers of workers are not re-estimated for 1st October 1990 to make it commensurable with the flow of NSDP. Table 6.5 shows the sectoral distribution of workers and NSDP. Column 4 of the table shows the relative output (NSDP) per worker. It is obtained by dividing column 2 by column 3.

Sector	Share (in %) of	Share (in %) of	Relative	Equivalent scale		
	NSDP	Workers	output per worker	P =1	S =1	T =1
1	2	3	4	5	6	7
Primary	46.19	67.44	0.68	1	0.27	0.50
Secondary	21.56	8.66	2.49	3.66	1	1.84
Tertiary	32.25	23.90	1.35	1.99	0.54	1

Table 6.5: Illustration of Homogenisation of Workers: 1991

Note: P is Primary, S is Secondary and T is Tertiary sector.

If a primary sector's worker is used as the standard unit, then a worker of the secondary sector becomes 3.66 equivalent units and a worker of the tertiary sector becomes 1.99 equivalent units. Similarly a worker of the secondary or tertiary sector can be used as the standard unit and equivalent scales can be prepared.

But the remedy seems to be worse than the problem. This is because of the highly protected nature of the market in Arunachal Pradesh. In this State 80 per cent Government and public sector jobs are reserved for the ST people and no licence or permit is issued to the non-tribal people. The size of the Government is very high relative to the size of the economy. During 1990-91, the aggregate Government expenditure in the State was 93.67 per cent of the NSDP. In recent years the public expenditure as the proportion of the NSDP has fallen to some extent, but still it is very high. In 2002-03, the latest year for which the data are available, the Government expenditure formed 80.75 per cent of the NSDP. The Government's dominance of the economy along with the highly protected, and at the same time, immature market renders the use of any equivalent scales presented in table 6.5 almost meaningless. Another problem involved in the process of homogenising of labour with the help of its productivity is the endogenising of labour, an exogenous variable,

Crowded with all these problems, the homogenisation effort is abandoned and a simple scale is prepared to transform the workers into the employment units. Based on information provided by the number of manufacturing units in operation, their strength of workers and the migration rate of non-tribal people obtained from census, employment conditions in the economy are derived. A situation of full-employment, the limiting case, is put a value of unity. Actual employment normally lies below it. The scale provided in table A 6.4 in the Appendix varies from 0.80 to

0.93. The lowest value, 0.80 was in 1996-97, when the Supreme Court's restrictions on the felling of trees created industrial doldrums in Arunachal Pradesh forcing widespread closure of its industries, many of which were timber-based. The numbers of workers are multiplied by the scale to obtain the time-series of employment for 1970-2003.

Estimation of Technical Progress

In Arunachal Pradesh the technical change has not gone through a continuous process; there has taken place a series of saltations or jumps. There was no bullock cart nor horse cart in the days before the independence. The age of steam-engines passed by; then suddenly came, in the post-independence period, the internal-combustion engines, and motorised vehicles. In agriculture the jhum fields never saw a wooden plough; in the 1960s came in this State power tillers and then tractors. The bullock driven ploughs became common in the plains of the State. Compared with other parts of the country, the level of technology in production is not high in Arunachal Pradesh but compared with the levels prevailing half a century ago, the current position is indeed very high in this State. The spread of technological change has been quite uneven. The jhum cultivation still depends on the traditional technology of production and much of industrial production uses simple technology.

Given the discontinuous nature of technological change, the quantification of each year's technological content of production is a problem. This problem of discontinuity is by-passed by a simple approximation. The cumulative manufacturing production is taken to be a proxy for the technological progress in the State. Again the cumulation of output is done since 1970-71. The estimated production function is as follows:

 $log Y = -3.91 + 0.62 log K + 0.46 log L + 0.16 log T \dots (6.24)$ (1.2) (6.8) (1.6) (3.8) $R^{2} = 0.98 \qquad D.W. = 1.6 \qquad N = 33$

Here Y is the NSDP at constant prices of 1993-94, K is capital, L is labour and T is the measure of technology. Parenthesised figures are, as stated before, t-values. Equation (6.24) is estimated by using the Cochrane-Orcutt method in order to remove the problem of autocorrelation. The removal of autocorrelation has, however, raised the significance level of the intercept and the coefficient of L: the significance level of the intercept is 25.78 per cent and that of the coefficient of L is 11.16 per cent. We accept that the intercept might not be much different from zero and its antilog not different

from unity. This, by itself, indicates that the total factor productivity in the State has not grown much. This is rather unusual. Of course, the answer may lie in the significant value of the coefficient of T (technology) – the growth in efficiency arising from the accumulation of human capital, the rising economies of scale brought about by the sectoral distribution of workers, etc. might be absorbed in the coefficient of T. The coefficient of capital may also share in this absorption.

Returns-to-Scale

The returns-to-scale of the production function (6.24) is 1.24. This implies that a one per cent increase in all inputs – K, L, and T – raises the output by 1.24 per cent. The elasticity of output with respect to capital is significantly higher than that of output with respect to labour. This shows that in the capital scarce Arunachal Pradesh, capital has a handsome productivity, a point which will be explored in chapter 8. Freed from log, the production function appears as

$$Y = e^{-3.91} K^{0.62} L^{0.46} T^{0.16}$$
$$= 0.02 K^{0.62} L^{0.46} T^{0.16}$$

Evaluated at mean values of K, L and T (arithmetic mean for the period 1970-2003) the value of Y is

$$Y = 0.02 (161449)^{0.62} (314971)^{0.46} (23884)^{0.16}$$
$$= 57257 (Rs in lakh)$$

The mean value of estimated Y for 1970-2003 is Rs. 50023 lakh. The estimated production (or in the language of marginal productivity theory of distribution, the income distributed) is 14.46 per cent higher than the mean output. It should be in fact 24.00 per cent higher. The difference may be due to the rounding errors. The marginal productivity of capital evaluated at its mean value is Rs. 21,990, that of labour is Rs. 8368 and that of technology Rs. 38,492, that is one lakh Rupees of investment (at constant prices of 1993-94) yields a return of Rs. 21,990 and the rate of return is then 21.99 per cent. The rate of return to technology turns out to be 38.49 per cent. A person year earns a return (wages) of Rs. 8368 at constant prices of 1993-94, an amount which is 49.62 per cent higher than the per capita income during 1986-87, the median year of the period for which the mean value of labour is calculated. Since per capita income was rising, the marginal product of labour would be higher than its average product (average per capita income), but a difference of 49.62 per

cent is too high to be believed. In the absence of alternatives, it may be accepted only with a grain of salt.

6.20 Causes of Growth

The causes should be called immediate, because the original impulses cannot be found in these causes. These 'causes' were caused by the inflow of Central funds. The process of changes brought about by the inflow have already been analysed. What is left is the quantification of the contributions made by different inputs of the production function, namely capital, labour and technology. The contributions of these inputs are shown in table 6.6. Capital made the highest contribution of all, amounting to 52.51 per cent. The next contributor is technology responsible for 40.78 per cent of the growth of NSDP. The growth contribution of labour is 8.94 per cent. Total factor productivity had a negative contribution of 2.23 per cent. This terminology, the total factor productivity does not appear to be much appropriate here.

Table 6.6: Relative Contributions of Capital, Labour and Technology to Growth in ArunachalPradesh: 1970-71 to 2002-03

Inputs	Elasticity	Rate of Growth (%)	Absolute Contributions (%)	Relative contributions (%)
Capital	0.62	6.07	3.76	52.51
Labour	0.46	1.40	0.64	8.94
Technology	0.16	18.26	2.92	40.78
Total factor Productivity	-	-	-0.16	-2.23
Total	-	-	7.16	100.00

Note: Dash means not applicable. The sum of absolute contributions by capital, labour and technology is 7.32 per cent but NSDP grew at the rate of 7.16 per cent per annum. The difference, -0.16, is the (negative) contribution by total factor productivity. The relative contributions are percentage of absolute contributions with their sum elevated to 100.

In the growth literature, the negative contribution of total factor productivity is perhaps unknown. It is better to relegate it to the 'zone of ignorance'. It may be a measure of various distortions ranging from the problems of politically-motivated allocation of resources to those of instability induced by insurgence and militancy. In the absence of adequate data it is not possible to press this point home. However, the relative contributions of different inputs appear to be plausible and these may be good starting points to be modified later by other studies.

Notes

(1) The autoregressive structure of the Inflow of funds from the Centre is

 $G_t = a G_{t-1} + b (G_{t-2} - G_{t-3})$

Empirically it is found that a > 0 and b < 0.

The history unfolds at t = 3, which corresponds to the year 1973-74. The data for years from 1970-71 to 1972-73 are pre-determined.

Putting t = 3,

 $G_3 = a G_2 + b (G_1 - G_0) \dots (N 6.2)$

We can know G_3 from our knowledge of G_2 , G_1 and G_0 , the three givens in the derivation of the future values of G. Putting successive values of t we can express G_t ($t \ge 3$) in terms of G_2 , G_1 and G_0 . If t = 4, then

 $G_4 = a G_3 + b (G_2 - G_1) \dots (N 6.3)$

Replacing G₃ by its values in (N 6.2), we have G₄ = a (a G₂ + b (G₁ - G₀)) + b (G₂ - G₁) = a₂ G₂ + ab (G₁ - G₀) + b (G₂ - G₁) G₄ = a² G₂ + b (G₂ - G₁) + ab (G₁ - G₀).....(N 6.4) If t = 5, then G₅ = a G₄ + b (G₃ - G₂) = a (a² G₂ + b (G₂ - G₁) + ab (G₁ - G₀)) + b (G₃ - G₂) = a³ G₂ + ab (G₂ - G₁) + a² b (G₁ - G₀) + b (G₃ - G₂) G₅ = a³ G₂ + b (G₃ - G₂) + ab (G₂ - G₁) + a² b (G₁ - G₀) Now an induction leads to Gt = a^{t-2} G₂ + b (Gt-2 - Gt-3) + ab (Gt-3 - Gt-4) + + at-3 b (G₁ - G₀) Replacing t - 2 by t, G_{t+2} = a^t G₂ + b (Gt - Gt-1) + ab (Gt-1 - Gt-2) ++ a^{t-1} b (G₁ - G₀)

This is the way how the pure level effect (at) can be shown separately from the chain of change effects. Algebraically, all changes can be converted into the levels. But the relationship between the current level and the several past levels is not supported by the data. Instead of showing the pure level effect, it is possible to show the actual effect as the resultant of interaction, but that does not shed more light.

(2) In Arunachal Pradesh the density of population is in general low and in some areas, it is extremely low. The sparse-settlement poses a challenge to the spread of educational facilities in the State. There are villages in Arunachal Pradesh with only one-or two-households and in the radius of five to ten kilometres of that one or two household village there is no other settlement. These households are, of course, dense with people consisting of three generations and numbering over twenty or sometimes thirty. In a micro-village like this the establishment of a school or provision of other infrastructural facilities is not feasible. The problem was tackled, to some extent, in case of education, by establishing a school called an inter-village school in a centrally-located village. Such a school is provided with hostel facilities so that the students from the neighbouring villages can stay and study in it. Since the people depending on the jhum-cultivation were poor, stipends were provided to the students staying in the hostels. Provision of stipends is not, of course, limited to the primary school students, it is provided to all the students of the Arunachal Pradesh scheduled tribes staying in hostels.

CHAPTER 7

INFLOW OF FUNDS AND GOVERNMENT EXPENDITURE

7.1 Size of the Government

Measured by the expenditure incurred from the State's consolidated fund, the size of the Government in Arunachal Pradesh appears to be very large. The large size of the Government can be easily gauged by the fact that in some years the expenditure of the Government exceeded the State's Net Domestic Product (NSDP) by a wide margin. Thus the height of the Government seems to rise above the height of this hilly economy. To press this point home, the Arunachal economy is a Government, an economy which is buttressed by the Government. The condition of being buttressed denotes a static quality, but here the dependence of the economy upon the Government has not been a short-term or transitory phenomenon, it has assumed a long-term character. Over the years the economy's need of the Government as the buttress has not much lessened. To see how big the Government is in relation to the economy we can look at the last column of table 7.1 showing the Government expenditure as the percentage of the NSDP for selected years. The complete data set from 1986-87 to 2002-03 appears in table A 7.1 in the Appendix.

Table 7.1 reveals the relative size of the Government in the State economy. In 1986-87 the Government expenditure was 118.43 per cent of the NSDP. In the next year the Government expenditure rose sharply to become 139.83 per cent of the NSDP, the highest percentage in any year of the sample period from 1986-87 to 2002-03 (shown in table A7.1 in the Appendix). The expenditure as the percentage of the NSDP in 1988-89 dropped to 111.47 and then in 1989-90 rose to a height of 130.02. The Government expenditure in our sample period of 17 years never fell below 70.79 per cent of the NSDP. In the last year of this period i.e. in 2002-03 the expenditure was 80.75 per cent of the NSDP.

Neer		ge of the NSDP	the NSDP		
Year	Revenue	Capital	Plan	Non-plan	Total
1986-87	82.59	35.83	-	-	118.42
1989-90	79.67	50.35	55.81	74.21	130.02
1994-95	50.33	29.95	44.93	35.35	80.28
1999-2000	53.70	31.26	49.97	34.99	84.96
2002-03	59.89	20.86	41.35	39.40	80.75

Table 7.1: Size of the Government: Expenditure-NSDP Ratio in Arunachal Pradesh

Note: Revenue means revenue expenditure, capital means capital expenditure; plan is plan expenditure and non-plan is non-plan expenditure. Total means aggregate expenditure from the consolidated fund of the State.

During this period the Government expenditure as the percentage of the NSDP averaged 91.20 with a standard deviation of 20.69. The expenditure as the proportion of the NSDP, however shows a falling trend as given below:

 $E_y = 117.37 - 2.91 t$(7.1) $R^2 = 0.50$ N = 17

In equation (7.1) E_y is the aggregate expenditure of the Arunachal Government as the percentage of the NSDP, t is time measured in years with origin at 1985-86 and N is the number of observations (years). The intercept of equation (7.1), being the estimated expenditure of the year of origin (1985-86), exceeded the NSDP by 17.37 per cent. Over the years the relative size of the Government in the economy fell, and the compression of this relative size was significant. As shown by equation 7.1, the Government expenditure measured by NSDP as the unit declined by 0.0291 per annum (which in terms of percentage is 2.91 per cent points).

The gradual decline in the expenditure as the proportion of the NSDP is shared by both of its components: revenue and capital expenditures. In 1986-87 the revenue expenditure was 82.59 per cent, and capital expenditure 35.83 per cent of the NSDP. Both of these in terms of the NSDP fell significantly in the subsequent years. By 2002-03 the revenue expenditure of the Government was 59.89 per cent and the capital expenditure 20.86 per cent of the NSDP. The expenditure classified in terms of plan and non-plan components shows the same type of behaviour over time. The plan

expenditure as the percentage of the NSDP fell from 55.81 in 1989-90 to 41.35 in 2002-03. The fall in non-plan expenditure was more drastic: as the percentage of the NSDP it fell from 74.21 in 1989-90 to 39.40 in 2002-03, as shown in table 7.1. The behaviour of different types of Government expenditure as the percentage of the NSDP is shown below:

 - 1.66 t	R = 76.41 - 1.66
= 0.36 N = 17	$R^2 = 0.36$
 5 – 1.35 t	C = 39. 15 – 1.35
= 0.69 N = 17	$R^2 = 0.69$
 - 0.39 t	P = 47.96 - 0.39
= 0.08 N = 14	$R^2 = 0.08$
 09 – 1.20 t	NP = 53.09 - 1.20
= 0.23 N = 14	$R^2 = 0.23$

In equations above R is the revenue expenditure, C is the capital expenditure, P is the plan and NP, the non-plan expenditure, all being expressed as the percentages of the NSDP; t is, as before, time in years. N is the number of observations (years). An N of 17 years corresponds with the period 1986-87 to 2002-03. C in equation (7.3) does not include the debt repayment, which is available from 1989-90. When included, the capital expenditure as the percentage of the NSDP behaved as

 $C_1 = 40.68 - 1.23 t$ (7.6) $R^2 = 0.50$ N = 14

A comparison of equations (7.3) and (7.6) shows that the capital expenditure excluding the debt repayment experienced a more pronounced decline as the percentage of the NSDP than that which includes debt repayment. The period of this comparison is however, different. The capital expenditure without the debt covers the period 1986-87 to 2002-03 and with debt covers the period 1989-90 to 2002-03. Of the two components, the revenue expenditure as the percentage of the NSDP declined more rapidly than the capital component. The fall in revenue component was 1.66 per cent points per annum and that in capital component was 1.35 per cent points per annum during 1986-2003. In case of plan and non-plan classification, the

non-plan component declined on average by 1.20 per cent points and the plan component by 0.39 per cent points by annum, both being expressed as the percentage of the NSDP. So the size of the Government relative to that of economy has fallen but it will be illuminating to have a glimpse of the trend of the absolute size of the Government expenditure. Before that we would have a quick look at the changes in the composition of the Government expenditure.

7.2 Changes in the Composition of the Expenditure

Substantial changes took place in the composition of the Government expenditure in the State during 1989-2003. The Government's propensity to consume increased at the cost of its propensity to save and accumulate. The current (revenue) expenditure, as the percentage of the total increased on average by 0.77 per cent points per annum, while the percentage of the capital expenditure declined at the same rate during 1989-90 to 2002-03. This is shown in table 7.2, and the data for all the years from 1986-87 to 2002-03 are provided in table A 7.2 in the Appendix.

In revenue expenditure, the plan and non-plan components behaved differently: while the relative proportion of the plan component increased, that of the non-plan component declined. The average yearly increase of the percentage of the plan expenditure under the revenue head was 0.84 per cent points, the average yearly decline of the percentage of the non-plan expenditure under the same head was 0.07 per cent points which is not statistically significant from zero. In case of the components of capital expenditure, their behaviour over time remained almost uniform – both declined. The percentage of the plan component of the capital expenditure declined by 0.49 per cent points and that of the non-plan component declined by 0.28 per cent points per annum.

Though the classification of the expenditure on the revenue-capital basis shows the Government's propensity to spend proportionately more on consumption than on investment, the picture becomes somewhat reassuring when the plan and non-plan expenditures are considered. During 1989-2003, the plan expenditure as the percentage of the aggregate expenditure increased an average by 0.34 per cent points per annum and the percentage of the non-plan component declined by the same amount. The plan expenditure averaged 52.32 percent of the total during 1989-2003. The non-plan expenditure constituted, on average, the rest, 47.68 per cent during the same period. On the revenue-capital division of the expenditure, the revenue component was on average 67.58 per cent and the capital component 32.42 per cent of the total during 1989-2003.

Table 7.2: Changes in the Composition of the Government Expenditure in Arunachal Pradesh

Sl. No	Components	1986- 87	1989- 90	1994-95	1999- 2002	2002- 03	Mean	Average yearly changes (per cent points)
1	Revenue Plan	-	17.60	21.52	19.47	30.38	23.42	0.84
2	Revenue non-plan	-	43.68	41.17	43.75	43.78	44.16	-0.07
3	Total revenue	69.74	61.28	62.69	63.22	74.16	67.58	0.77
4	Capital plan	-	31.42	37.40	43.60	25.78	29.54	-0.49
5	Capital non-plan	-	7.30	-0.09	-6.82	0.06	2.88	-0.28
6	Total capital	30.26	38.72	37.31	36.78	25.84	32.42	-0.77
7	Plan	-	42.92	55.97	58.83	51.20	52.32	0.34
8	Non-plan	-	57.08	44.03	41.17	48.80	47.68	-0.34
	Total	100.00	100.00	100.00	100.00	100.00	100.00	0.00

(Figures are percentages of the aggregate government expenditure)

Note: Mean is the arithmetic mean. Mean and average yearly changes have the same number of observations, 14, corresponding to the period 1989-90 to 2002-03.

7.3 Changes in the Size of the Expenditure

Different components of the Government expenditure measured in terms of the NSDP declined during 1986-2003. That is, the size of the expenditure relative to the NSDP experienced a fall during the 17 years ending in 2002-03. But if we look at the absolute size of the expenditure we get a different picture: the real expenditure increased significantly during this period. The aggregate expenditure in real terms increased at the average relative rate of 2.75 per cent per annum during 1986-2003. The growth rate increases to 3.05 per cent per annum if a shorter period, 1989-2003 is considered. The highest rate of growth was experienced by the plan component of the revenue expenditure: during 1989-2003 this component increased at the rate of 6.48 per cent per annum. This is shown in table 7.3.

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Sl. No	Components of expenditure	Period	Bo	B 1	R ²
1	Revenue Plan	1989-2003	13.60	0.0648	0.75
2	Revenue Non-plan	1989-2003	14.60	0.0288	0.71
3	Total revenue	1989-2003	14.89	0.0418	0.91
4	Total revenue	1986-2003	15.00	0.0329	0.79
5	Capital Plan	1989-2003	14.34	0.0112	0.05
6	Total Capital	1989-2003	14.44	0.0023	0.003
7	Total Capital	1986-2003	14.39	0.0068	0.04
8	Debt	1989-2003	12.06	0.0282	0.07
9	Plan	1989-2003	14.68	0.0372	0.63
10	Non-plan	1989-2003	14.73	0.0233	0.43
11	Aggregate	1989-2003	15.40	0.0305	0.76
12	Aggregate	1986-2003	15.44	0.0275	0.76

Table 7.3: Growth of Government Real Expenditure in Arunachal Pradesh

Note: The values of B_0 and B_1 are obtained by estimating the equation, log $E = B_0 + B_1 t$, where E is the expenditure and t is time measured in years. The nominal expenditure is divided by the NSDP deflator in order to get real expenditure. Capital expenditure excludes the debt repayment.

The non-plan component of the revenue expenditure had a relatively small rate of growth – 2.88 per cent per annum. The growth of revenue expenditure was 4.18 per cent during 1989-2003 and 3.29 per cent during 1986-2003. The real capital expenditure excluding debt repayment on the other hand, shows trendlessness, like other components of capital expenditure the debt repayment in real terms shows no clear trend. Of the plan and non-plan categories of expenditure, the plan component increased at a higher rate than the non-plan component. The plan component grew at the rate of 3.72 per cent per annum compared with the non-plan component's growth of 2.33 per cent. The fall of Government expenditure as the proportion of the NSDP during 1986-2003 is an indication that the rate of growth of expenditure has been lower than that of the NSDP. This happened when the Government was trying to diversify the sources of its finance.

7.4 Sources of Finance: A Recapitulation

Traditionally a tax-free area, Arunachal Pradesh did not inherit, unlike other States of the country, any machinery for administration of tax. Not only the Government lacked the machinery, but also the people lacked the enthusiasm to pay taxes. The

absence of their enthusiasm was due to their not being accustomed to paying taxes to any authority. It is a socio-behaviouristic complex formed over the years as an interacting process with the institutional structure where no centralised administration worked and where the economy was low productive with no monetisation. The Government of India had adopted a gradualistic approach loaded with all caution and consideration: taxes were not imposed upon the people of this State, rather the unending needs of resources for financing the development programme were met from its own funds. With the spread of administrative network, the tax-collecting machinery of the Government grew and some tax bases of the State were identified. The most important of these bases was forestry. In course of time a few small and medium scale industries based on forest resources were established in the State and this raised the pace of exploitation of forestry. Forestry remained the most important source of Government revenue in the State till the imposition of the ban by the Supreme Court on the felling of trees in 1996. Of course, in recent years the Government of Arunachal Pradesh have been taking allout efforts to expand its tax-net. However, the Central Government's tax base in the State remains very weak. The scheduled tribe people (autochthons) of Arunachal Pradesh remain free from the burden of income tax – their income being not assessed for the purpose of income tax. As Stated before (chapter 6), the Central inflow composed of the share of the Central taxes and Central grants-in-aid was on average about 68.00 per cent of the NSDP during 1986-2003. These two Central sources of funds constituted on average 75.63 per cent of the State Government's total expenditure during the same period. In chapter 5 we constructed a conceptual framework showing how the Central funds brought about different kinds of changes in the Arunachal economy. The framework was tested in Chapter 6. So far as the changes entailed by the inflow are concerned, there is perhaps no doubt. But the question which hovers around is how efficiently all these funds have been utilized, a related question is whether the development activities have resulted in any unintended consequences. Two chapters, 9 and 10 are devoted to the analysis of some consequences, inequality and unemployment which carry the potentialities of instability. The question on the efficiency of utilisation of funds is highly involved and its proper treatment demands the type of primary information which is difficult to get by. So, based on the available secondary data we try to make a quantitative analysis of the level of efficiency achieved in the utilisation of the Central funds.

7.5 Expenditure and Income in the Government Sphere

The major part of the expenditure of the Government of Arunachal Pradesh is used for what can be termed consumption and a small part builds up capital. If the revenue expenditure is approximately equated to consumption and capital expenditure to investment, then during 1989-2003, as high as 67.58 per cent of the expenditure amounted to being consumption and only 32.42 per cent investment. When related to the NSDP, the revenue expenditure of the Government amounted to being 61.50 per cent of the NSDP and the capital expenditure to being 29.70 per cent during 1989-2003. The aggregate net investment expenditure in the Arunachal economy averaged 30.97 per cent of the NSDP during the same period.

Apparently these two estimates of capital formation – one in the Government sector and the other for the entire economy - are conflicting with each other. Since the capital formation in the private sector is unlikely to be very low, so if the rate of investment in the Arunachal economy is 30.97 per cent, then the capital formation in the Government sector alone cannot be 29.70 per cent of the NSDP; it should be much less than it. If however, the Government sector's rate of capital formation at 29.70 per cent of the NSDP is true, then the aggregate net investment of the economy would be much more than 30.97 per cent of the NSDP – a possibility which is ruled out by the growth of the NSDP. During 1986-2004 the NSDP grew in the State at the average rate of 5.62 per cent per annum. This growth rate yields on averagean investment ratio of 30.97 per cent an incremental capital output ratio of 5.51 which is quite high. During the same period i.e. 1986-2003, the incremental capital-output ratio for the country as a whole is estimated at 4.17 excluding the year 1991-92 and at 5.12 including it. Given a low capital intensity of production in the State, the incremental capital-output ratio is unlikely to be higher than 5.51. Of course there are grounds to argue that the incremental capital-output ratio in the State would be quite high, given its hilly topography and the sparsely-settled population. The provision of public goods such as roads, transport services, schools, potable water, etc is highly capital demanding but the services generated by these facilities are spread over a small number of people.

The unit cost of road construction in the hilly Arunachal Pradesh is three times the cost in the States which are in the plains (Sarma 2004). In many primary schools, the number of students in this State are around 30-40; in other States where the density of population is high, the number of students per school may be five times higher (Das 2003, Nayak 2003). So the high capital cost of public services in the State tends to make the capital-output ratio high. The argument in the opposite direction that the capital-output ratio in the State should be low also appears to be quite strong. In the jhum cultivation where the traditional method is still used, the capital-output ratio is extremely low. Even in permanent cultivation, the capital intensity is low. In the industrial sector, handicrafts dominate the scene. Mechanised production is yet to

make much ground. Given a high capital intensity in the production of the public goods and a low intensity in the production of the private the overall capital-output ratio at 5.51 may not be unrealistic for the State economy.

One surprising observation for the operation of the Government sector in Arunachal Pradesh is the very high difference between the expenditure incurred in this sector and the income generated from the services financed by this expenditure. In case of the Central Government this difference is small. As shown in table 7.4, during 1986-2003 the income from public administration in Arunachal Pradesh averaged 11.23 per cent of the NSDP and in the country as a whole the income from the Central Government services including the defence service averaged 12.76 per cent of the GDP. However, the Government expenditure during the same period averaged 91.13 per cent of the NSDP in Arunachal Pradesh but in the country the aggregate expenditure of the Central Government averaged only 16.32 per cent of the GDP. In spite of the Government expenditure being very high, the income generated form the public administration is small in the State – only 13.35 per cent of the expenditure is transformed into income. This compares very poorly with the national average: in the country the income from the Central Government services including defence averaged 79.62 per cent of the total expenditure of the Central Government.

Sl. No	Particulars	Arunachal Pradesh	India
1.	Income from Government services as % of domestic product	11.23	12.76
2.	Government expenditure as % of domestic product	91.13	16.32
3.	Income from Government services as % of its expenditure	13.35	79.62

Table 7.4: Income and Expenditure in the Government Sector

(Average for the period: 1986-2003)

Note: For Arunachal Pradesh domestic product is NSDP and for the country it is Gross Domestic Product (GDP). The data for India are from Economic Surveys of Government of India for different years, and for Arunachal Pradesh from State Government budgets of different years and estimates of State Domestic Product (different years)

In case of the Central Government the expenditure not yielding income is in the nature of transfer payments and this non-income yielding part of expenditure is 20.38 per cent of the total. In Arunachal Pradesh as high as 86.65 per cent of the Government expenditure is not income-yielding: this portion of expenditure finances those activities which do not involve any direct value-addition to the economy.

However, a State government is not much concerned with this type of activities, the type which is in the nature of transfer payments. It is the Central Government which is largely concerned with the provision of subsidies and other forms of transfer payments, the services which do not lead to any value-addition to the economy. So the service-generated income and expenditure of the Arunachal and Central Governments give a picture which is opposite to what is expected. This calls for looking closely into the economic environment in which the Government operates in the State. In this respect a repetition of some highlights of the historical background would be instructive, though at the incurrence of some superfluity.

In the initial years of operation of the programme of planned development in Arunachal Pradesh, almost all inputs were brought into this State from the rest of the country. The inflow of non-financial resources paralleled that of the financial resources. It is not only inputs of production but also the consumer goods that came from outside. The migration of different categories of people ranging from high-level Government officials to the workers engaged in the construction of Government offices, roads, highways, educational institutions, hospitals, etc. created demand for consumer goods. In the absence of local market this demand could not be met locally and so these goods had to be purchased from outside. In course of time the consumption habits of the local people especially those who were educated and got engaged in non-traditional activities changed. However, the capacity for the production of these goods could not develop in the State. As a result, with the rise in the magnitude of the financial inflow, there was the growth in the parallel inflow of inputs and consumer goods in the State.

Efforts were, however taken to locally produce a number of goods and inputs but the success rate was low. One example is the cement factory. The construction activities have created, since the 1950s, a high demand for cement and in this State good quality limestone, the principal raw material for cement, is available in abundance. A cement factory was established by the Government of Arunachal Pradesh in the 1980s but it could hardly see the face of profits. The accumulated loss took such a mammoth shape relative to the size of the factory that it was closed down in 1995. To date that factory remains closed. The closure of the cement factory was not isolated: it came in a cluster. The industrial optimism of the 1960s had led to the establishment of a good number of industries – based mainly on the locally available raw materials – in the 1970s and 1980s. Most of these industries promoted mainly by the Government suffered losses and faced closure in the mid-1990s. If the 1980s is called the decade of industrialization. With this background we can State the reason behind

the gulf of difference existing between the income from the services of the Government and the expenditure incurred on them.

7.6 Absence of the Multiplier

In the economy with a well-equipped productive capacity, the enhanced expenditure by the government tends to boost the demand for locally produced goods and services. This sets the multiplier into operation resulting in the expansion of employment and output. In Arunachal Pradesh the production capacity is nonexistent for many goods and inadequately developed for others. The urban and semi-urban areas of Arunachal Pradesh almost totally depend on other parts of the country for supplies of required goods including the items of even daily consumption such as vegetables, fish, rice, wheat, etc. The production capacity in this State is so inadequate that even the construction of an RCC building requires all materials except sand and stones to be procured from outside. Not only material inputs, but also construction workers are not locally available. So they are brought from other parts of the country. This creates a peculiar situation.

The spending of money by the Government makes Arunachal Pradesh a centre of expenditure but not a centre of production. The spending centre not being fortified by the forces of production releases a centrifugal force which drives money away from this State. Money cannot rest here; it becomes the counterflow in the routes which bring the flow of goods to this State. Money flows to the parts of the country which supply goods and different inputs including labour, raw and skilled, to this State. The lack of production capacity makes the multiplier inoperative locally. In fact the multiplier accompanies the money spent. Leaving this State the multiplier becomes operative in areas which make supplies here. Thus the lack of local production capacity is responsible for much of the Government expenditure not being translated into income. Now a basic question arises as to why the productive capacity in the State has not been adequately developed despite the Government expenditure being very high – 91.13 per cent of the NSDP.

This question is investigated with the help of aggregate data, though occasional references are made to the micro-level observations. The Government expenditure is high in the State not because the people pay high, but because the Central Government finances the major part – to be exact 75.63 per cent, on average, during 1986-2003 – of this large mass of expenditure. Had all the Central funds been utilised to create the productive capacity, the Arunachal economy would have grown at a rate much higher than what has actually been achieved. The actual growth rate of NSDP during 1986-2003 is on average 5.62 per cent per annum and the incremental

capital-output ratio in the State during the same period was 5.51. This value of incremental capital-output ratio is obtained by dividing the average investment-NSDP ratio of this period by the rate of growth of NSDP. The average investment-NSDP ratio is 30.97 per cent. In case all Central funds could have been invested, then the rate of investment in the Arunachal economy would be 60.00 per cent even if local net investment both private and Government was nil. On an incremental capital-output of 5.51, this rate of investment works out an average growth rate of 12.34 per cent per annum. The actual growth rate was 5.62 per cent per annum, less than half of what could be achieved by accumulating the inflow into capital.

That the large inflow of funds from the Centre could not be transformed into the productive forces is a measure of the institutional incapacity which is reflected in the operational inefficiency of the Arunachal economy ⁽¹⁾. This operational inefficiency can be quantified in terms of the loss in the growth of the NSDP – the difference between the expected rate (12.34 percent) and the actual rate (5.62 percent) of growth of the NSDP. This difference is 6.72 percentage points. It is a conservative estimate based on the assumption that the propensity to save and invest, both Government and private in the State is zero. This assumption cannot be true. The survey carried out for this project shows that the households' propensity to save is not very low. Given a positive rate of private net saving and investment, the estimate we have obtained under-represents by a wide margin the amount of actual economic inefficiency in the State. In the absence of dependable estimate of private savings we can take 6.72 per cent points as the loss in the growth of income due to overall inefficiency in the allocation of resources in the State.

The job is not complete with the quantification of the inefficiency only: it is necessary to investigate into its causes. Again, the scarcity of micro-level data restricts our investigation to only aggregative level. In what follow the main sources of inefficiency are identified.

(a) **Resource-allocation by political process**: Given the size of the Government expenditure relative to the Arunachal economy, the resource allocation of the State is strongly influenced by the political process. What has achieved now the status of almost an axiomatic truth is that the allocation of resources by the Government suffers from a serious inefficiency. The political process involved in the resource-allocation leads to the achievement of goals which diverge from the goals of economic efficiency. When the decision-making is not based on economic or social cost-benefit analysis rather the decision is

made on 'political cost-benefit' analysis, the resources tend to be used in a way which helps the decision-makers to achieve their political goals.

- (b) **Large Government Size:** Before 1947 almost no centralized administration operated in Arunachal Pradesh. In the course of the last half century there has been such a high rate of growth of the Government that it overshadows the economy. The Government is manned by a very large number of personnel and this explains why in this State the revenue expenditure of the Government is so high relative to the capital expenditure. However, the size of the Government personnel in terms of the area is not high in the State, rather it is small, but in terms of the population which is now about 1.2 millions, the population size of a sub-division in many districts of the country, the Government of Arunachal Pradesh is large. In a hilly State with a long international border the size of the Government will be naturally big relative to the size of the population. The problem is not much about the size of the Government, rather it is the lack of the growth of productive capacity which makes the Government appear large relative to the economy.
- (c) Rapidity of Changes: It is said that Rome was not built in a day, but the policy-makers in the country wanted to build Arunachal Pradesh almost overnight. In order to remove the inter-State economic disparity efforts were taken to push the development programme hard, especially after the Chinese aggression. What other parts of the country had achieved in 2000 years, Arunachal Pradesh had to achieve it in 20 years. The removal of inter-State disparity is a sine qua non for raising the inner strength of the country, and there is no dispute as to the desirability of this goal. But the problem is with the means adopted to achieve this socially-desired goal. It was thought that an enhanced inflow of funds from the Centre would lead to a higher rate of economic growth resulting in the lowering of the disparity between this State and the other parts of the country. The Central inflow raised the Government size, but indirectly it sapped the individual-level initiative. Many people came to believe that money flowed from the consolidated fund of the State, not from the industrial activities ⁽²⁾.

It was not the individuals who tried to invest in the industrial activities; it was the Government which sponsored the programme of industrialisation. The individual entrepreneurs were by-passed in the process. The industrial enterprises, promoted and run by the Government, were short-lived; many of these industries could not survive even a decade.

(d) High cost of construction of infrastructural facilities: Elsewhere in the country, the infrastructural facilities were developed over a long period of time. The Grand Trunk Road, the pride of the country was constructed in the fourth decade of the 16th century by Sher Shah Suri. In the mid-19th century the train services in the country began and in the course of the next century the greater part of the country was connected by the railways. In Arunachal Pradesh the major efforts were taken during the Second World War in the construction of the famous Stilwell road connecting southern China with Assam. However, after the war that road remained uncared for and it is now almost inoperable. After independence concerted efforts were taken to develop the basic infrastructural facilities. The construction of infrastructural facilities in a hilly region which receives a very high rainfall almost throughout the year is a challenging task. Once constructed all these facilities require huge amount of maintenance services regularly. Because of a very low density of population, the per capita cost of maintenance of these facilities is very high. So the high cost of provision of public goods might be an important reason why the economic growth in the State remains low in spite of the high Government expenditure and a large inflow of funds from the Centre.

Notes

(1)The definition of an economy is usually given in terms of its reproductive ability. This definition is similar to the one used to define the living beings. Like a living being, an economy must have the capacity to reproduce; otherwise its viability would be attenuated. In Sraffa (1960), the definitions of different types of economies are illuminating: an economy which can reproduce itself but cannot generate any net surplus is a subsistence economy and an economy which can reproduce more than what it uses is a surplus economy. Sraffa (1960) does not study an economy which cannot reproduce itself - such an economy being unviable does not form the subject matter of mainstream economics. The traditional economies of Arunachal Pradesh were of subsistence type, but had viability. The transformed economy which has emerged after passing through all developmental activities does not appear to have developed the capacity to reproduce itself. Given the high rate of inflow of funds from the Centre on which this State subsists, there is so much inefficiency in the overall productive capacity in the economy that 100 units of input cannot produce 100 units of output. That is total output is less than what is used in its production: the consumption of

resources in the process of production is more than what comes out of it. This is indicative of inherent weaknesses in the operation of the Arunachal economy.

(2) The crowding-out phenomenon seems to have worked with almost all neoclassical vehemence in the State of Arunachal Pradesh. In the traditional communities, the individuals had a high level of participatory role in the social sphere. The local public goods were supplied by the participatory actions of the community members. With the expansion of the size of the Government, the community seems to have withdrawn itself from the public sphere. Many people think that it is the Government, not the community, which is responsible for the provision of even the village-level public goods. This type of attitude has resulted in the individual-level inaction in the social sphere.

In fact the hyper-active Government seems to have made the people hypoactive.

It has created a chain of dependence: the people tend to depend on the State Government which again depends on the Central Government for its financial support. This dependence is unilateral, bereft of mutualism. For the financing of its budget the State Government's dependence on the Centre makes it accountable more to the Central Government than to its own people for the utilisation of the funds. Had the major part of the Government finance been locally procured, the State Government's financial accountability to its own people might have been larger than what it is now. Moreover, the people would have taken more interest in ensuring the proper utilisation of the Government money. The presence of high inefficiency in the use of resources might be partly due to this lack of financial mutualism between the people and the State Government.

CHAPTER 8 PRODUCTIVITY OF CAPITAL

Introduction

In the study of the growth process of the Arunachal economy the data base was largely secondary. The aggregative time-series data were used to test different hypotheses. It would have been appropriate had we been able to study the productivity of capital in different sectors of the economy. But no time-series data on capital disaggregated on sectoral basis are available. In the absence of supporting data it is also not possible to make any dependable estimates of capital employed in different sectors of the Arunachal economy. This constraint on the secondary sources compelled us to depend on only micro-level data in order to secure an estimate of the productivity of capital. These enterprise-level data are cross-sectional obtained from a primary survey.

The primary survey was designed to draw samples from three well-defined universes: (a) production units in the State, (b) the households of the autochthonous people, and (c) the subset of the people in the age-group (15-59) forming the labour force of the Arunachal economy. The study of the production units forms the subject matter of this chapter. The household data are utilised in the study of inequality in chapter 9 and the labour force data are analysed in the chapter on unemployment.

8.1 Characteristics of the Universe

It was the subject matter, the productivity of capital, which guided the selection of the sample. Before analyzing the sample it would be quite relevant to have a glimpse of the universe from which it was drawn. This is the universe of production, the universe of activities, which yield income. In terms of the content of capital in the production space, this universe can be graded. In some production spaces the capital intensity is high and in others it is low. The capital intensity can be measured in terms of its standardised value: the amount of capital per unit of output or land or labour or any other input used in production.

The most widely used standardisation of capital is the measurement of capital in terms of output, popularly called capital-output ratio and the other standardisation is in terms of capital-labour ratio. Capital-output ratio is no doubt a good concept

but its problem is its inadequate variability. It has inter-sectoral variability in an economy but over time it may not vary much. (In this connection we can remember Kaldor's well-known stylist fact of economic development that the capital output remains a constant in the course of economic development (Kaldor 1989). Kaldor's claim, though based mainly on the experiences of the U.S.A and U.K. may not be far from the truth because of the nature of the technological change. Much of the technological change has been labour-augmenting type, the type which, through being embodied in capital, raises its use but at the same time saves labour. This may result in the rise of output in the same proportion as the rise in capital leaving the capital-output constant.

Given this limitation of capital-output ratio, a better measure is capital-labour ratio which shows a wide range of variability both cross-sectionally and in the course of technological progress. Seen cross-sectionally the production space of the Arunachal economy contains a range of capital-labour ratio which is very high. At one subspace of this production space is hunting and gathering activities which use very little amount of capital. It may be recapitulated here that in the remotest areas of Arunachal Pradesh some people – their number is not very small – still depend on hunting and gathering activities for their sustenance. These people have not yet taken to the crop production, especially the cultivation of cereals (Yadav 1999). The type of capital they use consists of bows and arrows, dao (bill hook), spear and axe. Domestication of cows has not yet reached the space of their material culture. Capital-labour ratio is extremely low in their production system.

From hunting and gathering activities if we go over to the next stage of production, the jhum cultivation we find a rising capital intensity – the jhum cultivators use, apart from axe and dao, the spade, hoe, scythe, etc. More interestingly, the accumulation process takes a concrete shape: the jhum cultivation requires saving a part of the output to be used as seeds, something which is not required in the hunting and gathering activities. The capital intensity rises in jhum cultivation and this is reflected in the rise of capital-labour ratio. From jhuming if we switch over to the sedentary cultivation we see a further rise in the capital-labour ratio. Capital intensity rises almost continuously with the rise in the technology content in production – the content of technology being lowest in hunting and gathering activities and highest in the information technology (IT) sector. The technological spectrum as well as the capital content of production was taken into consideration in the selection of the sample.

8.2 Technology, Capital intensity and Problems of Measurement

The hunting and gathering activities in the remote parts of the State are uniform in the use of capital. However, in the accessible areas of the State where the new technology of hunting as well as gathering has reached, the capital intensity in these activities has increased. Fire-arms have replaced the bows and arrows, the woodcutters (especially saws) have replaced crude axe in lumbering; motorized vehicles – and elephants in places where motorized vehicles cannot be used – have come to replace headload system. Fire-arms used in hunting had in the initial years a very high marginal productivity. But this productivity declined so rapidly with the killing of animals, young and old, that the game became rare. In the highly accessible areas the big birds are now invisible, and hunting is about to become a sport instead of an avocation. In the remote areas where the new technology of fire-arms has not yet reached, the bow-arrow based hunting still remains a viable proposition.

In the bow-arrow, versus fire-arm comparison, the productivity of capital in the new technology environment is very high in the first year, but in the second year it declines sharply; in the third year it becomes negligible and remains so afterwards. In this situation the productivity of capital traces a sharply-rising and then a steeplyfalling curvature. There is every possibility of the productivity of capital falling to zero thereby showing the non-viability of the uncontrolled use of capital embodying a higher level of technology. In the jhum cultivation, given the characteristics of land, the application of new inputs such as power tiller is almost impossible. The possibility of applying bio-chemical technology is also limited. Capital, however, can be applied to the terracing of the jhum fields so that the permanent cultivation could be practised there. This involves the modification of the character of land and enacting changes in the very method of production. All these can be brought about over a number of years. The method of permanent cultivation is so different from jhuming that learning is a sine qua non for instituting this kind of radical change. Given the same method of cultivation in the same kind of land, the productivity can be found out if there is variability of capital use in different farms. But in jhum cultivation such variability in the capital content in production is not found and so measurement of capital becomes extremely difficult.

The problem of measurement of capital is also highly complicated even in permanent cultivation where the new-yielding varieties of seeds are yet to make much inroads and the use of chemical fertilizers is still very small. As an example the fertiliser consumption in the State is shown in table 8.1.

Year	Chemical fertilizers used (tonnes)	Total cropped area	Fertilizer used per hectare (kg)
1989-90	390	167369	2.33
1991-92	470	167369	2.81
2001-02	715	173195	4.13
2002-03	720	183166	3.93

Table 8.1: Consumption of Chemical Fertilizers in Arunachal Pradesh

Note: In Economic Survey 2002-03 of the Government of India, the fertiliser consumption in Arunachal Pradesh is 2.88 Kg for the year 2002-03 (p.170)

Source: Statistical Abstract of Arunachal Pradesh, 1990, 1992, 2002 and 2003.

Three types of fertilizers, nitrogenous, phosphatic and potassic are included in what appear in table 8.1. The amount of different chemical fertilizers used in the State was 390 tonnes in 1989-90; it rose to 720 tonnes in 2002-03. A significant proportion of the chemical fertilizers as shown in table 8.1 is not used in the production of seasonal crops – it is used in the production of different plantation crops such as tea, coffee, etc. However, crop-wise consumption of fertilizers being not available, it is difficult to ascertain the proportion of the total consumption in crop production. The available studies show the farmer's reluctance to use chemical fertilizers in their fields. Saikia in his survey of 400 farm households in four districts of Arunachal Pradesh found only 6 percent farmers using chemical fertilizers (Saikia 2004). Most of the farmers reported either being fearful of using chemical fertilizers on the ground that it would destroy the intrinsic fertility of the soil or being unaware of their availability. So in all probability the fertilizer consumption that appears in table 8.1 is an overestimation. And this overestimated value is one of the lowest in the country. According to the Economic Survey (2002-03) of the Government of India per hectare consumption of fertilizers for the cropped area in Arunachal Pradesh was 3.20 per cent of the national average in 2001-02. Of course, Arunachal's position is not at the bottom. It is Nagaland's consumption which, at 2.36 per cent of the national average, was the lowest among all the States and Union Territories of the country.

Given the traditional nature of agricultural production where hardly any purchased inputs are used, the identification and valuation of inputs constituting capital is fraught with all inaccuracies. Moreover, the crop production sub-sector of agriculture is not receiving much investment from other sectors. Even Government's investment is not very significant. Considering all these, the universe is redefined to include the production units in the non-traditional sectors: manufacturing, trade and commerce.

8.3 The Sample

A sample of 100 units were selected using stratified method of sampling. In sample selection adequate care was taken to get a proper representation of the industrial and service production units operating in the State. All manufacturing units were divided into different strata. Similarly shops and service units were divided into different segments. The simple random sampling method was used to select the units from each stratum or segment. When in a segment there was only one unit, for example a fruit processing unit, no sampling was required. Table 8.2 shows the different types of units covered in the sample. It may be noted that the sample covers only the units which are in running conditions; those closed down could not be surveyed.

Sl. No	Type of activity	Number of units surveyed
1	Fruit-processing	1
2	Medicine-manufacturing	2
3	Weaving	1
4	Bakery	2
5	Wine-and bear-making	3
6	Cane furniture-making	4
7	Studio (photography)	3
8	Meat shop (butchery)	2
9	Cosmetic and clothes store	13
10	General store	30
11	Hardwares	13
12	Medicine shop	2
13	Hotels and Restaurants	5
14	Public call office	2
15	Wine shop	5
16	Tailoring	3
17	Vehicle Repairing	6
18	Barber's saloon	3
	Total	100

Table 8.2: Types of Units Covered in the sample

The glory of industry in Arunachal Pradesh was the timber mills which were of medium scale, but most of them faced closure after 1996 when the Supreme Court's restrictions on felling of trees reduced the supply of raw materials to these mills. However, our sample could not cover a single timber mill. A few other industries which were established by the Government of Arunachal Pradesh in the 1980s functioned almost a decade and were closed down in the 1990s. Among these industries which could not achieve viability, one is the cement factory as already mentioned, the only unit in the State located in Tezu, the district headquarters of Lohit which was closed down in 1995. The same happened to Arunton Television assembling unit established by the Government of Arunachal Pradesh.

As shown in table 8.2, the sample covers different types of service and production facilities: haircutting shops, butchers' shops, studios, wine and bear-making units, medicine manufacturing units, medicine-selling shops etc. As many as 30 units in the sample are general stores selling different types of goods; 13 shops deal in hardwares. On the basis of nature of business, that is, on the basis of activities, the sample can be subdivided into three subsets: the first is the subset of 18 units involved in manufacturing activities, the second sub-set includes 58 units all engaged in trading activities and the third subset consists of 24 units which are engaged in servicing activities such as hotelling, tailoring, vehicle repairing, etc. Before studying the sample, especially undertaking the work on the estimation of the productivity of capital, we should have some exposition of the hypothesis which was entertained at the time of formulation of this project.

8.4 The Hypothesis on the Productivity of Capital

The hypothesis is that the productivity of capital is low in Arunachal Pradesh. The idea which informed the hypothesis about the productivity of capital in Arunachal Pradesh was derived from Myrdal's celebrated theory of cumulative causation which is still much influential in regional as well as development economics. This theory is based on the premise that the production function is subject to diminishing returns to capital in the backward region and increasing returns to capital in the developed region. The outcome of this dual character of the production function leads to the prediction that capital will tend to move from the backward region characterised by the scarcity of capital to the relatively developed region with more abundance of capital (Myrdal 1957; Tornel and Velasco 1992). This prediction is the diametrical opposite of what the neoclassical model predicts (Solow 1956). The prediction of the theory of cumulative causation apparently seems to carry a good measure of validity
especially in respect to the developing countries characterised by dualistic economies.

It is a common observation in our country that the North-East India, a capital-scarce area is not an attractive destination for either the domestic or the foreign capital. It is the industrialized areas of the country, the areas which are relatively more endowed with capital, that attract capital. Private capital movement in the country and the inter-State differentials in credit-deposit ratio are examples supporting the hypothesis that capital is more productive in the more developed than in the less developed region. A specific example can be given from Arunachal Pradesh. It is a State which is capital-scarce and it has the lowest credit-deposit ratio among all the States in the country.

The received theory in its broad sweep fails to cover many specific cases. The premise that a developed region's production function shows increasing returns to capital and a backward region's production function behaves differently is based on a static technology. The successful adoption of new technology in the backward region may change the gradient of its production function in such a manner that the marginal productivity of capital does not show a diminishing tendency over a wide range of this function. This has happened in many countries especially the developed ones and the outcome has been the reduction in the inter-regional economic disparity in the same country. In case of inter-country comparison of capital productivity, some developing countries - the oft-cited prime example is the East Asian region – have successfully adopted new technology which has resulted in the radical changes in the environment of production causing the productivity of capital to increase. The rise in the productivity of capital or more broadly changes in the gradient of the production function, not necessarily its shift, may come not only from the introduction of new machine, but also from various sources: the changes in the domain of institutions, in the organizational forms, in the social environment of business, etc.

8.5 Heterogeneity of capital

So if we climb down from the general to the particular, we see a different world. The overall picture is composed of the elements which are so diverse that a randomly selected sample from them may give a picture which is the opposite of the general. Given this we adopt an inductive approach and this necessitates the particularisation of the concept of capital. Like labour, capital is highly heterogeneous. In practice the identification of what is capital and what is not becomes a problem and its solution is normally found in the standard accounting definition of capital. It is the generally-

accepted accounting principle which is used by the firms. While accepting the generally-accepted principles, we should attach some characteristics to capital so that its categorisation satisfying the contextual needs can be possible. That is, the monodimensional view of capital should be sacrificed in favour of one which takes into consideration both its quantitative and qualitative aspects.

We can look closely into the behaviour of the capital specially its mobility aspect. If we make binary classification of capital into the Government-owned and the privateowned, then we see that the Central Government is pushing capital into Arunachal Pradesh but in case of the private sector, the picture is different. To repeat this point, the Government fund is flowing in, but the private capital has a tendency to move out of this State. If now the private capital is classified into industrial and trade capital, then it is found that the big capital that can be capable of financing industry tends to move out of this State, but the capital moves in small quantities to finance mainly trade and commerce.

In terms of liquidity of capital, the industrial capital especially of the entrepreneurial firms is less liquid than the trade capital. The gestation in trading is, in general, smaller than that in industry; that is, the turnover is higher in the former than in the latter. In Arunachal Pradesh the small amounts of liquid capital that flow in the private sector yield good returns, but there is no mechanism in this State to collect, and transform this scattered trade capital into industrial capital. It seems the industrial niche in this State is not sufficiently broad and attractive to nourish the industrial capital so that it may yield high returns and expand steadily.

8.6 Institutional Basis of Production

Before examining the industrial niche, we take a glimpse of the domain of institutions, the set of rules and regulations shaping the structure of ownership and organizational forms of business in this State. As Stated before, Arunachal Pradesh is a tribal State; its land cannot be alienated to the non-tribals. The migrant people and their dependents who constitute 34.78 per cent of the population of the State can neither own any land nor can they construct any permanent house⁽¹⁾. They are not given any licence or permit to conduct any business in the State. Legally the migrants or in general, non-tribals are barred from owning any fixed asset or more appropriately fixed capital or wealth. However, the legal bar is only on ownership; there is no legal restriction on the operation: the migrants or people of migrant origins can operate land or run any business. The restriction on ownership but freedom of operation has created a peculiar business environment in the State.

Firstly, a booming rental market has emerged. Since the tribal people of Arunachal Pradesh do not take much interest in some categories of business, the operational part of these business activities is lent out to the migrants (non-tribals) on rental basis. The tribal licence holder charges a fixed rent and the lessee of the licence gets the full freedom over the operation of the business. Secondly, the restriction on ownership but freedom of operation has changed the ownership structure of capital. The tribal people own the fixed capital and the non-tribals or migrants own the variable or more appropriately the liquid capital. This restricts the operator's access to bank loan. Since the collateral value of the fixed or permanent asset is more than that of the non-fixed (mobile and liquid) asset, the non-tribal operators find it difficult to resort to bank finance. This inability slants the debt-equity ratio in favour of the equity in Arunachal Pradesh. Finally, the ownership-operation dualism has tended to reduce the time-span of business planning, since the non-tribal operators cannot own fixed capital, they try to avoid committing themselves to the sunken part of the cost, a situation which results in their tendency to reap the short-term benefits from the business.

In the 1950s when the development programme had been operationalised in Arunachal Pradesh, there were hardly any local traders. In course of time, the Arunachalee people took some interest in business activities, but the type of business they preferred was contracting which, was more or less protected from competition. A very few locals initially chose the trading and industrial activities. It was the migrants from other parts of the country who pioneered the trading activities in the State. Shops they opened in the areas where the administrative centres were established and it was these shops which catered to the needs of the migrants who initially manned the administration in the State. However, the relative importance of the migrant-traders gradually declined with the entry of the enterprising tribal people in the trade and commerce. In spite of that, the migrants retain even today the preponderant role in the trading activities of the State. This is reflected in our sample.

Of the 100 units surveyed, 75 are operated by the non-tribals, the people who belong to the category of the non-Arunachal Pradesh Scheduled Tribe (non-APST), 23 are operated by the APST entrepreneurs and the rest two are jointly operated by the locals (those belonging to the APST) and the non-locals (migrants from other parts of the country or their descendents born and brought up in Arunachal Pradesh). The tribal people of the State have not yet entered in some types of production and business activities. The activities demanding high technical and business skills have not attracted them much. In our sample, this is reflected to a great extent. We

surveyed three studios all of which are run by the non-locals. All the thirteen hardware shops surveyed are run by the non-locals, the people who have migrated from other parts of the country. The activity-wise distribution of the operators is shown in Table A 8.1 in the Appendix.

The units manufacturing wine and bear are all owned and operated by the entrepreneurs belonging to the APST. However, of the five wine shops surveyed, the two are operated by the locals and the three are operated by the migrants. Both the surveyed public call offices (telephone booths) are run by the migrants and so are two bakeries. The two medicine-manufacturing units are operated by the local entrepreneurs and the only fruit-processing unit in the State is now run by a local industrialist. Some of the professions appear rather repulsive to the locals who do not at all like the nature of work involved in such professions. The examples are tailoring, hair-cutting, etc. We surveyed three hair-cutting saloons which are all operated by migrants from Bihar; the three surveyed tailoring shops are also operated by the migrants from North Bengal and Assam.

8.7 Structure of Capital

Before studying the structure of capital, it will be pertinent to have a glimpse of the nature of operation of the production units especially those run by the migrants from other parts of country. In case of the production units owned and run by the people belonging to the category of APST, there is no division between ownership and management. The operator is the owner bearing all risks - too often the local business operator engages migrant people from other States, who have some skills and business acumen. Normally technicians, mechanics and shop floor workers are migrants who are paid a salary which is higher than that existing in the neighbouring areas of Assam. The business units operated by the migrants present a sort of complexity. As Stated before the migrants are not licence-holders; they do not - and cannot own - the buildings and other immovables. Of course, movables machines, tools, etc. - they can own and operate. These business operators hire licence from the people belonging to APST on rental basis. The arrangement is informal. There is no formal rental market for licence. (Perhaps that is not possible because of the legal restriction upon the issuance of licence to the migrants / nontribals). A non-tribal leases the licence mainly through the personal relationship and can retain it during the pleasure of the lessor. Normally the lessor of the licence does not evict the lessee as long as the latter fulfils all conditions of the informal contract. In a society where the judicial infrastructure is yet to be developed fully, the informal contract seems to be working well⁽²⁾. There does not seem to be a high rate of eviction. The eviction is not, however, unilateral. The migrant lessee of the licence can also give up the licence and abandon the business.

Operationally the migrant traders are free. They bear all kinds of risk of business. The licence-holder receives only the fixed rent; he does not share in the profit. The migrant operator raises his capital and runs business in a way which gives him the highest short run gain. As Stated earlier, his planning horizon for business may not be very long. He is legally weak and in the eyes of the law he is almost a non-person and this makes him an unequal partner in the contract operating informally.

S1.	Size class	No. of	Intra-class range			Class	Standard	Class m	nean of
No	of capital	units	Minimum	Maximum	Range	mean of capital	deviation of capital	Equity	Debt
1.	0-20	10	1	20	19	11.60	7.32	11.60	0.00
2.	20-40	10	25	35	10	28.50	4.12	28.50	0.00
3.	40-60	9	45	60	15	52.78	6.18	51.67	1.11
4.	60-80	8	65	80	15	75.63	5.63	75.63	0.00
5.	80-100	10	85	100	15	94.00	6.15	89.00	5.00
6.	100-150	7	145	150	5	149.29	1.89	142.14	7.15
7.	150-200	7	175	200	25	195.00	9.13	173.57	21.43
8.	200-250	5	205	250	45	241.00	20.12	213.00	28.00
9.	250-300	7	300	300	0	300.00	0	300.00	0.00
10.	300-400	8	350	400	50	379.37	20.78	379.37	0.00
11.	400-500	5	450	500	50	490.00	22.36	490.00	0.00
12.	500-1000	9	550	1000	450	788.89	181.62	750.00	38.89
13.	1000-10000	4	1100	30000	28900	10190	13566.10	4115.00	6075.00
14.	Total	99	1	30000	29999	621.02	3095.45	367.99	253.03

Table 8.3: Structure of Capital: Size-class Distribution in the Sample

(Capital and its components are in thousand of Rupees)

Note: The value of capital for one unit surveyed could not be ascertained and this reduced to the sample to 99.

The operational pattern of the business activities is instrumental in the determination of capital structure. In the surveyed units it is found that the debt-equity ratio is extremely low. Table 8.3 shows the size-class-wise distribution of capital and its components – debt and equity. It is found that the small-scale units depend mainly on their own capital: in their cases the debt-equity ratio is just zero. The debtfinancing begins when the size of capital is at least Rs. 45 thousand. However in the size-class of Rs. 40-60 thousand the average debt (the amount of debt per unit) is Rs. 1.11 thousand, against the average equity value of Rs. 51.67 thousand. The sample is dominated by the small-scale units: 47.47 percent of the surveyed units have a value of capital which is less than or equal to Rupees one lakh. The average value of capital of these units numbering 47 is Rs. 51.51 thousand, 97.52 percent of which consists of equity and only 2.48 percent of debt. The dependence on own finance, the equity, does not appear to be the characteristic of the small units only, many medium-sized units, as shown in Table 8.3, also do not depend much on the borrowed funds. In general, the borrowed capital (debt) is of peripheral interest to the majority of the surveyed units. Table 8.4 tries to make it clear.

As many as 88 units (almost 89 percent of the 99 units whose data on capital are available) were found during the survey not to have any outstanding loans from any financial institutions. One small unit with a equity of only Rs. 50 thousand was found to have an outstanding loan of Rs. 10 thousand. The debt for this unit is 20.00 percent of its own capital. Table 8.4 shows a rising trend of debt-equity ratio with the size of the unit. However, the positive relationship between the debt-equity ratio and the size of the capital in the units does not appear to be statistically significant, as shown below:

D = 9.612 + 0.0068K.....(8.1) (1.7) (3.8) R² = 0.13 N = 99

In equation (8.1) D is the debt-equity ratio (in percentage), K is the total value of capital (being the sum of debt and equity) and N is the number of observations (units). Though the coefficient of K is significant, the overall fitness of the equation is not significant.

Debt (Rs in 10 ³)	No. of units	Average equity (Rs in 10 ³)	Debt-equity ratio (in %)
0	88	229.61	0.00
10	1	50.00	20.00
40	1	165.00	24.24
50	2	75.00	66.67
100	1	150.00	66.67
150	2	300.00	50.00
200	1	350.00	57.14
900	1	200	450.00
3400	1	4560	74.56
20000	1	10000	200.00
Total	99	367.99	68.76

Table 8.4: Capital Structure: Dependence on debt

If the type of activity (A) estimated by an index is included in (8.1), the explanatory power of the model does not increase much as shown below:

$$D = 17.893 + 0.00645 \text{ K} - 7.127 \text{ A} \dots (8.2)$$

$$(2.0) \quad (3.5) \quad (1.2)$$

$$R^2 = 0.14 \qquad N = 99$$

The significance level of A, the type of activity is as high as 24.9 percent. This implies that the industrial category is not an important determinant of the value of debtequity ratio. If A is replaced by the category of the promoters – whether the promoters are tribals or non-tribals (migrants) – the explanatory power of the specification does not increase:

$$D = 23.250 + 0.0063K - 16.716 P \dots (8.3)$$

$$(2.0) \quad (3.4) \quad (1.3)$$

$$R^2 = 0.14 \qquad N = 98$$

In equation (8.3) P is a dummy variable taking on 0 for tribal entrepreneurs and 1 for migrants. Our expectation is that the debt-equity ratio of migrant-operated units will be smaller than that of the units operated by the locals, but this is not unequivocally accepted by the data – the coefficient of P is significant at 18.8 percent. The sign of P is, however negative, as expected. The estimated equation (8.3) provides the summary information. We can look into the detailed data in order to study the capital structure of the locals (tribals) and the migrants (non-tribals).

Of the 23 tribal entrepreneurs, 19 did not have any outstanding debt and they form 82.60 percent of the total. In case of the migrants the number of non-borrowers is 68 forming 90.67 percent of the total. All the local borrowers took big-sized loans varying between Rs. two lakh and Rs. two crore. On the other hand, the migrant borrowers took small-sized loans varying from Rs. 10 thousand to Rs. 150 thousand.

In general the size of the migrant-operated units is smaller than that of the units owned and operated by the locals (tribals). This is shown in table 8.6. In case of units operated by the migrants the average value of capital is Rs. 2.39 lakh, and the units run by the locals have, on average, a value of capital amounting to Rs. 18.39 lakh which is 7.68 times the value of capital in the average unit run by the migrants. In terms of equity the units run by the locals are on average 3.33 times the size of the units controlled by the migrants. The minimum equity of migrant-operated units is only Rs. one thousand and that of a unit run by the locals is Rs. four thousand. The maximum equity of a unit operated by the migrants is Rs. ten lakh but the maximum equity of a unit operated by the locals is Rs. one crore. The average debt of the units operated by the locals is Rs. 10.65 lakh which is 145.32 times the average debt (Rs. 7.33 thousand) of the migrants-operated units. The debt of the units run by the locals is 143.91 percent of their equity. Thus in the composition of capital, the equity's share is 42.08 percent and the debt's share, 57.92 percent. In case of migrants-run units, the debt is as low as 3.16 percent of the equity. That is, the capital of the units operated by the migrants is mainly equity-based: 96.94 percent of the capital is equity and only 3.06 percent is debt.

	Categories of operators							
Debt (Rain 103)	L	ocals	Migrants					
(KS III 10°)	Number	Percentage	Number	Percentage				
0	19	82.60	68	90.67				
10	0	0	1	1.33				
40	0	0	1	1.33				
50	0	0	2	2.67				
100	0	0	1	1.33				
150	0	0	2	2.67				
200	1	4.35	0	0				
900	1	4.35	0	0				
3400	1	4.35	0	0				
20000	1	4.35	0	0				
Total	23	100.00	75	100.00				

Table 8.5: Borrowings by different categories of Operators

8.8 Productivity of Capital

The sampled units covering different types of activities from manufacturing industries to vehicle-repairing shops show moderately high productivity of capital. Of course there is a high variation of productivity not only over the different types of activities but also over the units of the same activity. Intra-trade differences in productivity are often more pronounced than the inter-trade differences. The productivity of capital is measured by the rate of profit on the capital used in production.

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Structure of Consitul	Units operated by				
Structure of Capital	Locals (tribals)	Migrants (non-tribals)			
Capital per unit	1839.04	239.42			
Equity per unit	773.82	232.09			
Minimum equity	4.00	1.00			
Maximum equity	10000.00	1000			
Debt per unit	1065.22	7.33			
Minimum debt	0.00	0			
Maximum debt	20000	150			
Debt-equity Ratio (in %)	143.91	3.16			
No. of units	23	75			

(Capital and its components are in thousand of Rupees)

Note: The capital structure of the two units operated jointly by the locals and non-locals is not included in the table.

Measurement of Capital

The conventional definition of capital which takes it as the sum of equity and debt is used in this study. Symbolically the value of capital (K_T) for the reference year (2003-04) is defined as

$$K_{T} = \int_{O} Q_{t} P^{t} e^{(r-\delta)t} dt + L_{t} \dots (d 8.1)$$

In (d 8.1) Q_t is owner's (promoter's / operator's) capital. The promoter starts the activity with the equity, Q_t ; in subsequent years, Q_t is the amount of cumulative investment in that activity. P_t is the price index. In Arunachal Pradesh price indices of commodities are not constructed. So we use the State's domestic product deflator as a proxy for the price index; r is the rate of interest and δ is the rate of depreciation. A flat rate of depreciation of 10 percent and a rate of interest of 11 percent are taken. L_t is the amount of outstanding loan at the time of survey. This introduces a certain amount of imprecision in the measurement of loan. The amount of loan outstanding per day during 2003-04 is the accurate yearly measure of loan utilized, but the problem of data collection compelled us to take the shortcut – the amount of loan outstanding at the time of survey.

Estimation of Profit

The estimation of profit poses a variety of problems, the most complex one being the imputation of the time-cost of the owners / operators. In all family-operated firms, this problem is invariably present. We tackle this problem by taking into consideration the salary of the manager per hour and the number of hours usually worked by the operator / owner per day in that unit. If the firm in question engages a manager then the manager's salary is used in the imputation of the owner's / operator's time-cost. In case the firm has no manager, we take the salary of the manager of a firm which is similar to the one being investigated. This kind of imputation suffers from imprecision and more specifically the standard accounting principles do not support it. However, in Arunachal Pradesh there was no sales tax only in the recent past. So keeping accounts in a shop or trading house is not a routine affair. In the absence of the better alternative we had to make the imputation. Once the imputed value of the entrepreneur's time-cost is estimated, the other elements of cost are easy to identify and measure. The total cost (TC) of the operation of the business is defined as

$$TC = W_1 + W_2 + R + I + C_i$$
.....(d 8.2)

In (d 8.2) W_1 is the paid wages and salaries and W_2 is the imputed time cost of the promoter, R is the rent paid for the building, I is the interest paid and C_i is the other costs. C_i is, in fact, the catch-all costs: the cost of raw materials, transport, etc. From the total revenue (TR) or gross income the total cost is subtracted in order to arrive at the estimated profit or surplus.

At this point it will be better to mention the problem of underestimation of the total cost of a unit due to the under-imputation of the time-cost of the promotes /

operators. The intensity of the efforts of the owners / promoters is much more than that of the paid workers / managers. So taking the market wage rate as the imputed time-cost of the owner-operators is clearly an underestimation of the cost of labour and management. This is reflected in the underestimation of cost and the overestimation of profit or surplus.

Table 8.7 shows the activity-wise rate of profit. The value of capital, the surplus or profit and the range of profit rate per production unit are also shown in this table. The average value of capital varies widely over the activities, highest in the medicine-manufacturing firms and lowest in hair-cutting shops. In-vehicle repairing shops and in (handloom) weaving unit also the amount of capital use is low - only Rs. 40 thousand in vehicle repairing shops and Rs. 45 thousand in the weaving unit. In the fruit-processing firm, the only unit in this State, the amount of capital is Rs. 79.60 lakh. Except medicine-manufacturing and fruit processing firms, all the units have the capital value which is well below a million rupees. Though the medicine-manufacturing and fruit-processing units use a high amount of capital, the rate of return to capital is low in these activities. The lowest rate of profit, 11.05 percent, is estimated for the fruit-processing unit. In medicine-manufacturing firms the average rate of profit is 15.68 percent which is higher than that estimated for the cane-furniture manufacturing units. We surveyed three units engaged in the making of cane chair and other items of furniture. The main raw material, cane used for this industry is abundantly available in Arunachal Pradesh, still the rate of profit in this industry is low. The profit rate of one firm is as low as 2.00 percent. However, the firm with the highest efficiency level derives a high rate of profit, 24.25 percent. Apparently, the rate of profit depends on the skill-intensiveness of the work and the amount of capital used. In general, the rate of profit in the manufacturing industries where a high amount of capital is used is low. The exception is the wine-making industry.

8.9 Determinants of the Productivity of Capital

As Stated before, the productivity of capital is measured by the rate of profit on capital. The skill-intensive work where the physical capital used is small, the rate of profit appears to be high. In hair-cutting shop the rate of profit is as high as 85.61 percent. In vehicle-repairing the profit rate is also quite high – 82.20 percent. This high rate of profit may be due to the under-estimation of the time cost of the operator. In studio (photography) the rate of profit is 49.69 percent. If we take the entire sample, no significant relationship appears between the profit rate (Π) and the amount of capital used:

 $\Pi = 47.604 - 0.0018 \text{ K} \dots (8.4)$ (11.3) (1.4) $R^2 = 0.02 \qquad N = 96$

In equation (8.4), K is the value of capital, and the parenthesized figures are t – values. The intercept in (8.4) is significant at 1 percent level, but the level of significance of the coefficient of K is 17.9 percent. The very low value of R^2 indicates that the rate of profit is not systematically related to the size of capital.

S1.		No. of	Value of	Due Ct	Rate of profit			
No	Type of Activity	units	capital	Profit	Minimum	Maximum	Average	
1.	Fruit-processing	1	7960	879	11.05	11.05	11.05	
2.	Medicine-manufacturing	2	15550	2978	11.95	19.41	15.68	
3.	Weaving	1	45	35	77.89	77.89	77.89	
4.	Bakery	2	105	46	34.33	68.33	51.33	
5.	Wine – and bear-making*	3	175	113			64.50	
6.	Cane-furniture-making	3	800	54	2.00	24.25	12.28	
7.	Studio (photography)	3	73	33	24.00	66.75	49.69	
8.	Meat-selling (butchery)	2	65	41	61.58	70.00	65.79	
9.	Cosmetic and cloth store	13	282	65	3.20	145.00	40.68	
10.	General store	30	225	48	5.83	237.50	50.50	
11.	Hardware shop	13	260	76	2.70	85.63	36.24	
12.	Medicine shop	2	150	61	28.75	40.50	34.63	
13.	Hotels and Restaurants	5	205	35	8.85	88.00	40.99	
14.	Public Call Office (telephone booth)	2	325	61	1.43	39.08	20.26	
15.	Wine shop	5	509	64	1.63	105.00	29.54	
16.	Tailoring	3	73	46	44.00	83.13	60.99	
17.	Vehicle repairing	6	40	25	28.75	116.25	82.20	
18.	Hair cutting saloon	3	37	31	79.06	92.75	85.61	

Table 8.7: Rate of Profit on Capital

* Capital refers to the average of 3 units but surplus to one unit only.

Note: The value of capital is the average value per production unit. The rate of profit is obtained by dividing the profit by the value of capital.

The fitness, however, increases if the relationship between the rate of profit and the size of capital is estimated for the individual industries separately. Table 8.8 shows the estimated relation. In all activities presented in table 8.8 there appears a negative coefficient of capital. Most of these relationships are not statistically significant. The significant relationship emerges from the vehicle-repairing and wine shops, but the sample size of these activities is too small to draw any strong conclusion. In terms of the value of the coefficient, the vehicle repairing shop witnesses the most rapid fall of profit with the rise in the size of capital. A rise in the worth of capital by Rs. one thousand entails a fall in the rate of profit measuring 0.896 percent points. The lowest fall of profit rate due to a rise in capital is found in the hardware shops: a rise in capital by a thousand rupees leads to a decline in only 0.052 percent points in the rate of profit.

Sl. No	Type of Activity	Intercept	ercept Coefficient of capital		Ν
1.	Cosmetic and cloth store	59.206	-0.657	0.25	13
2.	General store	78.904	-0.119	0.30	29
3.	Hardware shop	49.713	-0.052	0.21	13
4.	Hotels and Restaurants	75.411	-0.168	0.69	5
5.	Wine shop	64.143	-0.068	0.40	5
6.	Vehicle Repairing shop	118.059	-0.896	0.83	6

 Table 8.8: Activity-wise Relationship between the Rate of Profit and the Size of Capital

(Regression of size of capital on the Rate of Profit)

Note: Capital is measured in thousand of Rupees, N is the number of units.

What now emerges from the above analysis is that in some activities, the rate of profit declines with the increase in the size of capital, but in others the profit rate does not seem to be declining with the size of capital. The picture from the entire sample is unclear, indeed very hazy. The rate of profit seems to be declining with the rise in the size of capital, but this seeming tendency cannot be supported statistically. So capital cannot be taken to be an argument in the function determining the rate of profit. Leaving aside capital, if we take the number of labourers (including the owner / promoter) engaged and education of the promoter as the arguments in the profit function we get the following picture:

$$\Pi = 97.988 - 3.811 L - 3.927 E \dots (8.5)$$

$$(10.00) \quad (2.9) \qquad (4.2)$$

$$R^2 = 0.27 \qquad N = 95$$

In equation (8.5), Π is the rate of profit, L is labour an E is education. The parenthesized figures are, as before, t-values and N is the number of observations (production units). L of a firm is defined as

L = No. of unskilled labourers + 1.25 no. of semi-skilled labourers + 1.50 no. of skilled labourers + 1.50 owner / promoter.

The existing salary structure in the units is used to transform all workers into the equivalent of the unskilled category. Education is measured by the years of schooling of the promoter / operators / owners. Equation (8.5) creates more disbelief than surprise. The statistically significant coefficient of L can be accepted with all readiness – and indeed with a good measure of gladness – in view of the fact that the owner-operated firm is usually more productive than the one where the paid labour / manager is used. But the statistically significant negative coefficient of education cannot be easily accepted. It is counter-intuitive and in many cases, counter-factual. The explanation of this apparently bizarre phenomenon – the educational achievement reducing the rate of profit can be given in terms of the relationship between the level of educated promoters use a higher amount of capital used. In many cases the highly educated promoters use a higher amount of capital and higher amount of paid labour which tend to reduce the rate of profit.

CI Na	Deuti euleme	Sample	e Size	Mean		
51. INO	Particulars	Papum Pare	West Siang	Papum Pare	West Siang	
1.	Equity	58	41	379.16	352.20	
2.	Debt	58	41	373.28	82.93	
3.	Capital	58	41	752.43	435.12	
4.	Profit	57	38	157.86	69.31	
5.	Rate of profit	57	38	45.99	47.17	
6.	Debt-equity ratio (in %)	58	41	98.45	23.55	

Table 8.9: Inter-district Difference in the Rate of Profit

(Capital and its components in thousand of rupees)

In table 8.9 we present the values of different parameters depicting the productivity of capital in the two surveyed districts – Papum Pare and West Siang. The average size of equity in the two districts is not very different, but a high difference exists in respect to debt. In Papum Pare, debt is 98.45 percent of the equity but in West Siang debt is only 23.55 percent of the equity. As a result of this high difference in debt, the

mean size of capital in Papum Pare is much larger than that of West Siang. The rate of profit in the two districts is almost similar: 47.17 percent in West Siang compared with 45.99 percent in Papum Pare.

There is another area where the differential in the rate of profit is informative: the firms operated by the locals and those operated by the migrants. Table 8.10 gives the comparative picture. Since we have already discussed the aspects of capital structure in respect to migrant-operated and locally-operated firms. We take up only the rate of profit. As shown in table 8.10, the rate of profit in firms operated by the locals / tribals is as high as 72.22 percent but in case of the firms operated by the migrants, the rate of profit is only 40.94 percent. The inter-district differential in rates of profits as well as the rates of profit in firms operated by different sets of people provide us some insights into the nature of profit in Arunachal Pradesh.

CI No	Deutionleur	Sam	ple size	Mean		
51. INO	Particulars	Locals	Migrants	Locals	Migrants	
1.	Equity	22	75	773.82	232.09	
2.	Debt	22	75	1113.64	7.33	
3.	Capital	22	75	1887.45	239.43	
4.	Profit	19	74	389.61	56.26	
5.	Rate of profit	19	74	72.22	40.94	

Table 8.10: Differential Rates of Profits: Firms operated by Locals and Migrants

Note: The locals mean those belonging to the category of Arunachal Pradesh Scheduled Tribes (APST) and migrants are people from other States and they belong to non-APST.

8.10 Analysis of Profit Rate

The estimated rate of profit seems to be too high to be convincing. The rate of profit for the sample (of 95 units, not of 100 units) is 46.47 percent. It can be suspected that some elements of cost might not have been included in the estimation of the total cost. Apparently there has been an under-estimation of the time cost of the operator. A resolution of this under-estimation of cost can be found in the fact that the rate of profit is essentially the same in Arunachal Pradesh and the neighbouring areas of Assam, except the difference due to the restriction of entry in the former. It was estimated that the rate of profit is 5 - 10 percent higher in Arunachal Pradesh than in the neighbouring areas of Assam because of the Inner Line Regulations. If we take

this into consideration then the rate of profit in Arunachal Pradesh may be on an average 20 percent. So the difference between what is estimated and what is predicted (46.47 % - 20 % = 26.47 %) can be taken to be a product of interaction of a number of factors: imperfection in the market due to the lack of competition, geographical isolation and remoteness, etc. West Siang is more isolated than Papum Pare and the rate of profit is higher in the former than in the latter. With this analysis we can now reconsider the initial hypothesis that productivity of capital is low in Arunachal Pradesh. The data do not support this hypothesis. But then the question can be asked if the productivity of capital is high in Arunachal Pradesh, then why is private capital not rushing in Arunachal Pradesh?

The answer to this question is to be given in terms of the institutional configuration of the economy of this State. As Stated earlier, the migrants are not given any licence to own any business in this Arunachal. In the presence of this restriction, the 'big capital' does not, but small amounts of private capital manage flow to into this State. These small amounts of capital earn high returns which are not accumulated here, but are remitted to the origin. Thus Arunachal Pradesh attracts liquid capital or trade capital but the industrial capital shows no tendency to enter in this State especially in the presence of different institutional restrictions on its operation.

Note

- (1) It is true that the people who are migrants from other parts of the country cannot own any land nor can they construct any permanent house (of course, the first restriction subsumes the second the legal inability to own any land implies that a person cannot construct a permanent structure which he can call his own property). These are the provisions of the Inner Line Regulation Act which is still in force. However, a few exceptions can be cited here.
 - (a) After the establishment of the Outpost in 1918 the British Government brought a number of officials (from other parts of the country) in Pasighat, now headquarters of the East Siang district. A few of these officials settled in Pasighat and they were allotted land by the British Government.
 - (b) The Chinese invasion in 1962 created the impression that a very low density of population and specially the unpopulated areas near the international borders pose the problems of security. So efforts were made to settle people especially the ex-service men in the strategically important vacant lands in order to strengthen the security. Then came

the waves of Chakma and Hajong refugees from East Pakistan. Since they came from the hilly areas of East Pakistan the Government of India found Arunachal Pradesh suitable for their settlement. Apart from these refugees a good number of ex-service men along with their families were also settled by the Government of India and land was allotted to them. Some Tibetan refugees have also been settled in Arunachal Pradesh. All these settlements took place mainly in the 1960s.

- (c) The ex-service men were settled in areas which were vacant and far away from any existing settlement and also their number was few. So no local reaction took place against their settlement. But the settlement of the Chakma and Hajong refugees created the local reaction first in a mild form and then in a strong form. At present one important agendum of all the political parties in Arunachal is the removal of the refugees from Arunachal Pradesh.
- (2) The administration of Arunachal Pradesh is still single-lined; the judiciary has not been separated from the executive branch of the Government. This has constrained the provision of adequate judicial services to the people. Apart from this, there is the problem of the application of law. The judiciary is supposed to apply the local (tribal) law which, however, is not yet codified. In a State with 1.2 million people there are more than 100 tribes and sub-tribes, each of which has its own laws and legal system. It is really a gigantic task for the judiciary to follow all these traditional legal systems and judicial procedures, both civil and criminal. The easing of this task might be lying in the application of the all-India code such as Indian Penal Code (IPC), civil and criminal procedures, etc. The process has, however begun in the urban areas of the State, where the judiciary in the adjudication of many cases applies the all-India Code.

CHAPTER 9 Economic Inequality

9.1 Introduction

In the traditional barter economies of Arunachal Pradesh large-scale inequalities in the distribution of income, assets and opportunities could not appear. Land, the main factor of production in jhum cultivation, was community-owned and so it could not be used as the instrument of inequality. It was the abundance of land which prevented its having the capacity to generate rent⁽¹⁾. Rentless land with a free access to all the numbers of the community ensured the security of their livelihoods. A family could cultivate any amount of land, but its production function was subject to a number of constraints, the most important of which is the absence of a labour market. A family had to depend largely on its own labour power; wage labour was not available. Another important factor was the technological inertia; no mechanised method could be adopted because of the non-availability of the better implements. Lack of knowledge about any improved methods of production was also responsible for the fixity of the agricultural production function. While, on the supply side, the static technological condition and the unchanging method of production did not allow any shift of the production function, on the demand side the constraint came from the absence of market. When there was a surplus, its disposal was not always easy. Under the circumstances production function could not behave independently, it came under an extra constraint, the constraint of demand whose main source was the family level consumption and investment.

9.2 Traditional Protective Mechanisms

The community ownership of land provided the primary security, the security of livelihoods. Associated with the community ownership of land are a number of institutions protecting livelihoods of the people. These protective institutions evolved in a situation where there was no market. In fact these institutions provided a kind of market, a surrogate market different from one based on monetised transactions and mutual independence of the transactors. The surrogate market developed mutual dependence between the transactors. When a farmer harvested an output which exceeded his family's demand, be disposed of his surplus not in a market but tried to meet the deficit of his neighbour who failed to reap an adequate harvest because of pest attacks or some other reasons. The output of all farmers did

not covary in a positive way. Given the different physical features of hillsides on which jhum-cultivation was practised, the output varied from family to family. In a low-rained season the farmers with less sloping jhum fields harvested a higher output than one whose lands were relatively steep and faced high run-offs resulting in reduced production. The surplus producer aided the deficit farmer with all spontaneity, and when the fortune reversed – the deficit farmer turned out to be a surplus-maker and the surplus-producer of the previous year ran a deficit – he received the same spontaneous response from the surplus producer. An interdependent relation it is, but not fed on the motive of earning a profit ⁽²⁾. The amount of surplus given was not necessarily the same as the amount of aid received. The double-entry book-keeping did not guide the transactions, rather it was the communitarian feeling that effected the transactions satisfying the mutual needs. Such transactions did not yield profits to a party at the cost of the other.

The jhum land of Arunachal Pradesh which did not suffer the deep furrows of the profit-maximising farmer's plough and the squeeze of his harrow was not reduced to the status of being individualized. It was not segmented into family domains, it was not saleable. It was considered priceless incapable of being subjected to transactions through payments of any kind. So in traditional economies of Arunachal no income was generated in the form of rent. The transaction guided by the spirit of interdependence did not yield profit. The absence of labour market did not allow the growth of what is called wages. Wage-labour was absent but labour services were available. There was a well-developed system of mobilisation of social labour. In the absence of Government, it was this socially-mobilised labour which provided the public goods in the village: the roads in the village were constructed and maintained, small streams were bridged by this combined labour. Mutual assistance remained the cornerstone in the agricultural work but socially-mobilised labour always extended help to a family which was in need of it. Like land, labour could not be purchased. Help received had to be repaid by help. No doubt it was based on the principle of quid pro quo, but it was not mechanical. While extending labour services, a person was not motivated by earning a wage - which in economics is thought to yield utility to compensate the disutility incurred while working – rather he was motivated by helping a member of his community.

The surrogate market provided a vent for surplus not for earning revenue, but for securing a protective coverage of the future. There was no market for insurance, but the surrogate market provided sufficient amount of insurance. In fact it was overprotection; it was excessively secure ⁽³⁾. The overprotection tried to eliminate risk from the consumption basket of the people. The elimination of risk and the smoothing of consumption placed a family in the lap of security but this security

came at a cost; it had to be paid in terms of the incentives for savings. In the traditional society there was not much incentive for savings. The incentive was dulled by two factors: (a) a family could always depend on others and so his future appeared secure and (b) there were very few avenues for investment.

In many rural areas of the country the traditional credit market is characterised by a high rate of interest (usury). Of course much of interest might be the coverage of risk. In Arunachal Pradesh there was no concept of interest. The lending and borrowing operations were not bridged by the rate of interest. A person borrowing ten kg rice should in future return the same amount, not a higher amount. Of course the borrower used to take into consideration the needs of the lender. It was not a one-way traffic – a two-way process which did not allow any unilateral gains to weaken the mutual relations which are of permanent nature. In general, the magnitude of productive investment was very low; the overall net productive investment in the community did hover around zero.

In a static technological regime characterised by a very low rate of accumulation of capital, the surplus used mainly for building the supportive mechanisms saw a diversion in the procurement of valuables. Mithun was one medium of accumulation ⁽⁴⁾. Beads, Tibetan bells, plates swords, etc. were considered valuable assets. But none of these raised the productive capacity of the economy. Hoe, spade, axe, etc. remained the main tools of agricultural production. In the absence of growth of productive investment, the technological basis of production could not be changed.

A society guided by the principle of communitarianism did not give much space for inequality. As already stated, land was abundant and the production function was constrained by the scarcity of labour. The demographic regime ruling then was characterised by high mortality and fertility rates, a situation which kept the growth of population very low. The shortage of labour was almost perpetual and this kept the marginal productivity of labour positive. The overall standard of living of the people was of course, low and poverty was generalised but it was a shared one.

9.3 Genesis of Inequality

In the communal economies was launched the development programme by the Government to propel these economies to growth and to raise the standard of living of the people to the level prevailing elsewhere in the country. The Arunachal economy was placed on the dynamic growth path. Along with growth came inequality in almost all realms of the society. It will be germane to provide a glimpse of the process of generation of inequality especially in the economic sphere.

The development programme required the launching pads, the administrative and basic infrastructural facilities, in the soil of Arunachal Pradesh for its materialisation. The land belonged to different communities with whom the Government had to negotiate in order to acquire it. The land could not be purchased because no individual owners were there. True that the communities in Arunachal Pradesh, were small, but the Government's negotiating table was still smaller – it could not accommodate all the members of the community. The Government had to be selective. Given the time-bound nature of the Government's projects, the bureaucratic expediency demanded that for the interest of the timely completion of the project, the tempo of the work should be increased by involving those members of the community who had deeper knowledge about the society and better communication skills. The negotiators of the community became almost a part of the Government.

The Government acquired land on the promise that it would distribute developmental benefits to all members of the community. But the Government did not – and cannot – have the mechanisms to make the same benefits reach all homes. The Government worked through its officials and the community participation took place through the negotiators first and then through the facilitators of the programme. These participators became in due course the community leaders. Contracts they got, prime-movers they became in the establishment of educational institutions and pioneers they turned out to be in the process of modernisation and integration of different communal economies into the Arunachal economy. Gradually with the spread of education a further differentiation took place. The educated people became the agents of change; they carried with them the inputs of the modernisation. They became Government officials, politicians and spread out in different modern professions. Differentiation and inequality got gradually deepened in the society.

The economic inequality came through the changes of the institutions. The most important change took place in the realm of ownership of land. The community ownership of land gave way to individual ownership. The migration of workers created the demand for accommodation which brought into being the rent on land and residential buildings. The age-old institution of mutual insurance got weakened with the arrival of market insurance. The organised credit markets reduced the dependence on traditional loan transactions which used to create social bonding. The availability of migrant wage labourers attenuated the institution of social mobilisation of labour. Thus the age-old basis of social solidarity was shaken thoroughly by the process of individualisation of relations. The individual acquired full control over his earned income. He could save and invest freely without the intermediation of the community. All these changes brought about inequality whose magnitude is considerably high today.

9.4 The Data

Though inequalities in the distribution of income, assets and productive resources appear to have assumed now significant proportions, the scarcity of adequate information does not enable us to draw an inequality map of the Arunachal economy. The data-scarcity may be due to the combined operation of the two factors. Firstly, a significant proportion of the people in the interior areas of the State depend on the common property resources (CPR) for their livelihoods. Market has not yet appeared in those areas; this creates the problem of valuation and estimation of income. True that in the areas where monetised transactions are yet to replace the barter, the magnitude of inequality in income or assets is small but the comparison of the interior areas with the accessible areas becomes difficult when the accurate measurement is almost impossible. Secondly the scattered and sparse settlement patterns in the hilly terrains make it severely difficult to conduct any household-level survey. Of course, some data on inequality in income are available (Human Development Report, Arunachal Pradesh 2003; Roy and Kuri 2001 and references therein).

Given the paucity of data a household-level survey was conducted to generate the data on the distribution of income and the status of unemployment. Two out of the then 15 (now 16) districts were selected, the basis of selection being the level of transformation the district economy has undergone, the level of urbanisation, etc. Papum Pare is the most urbanised of all districts, with more than 50 percent of its people living in the urban areas, and it is the district where the non-agricultural sectors contribute more then 50 percent of its domestic product. So Papum Pare was selected. The other district selected is West Siang which has an industrial base. It is the district which is the seat of one of the oldest district headquarters in the State. Apart from this, the field station of the Indian Council of Agricultural Research (ICAR) is located in this district.

The total sample of 200 households was distributed between these two districts on the basis of their population. While distributing the sample the total population was not taken into consideration; it was the size of the population belonging to the Arunachal Pradesh Scheduled Tribes (APST) category which was considered. Of the total population of 2.26 lakh in these two districts, Papum Pare's proportion is 54.0 percent and West Siang's 46.0 percent, but in case of APST population, Papum Pare's proportion is 45 percent and West Siang's 55 percent. On the basis of this relative size, the approximation distribution of the sample yielded a sub-sample of 91 (45.5 percent of the sample) households from Papum Pare and 109 (54.5 percent of the sample) households from West Siang. In the rural-urban distribution of a district's sub-sample the distribution of the population in the rural and urban areas was taken into account. From Papum Pare 46 households were taken from rural areas. In case of West Siang 19 households from the urban and 90 households from the rural areas were surveyed.

The sample size was kept small in order to raise the accuracy of the data. The urban sample was selected in such a way that the richest, middle income and the poorest areas were covered. In case of the rural sample, the selection was done in such a way that the most developed, medium and the least developed villages were represented in the sample. Apart from Itanagar, the capital of the State, three villages were surveyed from Papum Pare. In West Siang, of the two towns only one, Along, the district headquarters was surveyed. Apart from this four other villages of the district were surveyed.

Sl. No	Sampling area	Village / town	District	No. of households surveyed	Population	Literacy rate (%)
1.	Itanagar	Town	Papum Pare	46	224	84.86
2.	Rono	Village	Papum Pare	14	100	83.91
3.	Emchi	Village	Papum Pare	11	72	76.47
4.	Gumto	Village	Papum Pare	20	127	81.31
5.	Along	Town	West Siang	19	90	81.25
6.	Gumin-Nagar	Village	West Siang	20	104	85.15
7.	Kabu	Village	West Siang	16	97	69.57
8.	Yigi-Kaum	Village	West Siang	27	123	58.20
9.	Bagra	Village	West Siang	27	188	58.76
10.	Rural			135	811	71.22
11.	Urban			65	314	83.89
12.	Papum Pare		Papum Pare	91	523	82.71
13.	West Siang		West Siang	109	602	68.18
14.	Total			200	1125	74.81

Table 9.1: Composition of the Sample and the Literacy Rate of the Surveyed Population

Note: Dash means not applicable

A structured questionnaire was used in door-to-door survey. From each selected village around 80 percent of the households were randomly selected for survey. It may be noted that the size of a village in Arunachal Pradesh is usually smaller than in the plains states of the country. The composition of the sample and the literacy rate of the surveyed population are shown in table 9.1. The data on the literacy of the females and males is shown in table A 9.1 in the Appendix. The literacy rate of the surveyed population is 74.81 percent which is much higher than the literacy rate in the State (54.74 percent as per 2001 census).

9.5 Magnitude of Inequality: Income

Table 9.2 shows the summary measures of inequality for the rural and urban samples. The inequality of surveyed villages and towns is shown in table A 9.2 in the Appendix. Five parameters of the income distribution in a sample of two hundred randomly selected households of two districts of Arunachal Pradesh – Papum Pare in which is situated Itanagar, the capital of the State, and West Siang – appear in table 9.2 These are average income (the arithmetic mean of household incomes), range (the absolute difference between the highest and lowest income divided by arithmetic mean), variance of logarithm of income, CV sq (the squared coefficient of variation), T (Theil's entropy index) and L (Theil's second measure).

Area	Sample size	Average Income	Range	Variance of log (income)	CV sq	Т	L
Urban	65	36.22	5.36	1.11	1.47	0.54	0.57
Rural	135	11.85	12.60	0.68	1.60	0.41	0.37
Total	200	19.77	10.00	1.00	2.31	0.64	0.58

Table 9.2: Income Inequality in Arunachal Pradesh

Note: Average income is in thousand of rupees. Range, variance of log (income), CV sq, T and L are scale-free (pure) numbers. These parameters of income distribution are estimated on the basis of the data obtained from a primary survey conducted for this project. The data relate to the fiscal year 2003-04.

Per capita income in the sampled households is Rs. 19.77 thousand which is quite high. In 2002-03 per capita Net State Domestic Product was Rs. 15.62 thousand which is 20.99 per cent lower than that obtained from the survey for the year 2003-04. Per capita income of the sampled households is higher not only than the State's per capita income but also than the per capita national income (Net National Product).

There is a very high difference between rural and urban incomes. The urban income per head is 205.65 per cent higher than the rural per capita income. The urban income exceeds the average level by 83.21 per cent. As shown in the Appendix (table A 9.2) the inter-village difference in per capita income is substantial. The poorest village in the sample is Gumto in Papum Pare district with a per capita income of only Rs. 6.55 thousand. The richest village with a per capita income of Rs. 26.70 thousand is Gumin Nagar in the district of West Siang. The difference in per capita income between the richest and poorest villages is as high as Rs. 20.15 thousand. Of the seven villages surveyed, four villages have a per capita income which is less than Rs. 10,000 per annum. The standard deviation of per capita village income (number of villages is seven) is Rs. 6.67 thousand and the squared coefficient of variation is 0.29 and measured by it, the intra-village inequality in per capita income is higher than the inter-village inequality. Of the two towns in the sample, Itanagar, the biggest town in Arunachal Pradesh, is poorer than Along, the district headquarters of West Siang: Itanagar's per capita income at Rs. 28.00 thousand is about half of Along's Rs. 56 thousand. The sample fails to capture fully the inter-district differential in income. According to this survey the per capita income in West Siang (size of the sub-sample is 109 households) is Rs. 19.95 thousand which is only 2.05 per cent higher than Papum Pare's per capita income of Rs. 19.55 thousand.

Range

Defined as the absolute difference between the highest and lowest per capita income divided by the arithmetic mean, range is the simplest measure of inequality. Applied to the survey data under a binary classification into the rural and urban, range measures a higher degree of inequality among the rural than among the urban households. The rural household income per head has a range of 12.60 and the urban only 5.36. Among the villages (table A 9.2 in the Appendix), the lowest value of range, 2.07, is found in Emchi of Papum Pare district and the highest, 5.54, is estimated for Gumin Nagar of West Siang district. Between two surveyed towns, Itanagar with a range of 6.94 stands much higher on the inequality scale than Along with a range of 2.88. As a measure of inequality, range has a serious shortcoming. It takes into account only two extreme values of the distribution, all other values being neglected by this measure, it cannot be taken seriously.

Variance of Logarithm of Income

Unlike the variance of income, the variance of logarithm of income is a scale-free measure of inequality. This quality makes the variance of logarithm of income more attractive than the variance of income. Based on this measure, the inequality is

higher in urban than in rural areas, and the difference is substantial – the urban's 1.10 versus the rural's only 0.68. The overall inequality stands at unity. Of the two towns, Along has a higher inequality (1.10) than Itanagar (0.97). Among the villages the variance ranges from a low of 0.35 in Yigi-Kaum of West Siang to a high of 0.89 in Gumin Nagar in the same district. The inequality measured by range and variance differs significantly. Range shows the rural income distribution more unequal than the urban income, variance gives the opposite picture. This point will be treated later.

Squared Coefficient of Variation

In terms of the squared coefficient of variation, the rural inequality stands higher than the urban. The overall inequality at 2.31 is again higher than both the rural (1.60) and urban inequality (1.47). Of the two towns, Itanagar stands, with a value of 1.85 higher on this inequality scale than Along with its squared coefficient of variation carrying a value of 0.83. The village Kabu of West Siang is the most egalitarian with its coefficient of variation of 0.34 and Gumin Nagar, a village of the same district, has the highest inequality with a coefficient value of 1.36. Gumin Nagar's inequality is so high that no other village approaches even half of its value.

Theil's Measures: T and L

Henry Theil's entropy index, T is defined as

N
T = 1 / N {
$$\Sigma$$
 (Y_i / M) (log Y_i / M)}(d 9.1)
i=1

In this definition N is the number of households, Y_i is the per capita income of the ith household and M is the arithmetic mean of the per capita household income.

Called Theil's second measure of inequality by Anand (Anand 1997, p. 88; Theil, 1967), L is defined as

L = log M - log Mg(d 9.2)

Here M, as mentioned above, is the arithmetic mean of the per capita household income and Mg is its geometric mean.

Measures of inequality yielded by T and L are similar, as shown in table 9.2 and A 9.2. Both T and L place urban inequality at a higher level than the rural inequality.

However, the urban-rural distance in L-scale is higher than in T-scale. L measures a difference of 0.20 between urban and rural inequality and on the T-scale, the difference stands at only 0.13. The overall inequality measured by T is 0.64 and L is 0.58.

9.6 Relationship Between Inequality Measures

In order to show the relationship between the measures of inequality, a correlation matrix is calculated on the basis of village-and town-wise measures of inequality. In our sample there are seven villages and two towns yielding a total of nine observations. Estimates based on such a small number of observations are necessarily not very dependable. Presented in table 9.3, the correlation matrix shows that all the measures have a statistically significant positive relationship. The only exception is range and variance of logarithm of income – their correlation coefficient is not significant at 5 per cent level. The strongest relationship is between the squared coefficient of variation and T – the correlation coefficient between them being 0.97. T and L are also highly correlated and so are range and the squared coefficient of variation. L and variance of logarithm of income are also highly correlated. Except range, all the measures have their advantages and disadvantages. Weighing these we can make a choice between variance and T. Before exercising this choice we can turn to Gini-Measure.

Measures	Range	Variance of log (income)	CV sq	Т	L
Range	1	0.469*	0.949	0.856	0.685
Variance of log (income)		1	0.683	0.816	0.947
CV sq			1	0.969	0.859
Т				1	0.952
L					1

Table 9.3:	Relationship	between	Inequality	Measures
	1		1 /	

* Not significant at 5 per cent level.

9.7 Gini – Measure of Inequality

The measures discussed above are all summary in nature; they do not shed any light on the pattern of income distribution. The pattern is taken up now. However, there is a problem in the presentation of village-wise income distribution – the small size of

the sample. So instead of going for village-and town-wise presentation, the income distribution of the whole sample is taken up. Table 9.4 shows this. The lowest income class has a per capita income which is less than or equal to Rs. 2500 which translates into 312.5 kg rice at the rate of Rs. 8 per kg, not a high price in the context of Arunachal Pradesh.

The average income of this class is Rs. 1974 per annum, which is again equivalent to just 247 kg rice. If a person consumes 500 gm rice daily, then only 64.5 kg rice remains to meet all his non-rice demands of consumption. Pulses to him are too expensive to afford and a balanced diet cannot be even dreamt of. Some non-food items such as clothing, medicine, etc. fall within the most essential category. The paucity of income forces him to dissave. The per capita consumption of this class, however, exceeds its per capita income by a wide margin – the difference being financed by dissaving. The per capita dissaving of this group is as high as Rs. 2707 against its yearly consumption of Rs. 4680. The detailed information appears in table A 9.2 in the Appendix. As shown in this table, the per capita asset of this group is not low – it is Rs. 31887 which is quite handsome. Another important point to note is the composition of income of this group: as high as 76.94 per cent of their income comes from business activities and only 23.06 per cent from agriculture. No income of this class comes from service. A total of 11 households belong to this category constituting 5.50 per cent of the sample and the combined income of these households forms only 0.55 per cent of the total income. The next income class corresponds to the income range of Rs. 2500 to Rs. 5000. A total of 35 households forming 17.50 per cent of the sample belong to this class. The income share of this class is 3.64 per cent of the total. The average yearly per capita income of this class is Rs. 4109. This group also have to depend on dissaving in order to finance their consumption. It may be noted that dissaving is incurred by all the income classes below the income level Rs. 15,000. As high as 69.50 per cent of the households belong to this dissaving category.

On the other end of the distribution is the richest class of nine households whose per capita household income is Rs. one lakh (one tenth of a million) and above. This group of households constitutes 4.50 per cent of the sample, but their income is 31.66 per cent of the total. Average per capita income of this class is Rs. 1.39 lakh.

Table 9.4: Distribution of Income in Arunachal Pradesh

Sl. No.	Income Class	No. of households	% of total households	Cumulative % of households	Amount of income	% of total income	Cumulative % of income
1	< 2.5	11	5.5	5.5	21.71	0.55	0.55
2	2.5-5	35	17.5	23.0	143.81	3.64	4.19
3	5-7.5	28	14.0	37.0	170.65	4.32	8.51
4	7.5-10	25	12.5	49.5	215.70	5.45	13.96
5	10-15	40	20.0	69.5	515.94	13.05	27.01
6	15-20	10	5.0	74.5	172.22	4.36	31.37
7	20-25	13	6.5	81.0	287.38	7.27	38.64
8	25-30	10	5.0	86.0	269.61	6.82	45.46
9	30-40	11	5.5	91.5	389.97	9.86	55.32
10	40-50	1	0.50	92.0	47.55	1.20	56.52
11	50-100	7	3.5	95.5	467.26	11.82	68.34
12	> 100	9	4.5	100.0	1251.72	31.66	100.00
13	Total	200	100.0	100.0	3953.52	100.00	100.00

(Income is measured in thousand of Rs)

Note: Income is in per capita terms,

These households save the larger proportion of their income: their average propensity to save is 65.32 per cent and average propensity to consume is only 34.68 per cent. These households belonging to the class richest in the State derive their income from multiple sources. They have interests in land, some family members are in the service sector, but their main source of income is business. As high as 86.49 per cent of their income comes from business activities, 6.86 per cent from agriculture and 6.65 per cent from service. Below this richest group is the one with an income range of Rs. 50 thousand to Rs. one lakh. Nine households form this group which is 4.50 per cent of the sample but they earn income which is 11.82 per cent of the total. These two richest groups together constitute 8.00 per cent of the surveyed households and their income is 43.48 of the total.

The sample shows a very high magnitude of income inequality. Only 14.00 per cent of the richest households earn more than 50 per cent – to be exact 54.54 per cent – of the total income, and the 49.5 per cent of the households in the lower end of the income distribution earn only 13.96 per cent of the total income. The overall inequality measured by Gini-coefficient is as high as 0.566. Based on a sample of 200 households only we cannot claim much about the degree of income inequality in the State. However, other studies also show a high degree of inequality in Arunachal Pradesh. For example, the value of Gini-coefficient estimated by Roy and Kuri from a survey of 400 household is 0.48 (Roy and Kuri 2001, p.73). Next we take up the census data on landholdings. True that the census data on landholdings do not reflect the ownership patterns but the scale of operational holdings gives us an idea about the inequalities in the production units in agriculture on which depend 62.00 per cent of the population (as per 2001 census).

9.8 Inequalities in Agricultural holdings

Inequality cannot remain confined only to income. In fact income inequality is the reflection of inequalities in other areas: in wealth, in land, in human capital, etc. The latest agricultural census data available are presented in table A 9.3 in the Appendix and summary information appears in table 9.5. Though not of the same order as the inequality in income, yet the magnitude of inequality in the distribution of agricultural holdings is quite high. As many as 9593 holdings which are 9.25 per cent of a total of 103734 in the State as per 1995-96 census, belong to the smallest size-class, less than half a hectare. These holdings are too small to be capable of generating sufficient amount of output for the survival of the farming family. The average farm size of this class is only 0.28 hectares and the area operated by these farms constitutes 0.78 per cent of the total.

The farm sizes below one hectare are one-fifth of all the farms but the area under them is just 2.94 per cent of the total. On the upper side, farms measuring 10 hectares and above form only 5.35 per cent of the total but the land under their operation is as high as 22.32 per cent of the total. The Gini-coefficient estimated from the data and presented in table A 9.3 is 0.477 which is lower than the Gini-coefficient estimated for income; however these are not fully comparable. Had the landownership data been available perhaps it could have been seen that the ownership distribution was more skewed than the distribution of operational holdings.

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Size class of holdings	% of holdings	% of area	Cumulative % of holdings	Cumulative % of area
Below 2	39.46	10.39	39.46	10.39
2-5	38.73	35.69	78.19	46.08
5 – 10	16.46	31.60	94.65	77.68
10 and above	5.35	22.32	100.00	100.00

 Table 9.5: Distribution of Agriculture Holdings in Arunachal Pradesh: 1995-96

Note: Calculated on the basis of data from Arunachal Pradesh Agricultural Census 1995-96

In the absence of accurate information a definite statement on the ownership distribution of land cannot be made, but the scattered observations appear to show a high degree of inequality in the ownership of land especially the agricultural land. The emergence of the institution of the individual property rights in land has facilitated the separation of ownership of land from its operation. In the traditional institution of community ownership of land which vested only usufructuary rights to the individual farming households, ownership was co-terminus with the operation of land. The new property rights regime has, by separating the ownership of land from its ownership, brought in the institution of tenancy in agriculture. The tenancy, which is dominated by share-cropping has enabled the big landowners in the State to parcel out their land to several share-croppers who are mainly migrants from Assam, North Bengal, Bihar and Nepal. In some plains of the State it is found that as many as seven to ten tenants (sharecroppers) cultivate the land of the same owner. This is the holding multiplier effect of tenancy.

The availability of wage-labour has normally the opposite effect – it enables an owner to cultivate more land than he is capable of doing with his family labour. This is scale-raising effect of wage-labour. Not that the wage-labour has only the scale-raising effect, it has also scale-neutral effect. This is substitution effect in the context of Arunachal Pradesh. The expansion of non-agricultural activities makes it possible for a person to diversify his income-earning activities. What some small landowners do is the engagement of wage labour for cultivation and he himself engages in some non-agricultural activities. In such cases wage-labour does not raise the scale of farming operations. It may be noted that the supply side of the agricultural labour market is dominated by the migrant labourers from other parts of the country. Their skill in permanent cultivation, especially in wet-rice cultivation makes their demand high in the State. Some local people, skilled in jhum-cultivation , find the wet-rice cultivation too complicated to be engaged in. So they prefer tenancy to wage-labour,

⁽Area in hectares)

because the labourers require monitoring and especially managerial guidance which some local land owners are unable to provide. On the basis of these observations we can tentatively conclude that in Arunachal Pradesh the landownership distribution is, in all probability, more unequal than the distribution of operational holdings, a conclusion which requires substantiation from studies based on large samples.

9.9 Level of Income and Inequality

Since Kuznets' seminal work on the relationship between economic inequality and development, in the mid-1950s, a huge literature on the subject has grown up. With few exceptions (see for example, Anand and Kanbur, 1997), this literature has been supportive of what is called Kuznets' inverted U-hypothesis that the inequality rises in the early stage of development, then with the advancement of development the inequality stops growing and at a later stage of development the inequality falls.

Establishing the relationship between the level of income and the degree of economic inequality requires preferably the time-series data. But for Arunachal Pradesh no time series data on income inequality are available. This compels us to remain confined only to our cross-section data.

Measures of	N	Linear relationship		Non-linear relationship				
Inequality		b 0	b 1	R ²	b 0	b 1	b ₂	R ²
Range	9	2.96 (3.3)	0.03* (0.8)	0.09	0.278* (0.2)	0.323 (3.0)	-0.005 (3.0)	0.60
Variance of log (income	9	0.39 (4.1)	0.015 (3.8)	0.67	0.24* (1.4)	0.0302* (1.9)	-0.0003* (1.0)	0.72
CV sq	9	0.48 (1.9)	0.016* (1.5)	0.25	-0.35* (1.3)	0.106 (4.2)	-0.002 (3.7)	0.77
Т	9	0.18 (3.1)	0.01 (2.3)	0.44	-0.0003* (0.005)	0.026 (3.8)	-0.0003 (3.1)	0.78
L	9	0.18 (3.6)	0.007 (3.3)	0.62	0.055* (0.7)	0.020 (2.9)	-0.0002 (2.0)	0.77

Table 9.6: Level of Income and Economic Inequality in Arunachal Pradesh

Note: Estimated on the basis of the data obtained from the primary survey. N is the number of observations. The unit of observation is the average per capita income of a village or town. In linear relationship, b_0 and b_1 are the estimated parameters of the equation: $NE = b_0 + b_1 Y$ and in the non-linear relationship, b_0 , b_1 and b_2 are the estimated parameters of the equation: $NE = b_0 + b_1 Y + b_2 Y^2$. In these equations NE is a measure of inequality and Y is the measure of per capita income. Parenthesised figures are t-values. Asterisked parameters are not significant at 10 per cent level.

One basic problem with these data is the smallness of the sample – only nine units of observations are available, each unit corresponding with the average per capita household income of a village or a town. With this weakness in mind, we try to establish the relationship between the level of income and inequality. As before, five measures of inequality are used: range, variance of logarithm of income, squared coefficient of variation, and Theil's T and L. First a linear relationship between average per capita household income of a village or a town and its income inequality is estimated. Then two forms of relationship, linear and quadratic are estimated. Both the linear and quadratic relationships are estimated using the least squares method. The results are presented in table 9.6.

We can first take up the linear relationship for analysis. It can be observed, per haps with a bit of suspicion, that the strength of the relationship is dependent on the type of inequality measure being used. If range is used as a measure, we see in table 9.6 that there is no significant relationship between the level of income and its inequality. The coefficient of income is insignificant and the value of R^2 is very low only 0.09. From this extreme if we take variance of logarithm of income, we reach another extreme. Income now carries a highly significant coefficient and the overall fitness of the relationship is quite high as shown by the high value of R^2 (0.67). Of the five measures of inequality only two – range and squared coefficients which are significant at 10 per cent level. This rather mixed result prevents our making any conclusive statement.

If we move from the linear to the non-linear relationship we see a reflection of the familiar hypothesis of Kuznets. All measures except variance of logarithm of income have significant quadractic relationship with the level of income. If we exclude the variance of logarithm of income, then we see that the coefficients of income and squared income are significant at 10 per cent level in all the equations. The intercepts are not, however, significant. The estimated non-linear equations show that the inequality first increases, then reaches a maximum value and afterwards, it declines. Different measures give different levels of income at which the highest degree of inequality occurs. Table 9.7 shows the maximum values of different measures of inequality obtained by maximizing the functions appearing in table 9.7. The critical level of income, the level which witnesses the start of falling of inequality also appears in table 9.7.

Measures of Inequality	Maximum Inequality	Critical level of Income (Rs in 1000)		
Range	5.49	32.30		
Variance of log (income)	1.00	50.33		
CV sq	1.05	26.50		
Т	0.56	43.33		
L	0.55	50.00		

 Table 9.7: Maxima of Inequality Measures and the levels of Income at which

 Inequality Starts falling

Note: Critical level is that level of income at which the inequality starts falling. Income is average per capita household income.

It is found in all the measures of inequality that there are some observed values which exceed the estimated maxima. Thus the maximum observed value of the range is 6.94 found in Itanagar; but the estimated maximum value of range is 5.49 shown in table 9.7. The highest observed value of the variance of logarithm of income is 1.10 which is found in Along, and its estimated maximum value is 1.00. The level of income at which the maximum inequality takes place and then it starts falling varies widely from measures – the range of this variation being as high as Rs. 23.83 thousand. The inequality measured by the squared coefficient of variation starts falling when the level of incomes reaches Rs. 26.50 thousand, the minimum among all measures. In case of the variance measure, the fall in inequality starts at the income level of Rs. 50.33 thousand, the highest among all measures is Rs. 40.49 thousand.

We can now extend the empirical measures of inequality to the Arunachal economy and find out the estimated value of inequality. Estimated values of different measure of inequality are presented in table 9.8. In the estimation of inequality, the per capita NSDP at current prices for the year 2002-03, which stands at Rs. 15.62 thousand is used.

Compared with the observed values of inequality for the sample, those estimated for the economy of the State are small. Table 9.8 gives the estimated number of years that will be required for the income inequality to take on the path to decline. Two growth rates of NSDP are assumed to derive the estimation. At the 7 per cent growth rate, range is projected to fall after 10.38 years. The long period – 16.71 years – will be required for variance to fall. The smallest period – 7.55 years – will be required for

the squared coefficient of variation to start falling. L takes 16.62 years to start the fall. With the assumed growth rate of 7 percent the average number of years required for the inequality to fall is 13.17 years. If a higher growth rate of NSDP at 10 per cent per annum is assumed, the minimum amount of time required for any index to start falling is 5.29 years, required by the squared coefficient of variation. The longest period – 11.70 years – is required by variance of logarithm of income and the average over all measures is 9.22 years.

Management of Language liter	Estimated value	Years required for inequality to fall		
Measures of Inequality	for 2002-03	NSDP Growth = 7%	NSDP Growth=10%	
Range	4.10	10.38	7.27	
Variance of log (income)	0.63	16.71	11.70	
CV sq	0.82	7.55	5.29	
Т	0.33	14.58	10.20	
L	0.32	16.62	11.63	
Average		13.17	9.22	

Table 9.8: Estimated Inequality and Projected Number of years required forthe Decline of Inequality

The projection of a sample of cross-section data upon the time-path of the aggregate economy is inherently weak. What however we can assert with a good amount of certainty is the high level of economic inequality in the State. Inter-personal income inequality is very high. The agricultural land holdings are also distributed skewedly.

Trend in Inter-district Income Inequality

The secondary data (estimated by Directorate of Economics and Statistics , Government of Arunachal Pradesh) show a high degree of inter-district income inequality. As provided in table 9.9, among all the 12 districts for which data are available since 1993-94, the year of beginning of district domestic product accounting in Arunachal Pradesh, Dibang Valley has the highest per capita Net District Domestic Product (NDDP). Dibang Valley's per capita NDDP of Rs. 13.33 thousand in 1993-94 exceeded Lower Subansiri's Rs. 6.01 thousand, the lowest per capita NDDP among the districts, by 122.03 per cent. The range of variation in district income fell marginally in 2000-01, when Dibang Valley, all through the district with the highest per capita income in the State, had an income Rs. 13.24 thousand which is 97. 61 per cent higher than that of Subansiri, the district which retained its lowest position in the scale of per capita income in all the years between 1993-94 and 2000-01. Table 9.3 also shows the growth of district income in Arunachal Pradesh. The growth rates vary significantly among the districts.

Measured by the squared coefficient of variation, the inter-district inequality in the per capita NDDP shows an increasing trend upto 1999-2000 and then in 2000-01 it suddenly dropped, so that the overall trend during 1993-2001 is insignificant as shown below:

 $CV \text{ sq} = 0.065 - 0.001 \text{ t} \dots (9.1)$ $R^2 = 0.03 \qquad N = 8$

In equation (9.1) CV sq is the squared coefficient of variation, t is time measured in years with origin 1992-93 and N is the number of years covered. The coefficient of t is insignificant.

Table 9.9: Per Capita Net Domestic Product: 1993-94 to 2000-2001

(In Rs. at constant prices of 1993-94)

District	2000-01	1993-94	Mean	Growth Rate (in %)
Tawang	11411	12082	10541	3.46
West Kameng	10909	10698	12391	1.69
East Kameng	7604	7458	7237	0.61
Papum-pare	7848	9440	9334	4.3
Lower Subansiri	6701	6006	6179	2.6
Upper Subansiri	8438	6475	7268	4.90
West Siang	9299	8241	8595	2.73
East Siang	12203	8223	10719	3.00
Upper Siang	10158	-	9878	2.85
Dibang Valley	13242	13335	13328	2.59
Lohit	9191	8678	8450	2.49
Changlang	7421	7474	7167	1.42
Tirap	7427	7442	7602	1.11
Arunachal Pradesh	9153	8866	8914	2.72

Note: Growth rate is the estimated value of r in the equation log y = a + rt, where y is the Net District Domestic Product at constant prices of 1993-94 and t is time measured in years. The number of observations used in estimation is 8 years (from 1993-94 to 2000-01)

Source: Estimates of District Domestic Product, Arunachal Pradesh (1993-94 to 1998-99) and Quick Estimates of District Domestic Product, Arunachal Pradesh 2000-2001; Directorate of Economics and Statistics, Government of Arunachal Pradesh, Itanagar.
The squared coefficient of variation which had a value of 0.06 in 1993-94 rose to 0.07 in 1996-97 and then took a slightly downward turn, falling sharply in 2000-01 to a value of 0.05, the lowest during the reference period. The slow rise and then fall in the value of squared coefficient of variation traces a quadratic curvature as shown below:

CV sq =
$$4.90 + 0.009$$
 t - 0.001 t²(9.2)
(6.0) (2.2) (2.3)
 $R^2 = 0.53$ N = 8

The values of all the parameters are now significant at 10 per cent level. If however, the year 2000-01 is slashed from the sample, a weak positive trend emerges as shown in equation (6.3).

Both the parameters are now significant at 5 per cent level. The value of R^2 is, however, small. The low value of R^2 as well as the small size of the sample does not enable us to make a categorical statement on the trend of inter-district income inequality, but the prima facie evidence is supportive of a trend which is not falling. A rising trend can, however, be buttressed on a truncated data set – by excluding the year, 2000-01 – but such truncation cannot be justified. What we can gather from the district-level domestic product is that the inter-district inequality in per capita income is substantial and this inequality is more or less showing no definite trend, upward or downward. Moreover, different districts have been experiencing different rates of economic growth which are not reducing much the inter-district economic inequality. We can now turn to the survey data to focus on the magnitude of inequality in household income.

In every segment of the economic space there is inequality. This is totally a new phenomenon which has grown gradually in Arunachal Pradesh since the 1950s. With development has come the inequality which is not accommodated in the traditional socio-cultural values of the tribal communities. It is the high magnitude of inequality which is basically the reason behind the tension in the society.

Notes

- (1) The relative abundance of land in Arunachal Pradesh can be gauged by its very low density of population only 13 people per sq km as per 2001 Census. The estimated density in 1947 was three people per sq km which translates into 33.33 hectares of land per head. The abundance of land much of which is hilly and forested might be responsible for its rentlessness in a very old technological regime, but the land's not earning rent does not mean that it was valueless. The land was, in fact, too valuable to be owned by the individual or even by the family. The social utility of land was placed above its individual-level utility.
- (2) (a) Given the amount of heterogeneity in the socio-economic and administrative landscape of the traditional communities in Arunachal Pradesh, generalisation is hazardous. In majority of the communities mutual inter-dependence did not evolve into a principal-agent relationship, but among the communities in Changleng and Tirap districts, and partly in Lohit district, a weak form of chieftainship evolved. The Chief was, however, a nominal head, the symbol of a clan operating more in the spirit of being primus inter pares than a prime moving the followers. The source of income of the Chiefs was not tax; it was cultivation.
 - (b) Among the people of West Kameng and Tawang, a hierarchy in the religious order was a highly developed one. The main priests of the Buddhist temples enjoyed even in the secular realm the status of a chief. Empowered to collect tax from the commoners, the temple authority acted like a feudal lord making a distinction between the order of priest and the lay.
 - (c) The spirit of equality bound the members of a community but this spirit did not transcend it. In some areas where slavery evolved, the members of the slave tribe worked as followers of the members of the master tribe. So egalitarianism was a principle binding intra-tribal relationship but it was not applicable to the determination of the inter-tribal relationship.
- (3) Anthropological literature is dense with instances of mutuum, reciprocity and inter-family bonds of durable nature. In a society where the insurance market or the organized credit market has not yet appeared, a kind of smallscale insurance mechanism develops. This is called generalised reciprocity in

anthropology and mutual insurance in development economics. Considered by some scholars as an effective substitute for market insurance, others doubt its efficacy (see for example, Platteau 1997).

(4) Mithun, the semi-domesticated variety of cattle (bos frontalis), occupied the uppermost position in the hierarchy of the value-space of objects in the traditional society in Arunachal Pradesh, where there was no generalised money. To a high degree mithun's function as a medium of exchange was generalisable. Any amount of debt or liability could be discharged by paying in mithun. Bride-price, so common in traditional Arunachal Pradesh, was invariably paid by mithun. It was mithun which could relieve a person from any tort, any crime of heinous nature. The high value of mithun was derived from its wide-spread use as an animal of sacrifice in the religious festivals. Its meat is a delicacy to the people of this State.

Mithun was the most important medium of accumulation of wealth: the economic worth of a family was determined by the number of mithun owned by it. Traditional accumulation took place in terms of other objects also. These were beads, Tibetan bells, swords, etc. However, beads constituted personal property; Tibetan bells, swords, etc. served no general purpose and their use was limited to a few areas only. Given the high value of mithun, the question arises as to its productivity. Mithun used to range, and still ranges in many areas, freely in jungles. Its cost of raring is insignificant. The check on the growth of mithun population comes from its extensive sacrifice and its high mortality from diseases and attacks from wild animals. It can be noted that unlike in other parts of the country, in Arunachal Pradesh gold, silver, or any other metal were not traditional medium of accumulation. The highly valued beads in this State are made of rare stones.

CHAPTER 10 PROBLEMS OF UNEMPLOYMENT

10.1 Employment in Traditional Economies

The traditional economies of Arunachal Pradesh characterised by their very limited transactional interaction with each other were virtually secluded. These economies were not well-acquainted with either wage-labour or unemployment. In fact these economies did hardly face the situations where manpower could idle away the time because work was not available. It was rather the availability of work and relative non-availability of man-power that was the more usual condition. The reasons are not far to seek. A pre-transitional demographic regime with high birth and death rates kept the growth of population low. This put a bound on the natural growth of the working population, and simultaneously the insularity preventing any inmigration, there could not be migration-induced growth of population or labour force. The slow-growing population, the insignificant use of capital and the abundance of land placed the people at the centre-stage of production. In the jhumbased agricultural production function, it was not the land which put a constraint, rather it was labour which acted as the constraint and placed an upper bound on production.

The question of capital as a constraint does not arise because of its little use and there was no scope in the given technological environment to raise the capital-intensity in production. Under this situation production became a monotonically increasing function of labour. A Leontief production function can capture this type of relation as follows:

Y = min [aL, bN](10.1)

In this function Y is agricultural output, a is the coefficient of land (L) and b is the coefficient of labour (N). Since land is not scarce but labour is, the production function turns out to be

Y = b N(10.2)

It is labour-power (N) which determines Y, but it is also possible that in a pre-market economy, the application of labour depends on the output needs. In that case an inversion of (10.2) gives

N = 1/b Y.....(10.3)

In a market-economy, the determination of Y is a highly studied subject. The traditional theory is based on the assumption of profit maximization: the firm produces the level of output that maximizes its profit. Modern theories of the firm do not accept the mono-dimensional objective of the firm in all circumstances. The property rights school tries to capture the behaviour of the firm in terms of the property rights of the stakeholders in it – management, workers, equity holders, etc. For convenience the firms are divided into two types: the owner-operated firms and the management-operated firms. The entrepreneurial firms, those operated by the owners try to maximize profits - the employment and output of these firms are determined at the levels which ensure the maximum profit. The managerial firms those operated not by the owners but by the paid managers – cannot be motivated by the singular objective of profit. While the shareholders' objective is to have the maximum profit, the singular argument in their utility function; in the utility function of the management, profit is not the singular objective, because profits are not shared by them, though the levels of profits show their performance and the possibility of their continuation in their jobs. Leisure and other facilities are important arguments in their utility functions. So the property rights school concludes that in the managerial firms the rate of profit will be lower and the level of employment will be higher than in the entrepreneurial firms (Furubotn and Pejovich 1972).

For the family farms in the pre-market economy hardly any elegant theory has been formulated to determine their output and employment. Some simplistic theories exist. The most well-known and highly stereotyped one is the subsistence theory of output and employment developed to explain the behaviour of output and employment in the peasant farms. The parentage of this theory can be traced back to the theory of limited wants propounded initially by Boeke (Boeke 1953). The subsistence theory and its philosophical basis, the cultural determinism cannot stand the test of facts - by these theories neither employment nor output in the peasant farms can be determined. The theory which deserves a careful analysis was propounded by Chayanov (Tannenbaum 1984). Though Chayanov's theory is based on the Russian farm experiences, yet it has more universality than those based on cultural determinism or dualism. Stated in common place language, the basic point of Chayanov is that work or in his words, drudgery causes disutility while output, a function of drudgery, yields utility. In his formulation the marginal disutility from time spent on working increases as more time is devoted to it. The utility function is assumed to behave neo-classically: as the quantum of output increases, the marginal utility from it goes on declining - the familiar downward sloping marginal utility curve. The output and employment of a farm household is determined at the point of

intersection of the two marginal curves incorporating utility from work as transformed into commodity and disutility from work. In Chayanov model the unit of analysis is farming household. This framework extends rather automatically to cover the peasant households. But its extension to jhum cultivation faces hurdles in terms of the unit of operation of the farm and the mode of disposal of final output. On these fundamental points we can shed some light in order to grasp the problems of determination of output and employment in the tribal economies.

In the tribal economies of Arunachal Pradesh defining a unit of production in jhum cultivation is difficult and more difficult is defining a family or household. The standard definition of a household elsewhere in the country is based on the sharing of food cooked in the same pot and on the same oven. This Chulha (oven)-based definition is difficult to apply in the major part of Arunachal Pradesh, where those who share food cooked on the same oven do not form a complete family. So an ovenbased accounting of income and employment gives us the incomplete picture. The oven-based unit in this State is small; sometimes it may correspond with a nuclear family but often it does not correspond with a family. When the married sons of a person open separate ovens, the members sharing food cooked on the same oven form a nuclear family but when a person has more than one wife and each wife has a separate oven to cook food, it is not possible to say that each wife forms a nuclear family because the husband normally shares food with each wife cyclically ⁽¹⁾. Moreover, all the ovens are placed in the same long house (Chang ghar) which is stilted and one-roomed. All the members taking food cooked on different ovens also live in the same house. Each oven-based unit has a separate accounting of income and its income flows from two sources: one is earned income or own income and the other is from the common source, from all members sharing the long house. This source is the joint income. When the sons live in the nuclear families in the long house, the income from their father flowing to them is this joint income. In case of wives, the husband's income flowing to each of them is the joint income. On first looking at the long house and the amount of co-operation among the members, one will be tempted to think that the long house forms a single household. But in many cases this is not true. When the husband passes away, his wives continue to live in the same long run, but now their ovens can be considered as the defining principle of the household. Similarly, on the death of the father the sons' oven-based families may correspond with different households. However, a family defined on the basis of sharing the cooked food remains incomplete, as mentioned before.

A little formalisation of this with the well-known concepts may shed some light on the determination of employment in the traditional economies. Below we try it. Let the utility function of the typical family defined on the basis of food-sharing be

 $U = U (Q_1, Q_2, L) \dots (10.4)$

In this utility function Q_1 is a vector of the family-specific goods, Q_2 , is a vector of household specific goods and L is a vector of leisure. The vector of household specific goods represents household 'public goods', the goods which are consumed by all the members of oven-defined families living in the long house. The clearest example of this kind of public goods is the long house itself. There is another vector of public goods, the 'pure' public goods provided by the community. For the sake of simplicity we do not consider these public goods. The utility function (10.4) is subject to a budget constraint

 $P_1 Q_1 + P_2 Q_2 + P_L L = T$ (10.5)

In (10.5) P_i (i = 1, 2) is the price-vector for Q_i , P_L is the price vector for L and T is total time. Time being scarce, the prices are expressed in terms of it. Time is the numeraire in which is expressed the total income of a family. Since time is the numeraire, P_L can be considered to be unit vector. A little rearrangement of (10.5) yields

 $P_1 Q_1 + P_2 Q_2 = T - P_L L = T_w....(10.6)$

In (10.6) Tw is the total time spent working. The maximisation of (10.4) subject to (10.6) gives the familiar Marshallian demand function for Q_{i} ,

 $q_i = f(P_1, P_2, T_W)$(10.7)

We can attribute some properties to this demand function. The first partial derivative of q_i an element of Q_1 , the vector of private goods (family-specific goods) with respect to its price, p_i , is negative and with respect to p_i which is the price of a household level public good is positive. This implies that if a nuclear family faces a higher price of a public good, it switches over towards the private goods, the goods produced by it alone. We can now equate (10.7), the demand function and (10.2), the supply function of q_i as

 $Y_i = b N_i = f (P_1, P_2, T_W)....(10.8)$

Summing over all private goods and making appropriate changes we have

 $N = h (P_1, P_2, T_W) \dots (10.9)$

N is the family employment on the production of private goods and (Tw - N) is the time spent working on the provision of public goods of the household. P₁ and P₂ are not observable; they are not objectively given in the market. These prices are marginal utility of time or marginal disutility of time spent working. This is almost the familiar model of Chayanov, except the finer definition of the family and household and incorporation of the household level public goods in the specification. The implication of the public goods is simple to present. As the price of public goods increases relative to that of the private goods, the semi-nuclear family tends to produce more of private goods and it tries to reduce dependence on the public goods. The effect of new technology can also be studied. If the introduction of a good, its price (subjective price) immediately falls and its demand increases. The employment effect of this kind of technical change cannot be determined a priori.

The problem of this kind of pricing is that it is all subjective and at a more fundamental level the problem is the imposition of the formalisation of market economy upon a pre-market economy. In a market economy where the property rights are well-defined and strongly defended, the goods supplied are priced and these cannot be given gratis ⁽²⁾. But in a tribal economy the property rights may be weak or even absent and this may induce the people not to be price-oriented. This requires some contextual elaboration from labour supply.

In a market economy time spent working and countable as employment is instrumental; it involves disutility and compensation is required to induce people to supply labour services. Labour services are considered irksome and unpleasant and normally not considered as intrinsically valuable. The commonly-held idea is the impossibility of labour services being intrinsically valuable to the supplier. In a premarket economy, a person cannot be a labourer. His labour services are not saleable. The work he performs as a free person may be intrinsically valuable to him – it may give him joy and satisfaction. The element of instrumentality in work may be quite low. That is, the work undertaken may carry in itself utility and so no compensation is required ⁽³⁾. This is far removed from the services rendered by a paid worker in the market economy. The habit of the people to engage in pleasant and agreeable work in the spirit of freedom stands in the way of their accepting the 'paid work', the routinised tasks which, performed over a long time, make one a clog in a machine. Working under a dependable and subordinate position is something alien to the work culture in the traditional economies of Arunachal Pradesh.

10.2 Human Capital Formation and Labour Market

The launch of the development programme after independence created the demand for labour with different types of skill in the non-agricultural sectors, but the local supply function of labour could not respond immediately. Many people of even poor background were not temperamentally ready initially to take up the 'paid work'. Moreover, the nature of the newly-created jobs was so different from those in the traditional sector that the local people could not adjust to new working conditions. So the Government had to bring labourers from other areas of the country. As stated before, in order to induce the labourers to migrate to Arunachal Pradesh incentives in the form of higher wages or salary had to be paid. The local supply function of labour started to change in order to adjust to the new situation. With the opening of educational institutions, literacy spread and there was the formation of human capital. In the mean time labour market emerged. The supply side of the labour market was in the 1950s and 1960s dominated by the workers who were migrants from other states.

As the human capital formation in the State picked up, the supply of local manpower increased. Till the beginning of the 1980s the local supply of workers did not exceed the demand. However, since the middle of the 1980s, the local supply in some segments of the labour market has tended to overstrip the demand. The 1980s witnessed more unforeseen events especially in the skilled segment of the labour market. The professionals in the State were in search of job, the reverse of what had happened a decade earlier. Now Arunachal Pradesh, like many other states, is beset with the problems of unemployment. This unemployment is more acute among the educated seeking white collar jobs than among the illiterate.

10.3 Magnitude of Unemployment

The household survey conducted for this study covered 484 people in the age group 15 to 59 years. This group includes those who are either employed or unemployed but seeking job, the standard definition of the labour force in an economy. However, our definition of the employed people differs from the standard definition of employment. The employed are defined to include those who are either in paid jobs (in the employment of others) or self-employed. The self-employed are those who are engaged in trade and commerce (the non-agricultural activities) or in agriculture (as farmers / cultivators). Another group of people are included in the category of self-employed and this makes our definition deviate from the standard one: this group includes those who are engaged mainly in household activities – the housewives. In national income accounting or in the usual definition of income the

services and activities in the household are not considered as income-generating and those who are engaged in such activities are not included in the labour force.

This standard definition is difficult to follow in Arunachal Pradesh where the jhum cultivation depends to a large extent on the female labour. In the jhum fields the male work gets completed with the preparation of the fields for sowing. The male members of the family cut the trees, bushes and plants and leave those on the field to dry. This is the slashing part of their work. After a few days when the felled trees and cut plants become dry, the male agricultural work almost comes to an end with the fire setting on the dry materials. The female members of the family now take over the fields fertilized by the ashes. The sowing of seeds, weeding and taking care of the field are the responsibility of the females. The harvesting part of the agricultural operations is also done by them. It is estimated that about 70 per cent of the jhum agriculture is done by the females in Arunachal Pradesh (Bashar 2004) ⁽⁴⁾.

Apart from the agricultural work, the female members of the household perform duties which fall under the jurisdiction of productive or economic activities: the cultivation of vegetables, rearing of poultry and especially the weaving of clothes for the members of the household. In the traditional economies of the State the economic role of the females is comparable with that of the males, but if the National Classification of Occupations (NCO) is applied to them, they will be counted as housewives. The counting of heads is indeed a very crude measure of employment. Extracting the information on employment from the occupational headcounts is undependable. The best way is to use labour-hour as the unit instead of counting the heads. Both, counting of heads and hours spent working, we use in order to find out the employment patterns in the State.

The inclusion of the housewives in the set of the employed created an upward bias which, however, was got rid of by taking the duration of work on the day before the survey. A downward bias came from the non-inclusion of a few 'students'. In this State the students belonging to the category of Arunachal Pradesh scheduled tribes get stipend if they reside in the hostels. The stipend encourages some dropouts to keep their names enrolled. The attendance of few classes and occasional stay in the hostels ensures their identity as students but they may be engaged in some other tasks. We faced this problem while surveying. A few respondents identified themselves as unemployed job-seekers but after probing, it was found that they were enrolled in a college but not attending the classes regularly. They are engaged in part-time business activities earning enough for their survival and they are, of course, on the look-out for white collar jobs. These respondents were not included in the sample. The handicapped not capable of working were also excluded from the sample.

Table 10.1 provides the employment status of the working-age population in the sample. The age distribution of the working population appears in table A 10.1 in the Appendix. Of the 484 working-age people surveyed, 445 are employed and 39 are unemployed. The unemployment rate turns out to be 8.06 per cent and the employment rate 91.94 per cent. When a gendered division of the sample is done, it is found that 260 (53.72 per cent of the total) are male and 224, being 46.28 per cent of the sample, are female. However, out of the 39 respondents counted as being unemployed, 34 constituting 87.18 per cent of the total are male and only 5 (12.82 per cent of the total) are female. The male unemployment rate is estimated at 13.08 per cent and the female unemployment rate at only 2.23 per cent.

C1		No. of	Percentage	of the total	Average		
51. No	Status	people	Including Housewives	Excluding Housewives	Years of Schooling	Hours of work *	
1.0	Employed	445	91.94	89.79	6.38	6.73	
1.1	In paid job	105	21.69	27.49	10.67	6.01	
1.2	Self-employed	340	70.25	62.30	5.06	6.95	
1.2.1	In non-agricultural sectors	90	18.60	23.56	10.13	7.73	
1.2.2	In agriculture: farmers	148	30.58	38.74	1.96	8.76	
1.2.1	Household activities	102	21.07		5.09	3.63	
2.0	Unemployed	39	8.06	10.21	13.23	2.33	
	Total	484	100.00	100.00	6.94	6.37	

Table 10.1: Employment Status of the Surveyed Working Age Population (Excluding Students)

* Average hours of work one day before the survey.

The estimates of unemployment from our survey are significantly different from those estimated by the National Sample Survey Organisation (NSSO). The overall rural unemployment rate in the State based on usual status was only 0.60 per cent in 1999-2000 (NSSO, 2001). The unemployment rate among the males was 0.90 per cent and among the females only 0.10 per cent which is too low compared with what we have estimated for the State as a whole. The unemployment rate, according to the NSSO, was higher in the urban than in the rural areas. The overall urban unemployment rate based on the usual status was 2.9 per cent in 1999-2000. The male

rate was 1.40 per cent and the female rate as high as 10.0 per cent. Our sample size is too small to yield dependable estimates for the rural and urban rates separately. However, if we compare our estimates with the NSSO's urban rates of unemployment, we see that our estimated rate of unemployment for the females is smaller than the NSSO's estimate, but our estimate for the male rate is significantly higher than that estimated by the NSSO. One reason behind the difference may be the time-gap: while NSSO's survey refers to the year 1999-2000, ours refers to 2003-04, a gap of four years. As stated before, in Arunachal Pradesh the unemployment scenario has been changing very rapidly. The history of the reversal in the labour market from the excess demand to the excess supply condition is very recent. The time-gap may be only a part of the reason; the other part may be hidden in the sampling of different areas.

In order to secure a better estimate, information was collected on the number of hours worked one day before the survey, the number of hours worked during the week ending one day before the survey and the number of days worked during the month ending one day before the survey. The work is defined as consisting of those activities which generate income. The definition of work is therefore standard. The distribution of hours of work is presented in table 10.2 and the detailed distribution appears in table A 10.2 in the Appendix.

Hours of work	No. of respondent	Percentage of the total	Cumulative percentage		
0	18	3.72	3.72		
1-3	81	16.74	20.46		
4-6	177	36.57	57.03		
7-9	12	25.00	82.03		
10-12	87	17.97	100.00		
Total	484	100	100		

Table 10.2: Distribution of Hours of Work

Note: The class intervals including both the upper and lower limits.

During the 24 hours one day before the survey, 18 respondents did not perform any income-generating activities. They constitute 3.72 per cent of the whole sample, and 81 respondents worked from one to three hours. Majority of the respondents, 57.03 per cent of the total, worked at most six hours. On the other end of the distribution,

as many as 87 respondents forming 17.97 per cent of the total worked from 10 to 12 hours.

The average hours of work appears in table 10.1. The farmers worked for the longest duration - on an average they worked for 8.76 hours and the unemployed respondents worked on average only for 2.33 hours. The housewives' economic part of work averaged 3.63 hours, not much different from that of the unemployed respondents. Among other groups, the self-employed people worked longer hours than those who are in paid services: those who are in the employment of others worked on average 6.01 hours and the self-employed respondents worked for 6.95 hours. From the information on the hours of work the rate of unemployment can be estimated. This requires the fixation of a standard – the hours of work that a person must do in order to be regarded as fully employed. This is a difficult task, because the working day varies from the sector to the sector and from the activity to activity. A farmer's working day may begin well before the sun-rise and end three hours after the sun-set. Subtracting out the time of rest, etc. the farmer's working day may have a duration of 13 hours during the peak agricultural season. During the slack season a farmer's working day normally draws in. In some sectors the working day may be fixed, for example in government service, but the officially fixed working day may not match with the working day measured in terms of efficiency hours or by the duration of actual work.

Like the fixation of the normal body temperature, the length of the standard working day may be fixed by taking the mean of the lengths of the working days of all the employed people of the country. In our case we try to find out the mean from our own sample. If we exclude the unemployed segment of the sample, then the length of the mean working day turns out to be 6.72 hours. It is perhaps too low to be accepted. If housewives are excluded, the mean length is 7.64 hours which is too high. If the extreme cases – farmers, housewives and unemployed people – are excluded, then the mean length turns out to be 6.80 hours which is closer to 6.72 hours which was regarded as too low. On methodological grounds then we are to accept 6.80 hours as the normal working day of the sample. The rate of unemployment that comes out from this standard is 6.75 per cent. Using the standard working day of 6.80 hours, the unemployment rate that comes out of the weekly data are too insignificant to be reported here.

It will be relevant here to make a comment on these findings. One is the work of the unemployed people. Unemployment does not necessarily mean, in case of the educated youth, that they are sitting totally idle. Our data show that some

unemployed people also spend few hours on productive work. Another point to note is the productive work of women. In the survey a number of women reported as being fully absorbed in the agricultural activities. They are classified as farmers. Other women reported as being involved in a good number of economic activities such as weaving, kitchen gardening, rearing of pigs, poultry and they were grouped under household activities. However, hourly data on work do not support much the claim that household activities have a significant economic component.

Table 10.1 also shows the average years of schooling of different categories of the working age people. It may be noted that the unemployed respondents are the most educated – their average years of schooling is as high as 13.23 – among all the categories surveyed. The least literate are the farmers, their average years of schooling is only 1.96. When these two extremes are set aside, the striking contrast is between those who are in paid jobs and those who are self-employed. Those in paid jobs have on average 10.67 years of schooling; while the self-employed's average years of schooling is very sharp. Those who are self-employed in the non-agricultural activities have a higher level of education than those engaged in the agricultural sector.

The detailed educational levels of the unemployed are contrasted against those of all the respondents in table 10.3. It can be noted that not a single unemployed person is illiterate and the minimum years of schooling is 7. In the whole sample 28.51 per cent have no schooling at all; 14.88 per cent have only 2 to 5 years of schooling. Of all the respondents 56.61 per cent have a level of education which is 7 years and above. The highest level of education in the sample is 17 years. Of the six respondents with this level of education, which is post-graduation, four are unemployed, the rate of unemployment being 66.67 per cent, the highest among all levels of education.

Below two steps, there are 52 respondents with 15 years of education, the graduate level; 21 of them are unemployed. The rate of unemployment is 40.38 per cent. The phenomenon of unemployment seems to be intimately related to higher or tertiary level education. Of all the unemployed surveyed, 64.10 per cent are graduates or post-graduates. The rate of unemployment varies positively with the level of education. The simple correlation coefficient between the years of schooling and unemployment is 0.79 which is significant at one per cent level.

Nirod Chandra Roy

Naara af	All resp	ondents		Unemploye	ed
schooling	Number	Percentage of the total	Number	Percentage of the total	Rate of unemployment
0	138	28.51	-	-	-
2	3	0.62	-	-	
3	13	2.69	-	-	-
5	56	11.57	-	-	-
7	8	1.65	1	2.56	12.50
8	54	11.16	4	10.26	7.41
9	6	1.24	2	5.13	33.33
10	84	17.36	4	10.26	4.76
12	64	13.22	3	7.69	4.69
15	52	10.74	21	53.84	40.38
17	6	1.24	4	10.26	66.67
Total	484	100	39	100	8.06

Table 10.3: Educational level of the Surveyed Working Age Population

Note: Hyphen means nil.

10.4 Duration of Unemployment

The problem of unemployment seems to have taken a chronic shape in the State where there are people who have remained jobless for more than a decade. Table 10.3 shows the duration of joblessness of those who are still unemployed. Many people, now old, reported the heyday of the job market in Arunachal Pradesh in the 1960s and 1970s when people with a little education could expect some Government job. Things have changed radically in recent years: the waiting time for job in all segments of the labour market has increased significantly. In our sample there are nine people who have remained jobless for the last 10 years and more. They constitute 23.08 per cent of the unemployed. The same numbers of the respondents have not got any job from the last 6 to 10 years. As high as 29 respondents, being 74.36 per cent of the unemployed, have remained jobless for at least four years. The average duration of unemployment for the entire sample of the unemployed is 6.60 years with a minimum of six months and the maximum, 14.50 years.

Duration (years) of unemployment	No. of respondents	Percentage of the total	Cumulative percentage
< 2	6	15.38	15.38
2-4	4	10.26	25.64
4-6	11	28.21	53.85
6-8	6	15.38	69.23
8-10	3	7.69	76.92
> 10	9	23.08	100.00
Total	39	100.00	100.00

Table 10.4: Duration of Unemployment

10.5 Relationship Between the Years of Schooling and Duration of Joblessness

Table 10.5 shows the relationship between the years of schooling and the duration of unemployment. In general those who are highly educated have a smaller duration of joblessness than those with a lower level of education. The correlation coefficient between the duration of joblessness and the level of education is -0.84 which is significant at 5 per cent level. This is partly due to the differential supply to the different segments of the job market: a very high supply relative to the demand in the low skill segment of the job market and in the high-skill segment the pressure of supply is less.

Nature of unemployment: A Case Study

A youth of seven years of schooling reported having been jobless for the last 13.50 years. His case is typical of a few other cases in the sample. So as a case study the history of his tackling the problems of livelihood is illustrated. He could not pass the final examination of class seven and he did not like to continue his education. He dropped out from school and got the job of a peon in the Government office on contingency basis. The salary was small and the work was so monotonous to him that he resigned from the job without completing one year ⁽⁵⁾. Had he continued in his job, he could, after the completion of three years' of service, have been permanent. Monotony, subordination, lack of freedom, etc. were his agonizing experiences of work in the Government office. He chose business and started contracting work. In the beginning he got a wide margin of profit, but with time competition increased and the number of contracts he succeeded in getting declined drastically. Not only that the rate of profit also decreased. He is married with three

children. His cultivable land has been leased out to a migrant tenant for sharecropping.

Naara af	No. of	Duration of unemployment							
schooling	respondents	Minimum	Maximum	Mean	Standard deviation				
7	1	13.50	13.50	13.50	0.00				
8	4	5.50	9.50	7.25	2.06				
9	2	13.50	13.50	13.50	0.00				
10	4	3.50	14.50	9.00	5.32				
12	3	3.50	11.50	8.83	4.62				
15	21	0.50	12.50	5.88	2.78				
17	4	0.50	0.50	0.50	0.00				

Table 10.5: Years of Schooling and Duration of unemployment

Source: Based on survey data.

Two years ago he started one small shop, which is being run by a hired non-tribal youth from Assam. He reported himself to be jobless and he was recorded so, but he has created jobs for two people: a tenant and a shop-keeping youth. The types of job he created for others are not suitable for himself or for many tribal youths of Arunachal Pradesh. With a family background of jhum cultivation, many autochthonous people in Arunachal Pradesh have not yet been to learn through practice the wet-rice cultivation. To them leasing land out to migrant tenants is preferable to its being cultivated by themselves. From the land leased out a share of crops comes, and a multiplicity of activities - supplying to the Government office, running a shop with the help of a hired boy, etc. – provide sources of earnings. These sources are not very secure and it is the sense of insecurity, which was perhaps responsible for our respondent's having reported that he was unemployed, though he himself was an employer. The type of employment he has created is as insecure as his purported condition is. The tenant may be evicted any time, his shop-keeping boy may be dismissed. The boy may also run away. Considering all these factors we can tentatively conclude that the joblessness of some school-dropouts is more a reflection of the non-fulfillment of expectations in business activities than the nonavailability of jobs.

A few cases of unemployment show the real helplessness. They are from low income families. They have now dependents. Jobs they tried to get but they did not and till date they have not been able to have a secure source of livelihood. Their insecurity is chronic and their experience is frustrating. On the other hand those who have got a higher education, but have not yet been able to secure a job, are quite optimistic of getting a job soon. Their efforts have been singularly directed towards getting a job and this is likely to shorten their waiting time, as has happened to others with similar education.

10.6 Economic Conditions of the Households with Unemployed Members

The sample provides a glimpse of what is not normally expected – the economic status of the households with at least one unemployed person is on average as good as or even better than that of the households with all the members fully employed. Table 10.6 gives a comparative picture of the economic conditions of the households based on the status of employment. When the sample of the 200 households is divided on the basis of the status of employment, it is found that 34 households have at least one unemployed person and 166 households have all their members fully employed. The average income of the households with at least one-person unemployed is Rs. 126 thousand and that of the fully employed households is Rs. 99 thousand. The difference is significant. However, if we take the per capita income then the difference pales into insignificance: the household with unemployment has a per capita income of Rs. 21 thousand and the fully employed households' income per head is Rs. 20 thousand. The reason behind the significant difference between these two levels of income, per household and per head, is the different household sizes. The unemployed households have a size of 6 against the fully employed households' average size of 4.95. In both the rural and urban areas the difference in household income between the unemployed and fully employed households is significant, but in case of income per head no significant difference exists.

As regards the sources of income, the difference between the unemployed and fully employed households is not substantial. More than 50 per cent of income in both the types of households comes from the business activities. The household with at least one-member unemployed depends somewhat less on agriculture than the fully employed households. In case of service the picture is different; the households with unemployment are more service-oriented than the households with full employment. The ownership of assets also does not make much difference between the households with, and without full employment. The average propensity to consume is somewhat higher in households with unemployment than in households with full employment. There is however substantial rural-urban difference.

T (Sample	Mean Income		Sources	of Income ((as %)	Mean		
lypes of Households	size	Per Household	Per head	Agriculture	Business	Services	Household Assets	APC	
Unemployed	34	126	21	11.22	55.76	33.02	618	71.32	
Fully employed	166	99	20	15.12	54.17	30.71	589	68.39	
Rural unemployed	22	84	13	24.42	28.80	46.78	407	69.88	
Rural Fully employed	113	64	12	26.96	26.42	46.62	341	80.92	
Urban unemployed	12	204	35	1.23	76.15	22.62	1005	72.41	
Urban Fully employed	53	172	36	5.59	76.51	17.90	1117	58.28	

Table 10.6: Households with Unemployment and full employment:A comparison of economic Status

(Income	and	Assets	are	in	thousand	of	Rs)
<u>،</u>	meenne		1 100 000			er to eto ett tet	~	

Note: APC is average propensity to consume defined as the household consumption divided by the household income; the resulting ratio is multiplied by 100.

In the rural areas unemployed households spend a lower proportion of their income on consumption than the households with full employment. In urban areas the picture is different: the households with unemployment consume a higher proportion of their income than the households with full employment.

Notes

(1) Polygyny, a person having more than one wife simultaneously, was a very common institution of marriage in Arunachal Pradesh. This institution is slowly fading away with the spread of education, urbanisation and higher interactions with the people of the other states of the country. Polygyny in Arunachal Pradesh has got some unique features, which stand in the way of accounting for household income and employment. In this system, co-wives do not share food; they maintain their own oven in the same long house in which all the co-wives and their children live. The traditional long house is

one-roomed; nowadays the long house is being increasingly partitioned at least partly.

- (2) In the simplest everyday language this is expressed as 'there is no free lunch'. This may sound trivial and banal but pure economics which has taken shape gradually since the invention of the double-entry book-keeping considers it sinful to think that it is possible to get any valuable thing in scarce supply without paying for it. This world of economics is the world, which in the language of Karl Polanyi, has undergone the 'great transformation so that the pre-market economies cannot be considered to be the small-scale image of the market economies (Polanyi 1944). The self-interested action in the market may not have its counterpart in the pre-market economy where the various social exchanges may follow broadly quid pro quo but the action may reflect a measure of altruism or dignity. It also may be guided by social norm.
- (3) Our fieldwork in Arunachal Pradesh has provided many cases where work does not appear to be burdensome. One simple example is the houseconstruction. Materials used in the construction of traditional houses are bamboo, cane, wood and grass or leaves (for thatching). A family's houseconstruction is not only its own responsibility but also the responsibility of all other families in that village. All the grown-up people mainly males participate and the construction site takes on a festive look. Some drink apong (a local brew made from rice), some work and others help. At the end of the day all participants are feasted. The feast is not compulsory but it is normally offered. The whole-hearted participation of many members lightens the work so much that the house-construction does not become a drudgery. It is a piece of joyful work, a meeting place of the people and it seems to the people that house-building is intrinsically valuable and such work does not require any compensation. Of course, reciprocity might be at least partly responsible for the spontaneity in participation, but the value in the action itself cannot be minimised. House-building is just one example of community participation. Such cases in the traditional society are too common to escape the eye. In the preparation of the jhum field, in the harvesting of crops, and in various other occasions, the concerted action of the community members lessens the work burden of the individual families. The participatory spirit ran so deep in the traditional community that people made the provisioning of many social goods such as bridges on the streams, village roads, etc

Work and play are taken to be the diametrical opposites in a society, which has achieved some technological sophistication. Mechanised production requires full attention and all seriousness. Lack of attention may invite accidents of serious nature. The condition is different in the production, which is done manually. In a society where the level of technology is very low, the work may contain a sportive element. Examples may be hunting, angling, etc. In the technologically sophisticated society, hunting and angling belong to the category of sport, but in a society where hunting and angling or fishing in general constitute a source of income, these activities constitute productive work. But the element of sport may be present in this kind of productive work. The sportive element in work and its sharing by many members of the community in a free spirit make the work light, less burdensome and attractive.

- (4) No quantitative study is available on the proportion of time spent on the jhum cultivation by the female members of the household. Traditionally, jhum cultivation is taken to be under the female jurisdiction but males also participate in some specified tasks. Apart from slashing and burning work, they perform the vigilance work. The damage of crops by wild animals, elephants, bears, etc. was common and still not very uncommon in some areas of the State. It is the responsibility of the male members to protect the crops from the wild animals.
- (5) The nature of sedentary job in the non-agricultural sectors is so different from that of the traditional activities consisting of jhum cultivation, hunting, collecting fruits, edible roots, wood, etc. from forest that some people find it difficult to adjust to the demands of the work in the modern sectors. They prefer engaging non-tribal migrants in their shops to operating it by themselves. Upon being asked why they did not work in their own shops, some replied that it was full of boredom, a few replied that they just cannot sit long in a shop and others replied that they did not like bargaining with the customers nor did they like serving under their orders!

CHAPTER 11 CONCLUSIONS AND POLICY IMPLICATIONS

11.1 Mixed Picture

The findings of this study portray a mixed picture of the Arunachal economy. The rosy part of the picture emerges from the impressive growth and structural transformation of the economy. But the picture becomes pale when the causes of growth are analysed. It is seen that the inflow of Central funds still acts as the propulsive force of the Arunachal economy.

11.2 Achievements

It will be pertinent to summarise the main economic achievements of Arunachal Pradesh. In the course of the last fifty years there has been substantial occupational diversification which is associated with the accumulation of both physical and human capital. The overall literacy rate which was lying in the right neighourhood of zero rose continuously after independence and by 2001 reached 54.74 percent, a rate which is low compared with the national standard (65.38 percent), but stands in bold relief when compared with its past value. Similarly, the physical capital accumulation especially the growth in social overhead capital in the forms of various physical infrastructures such as roads, hospitals, educational institutions, etc. has been quite impressive. In the traditional jhum-based economies of different communities the net investment was not much different from zero. Apart from the supply constraint there was a demand constraint imposed by the institution of property rights. In the pre-transitional economies, the land was owned by the community. This community-centred property rights regime did not provide adequate incentives to the individuals for accumulation of capital for improvement of the techniques of production. The economic growth took place along with the changes in the institution of property rights. The land ownership shifted from the community to the individuals, a process which created incentives for improvement of the method of cultivation. The outcome was a steady extension of the permanent cultivation and the overall growth in agricultural productivity. The non-traditional manufacturing and tertiary sectors appeared and created demand for human capital, an important factor in the gradual spread of education in the State.

11.3 Problems

In spite of the growth achieved over a number of decades, the Arunachal economy is still structurally weak; the operational efficiency of the economy is low and the most disconcerting fact is that the economy has not yet achieved the much-desired sustainability. Much of the driving force of the economy comes from the Central funds. The industrialisation programme, though undertaken at a modest scale, showed a low success rate. Had the industrialisation been fully successful, the State could by now have a manufacturing base capable of absorbing a proportion of the educated youth being turned out by the educational institutions in the State. But the manufacturing sector is not showing any signs of major expansion. In the mean time there is growing unemployment in the State – this is the unemployment mainly of the educated youth. Another problem which has appeared with all starkness is the inequalities in the distribution of income and productive resources.

11.4 Policy Measures

The major weakness of the Arunachal economy is its low operational in efficiency. The public expenditure constitutes a significant part of the domestic product but the investment ratio is not very high. Much of the Government expenditure is not used in the formation of capital; it is revenue or consumption expenditure which absorbs the major part of the Government budget. The outcome is clear: the Government expenditure does not raise much the productive capacity of the economy. This low productivity of the Government expenditure is at least partly due to the fact that the people of the State do not take much interest in ensuring the efficient utilisation of the Government funds. Since much of the Government finance comes from the Centre, not from the locally-imposed tax, many people in the State think that the public money is basically the Central money and it is the State Government which has the property rights in it, because it is through the strenuous efforts of the State Government that the money is brought from the Centre. In our survey we found a good number of people holding this kind of attitude towards the State Government finance. Moreover, there are many people in the interior areas of the State who do not know the actual sources of the Government finances and they think that the public expenditure is just a gift of the Government to the people.

The picture might have been different, had the people been accustomed to paying taxes. Then they could understand that the Government money irrespective of the levels of the Government – Centre, State or the Local – is the people's money and the society is its ultimate owner, and so it is in the common people's interest that the Government money should be spent in such a way that the society gets the

maximum benefits out of it. As long as the common people do not take much interest in raising the productivity of the Government expenditure there is little possibility that the efficiency in the public expenditure will increase. This requires the formation of Vigilance Committees consisting of ordinary people with no individual stake in a particular project in order to ensure that the contractors complete the public works satisfactorily. The situation is unlikely to improve as long as the contractors only participate in the Government projects and developmental works. Participation of the neutral people in the Government's developmental works should be increased as much as possible.

Both unemployment and large-scale inequalities are unprecedented in Arunachal Pradesh. It was not long ago that the society was run on the communitarian principles and the individuals enjoyed a high degree of security in their livelihoods ensured by mutual insurance, community ownership of productive resources, etc. The newness of these phenomena in a society with a small population seems to carry the potential of instability. Compared with the large states in the country, Arunachal's inequality or unemployment may not appear at all high. Specially the rate of unemployment in Arunachal Pradesh is one of the lowest in the country. But the level of tolerance of these phenomena is smaller in Arunachal Pradesh or in any state with a small population than in a large state. A few reasons can be cited in order to make this point clear.

(i) In the large (plains) states where the social hierarchy as well as economic inequality is inherited from the past, a small rise in inequality does not assume much visibility. In the language of information theory, the newness or information content in the event is very small. (The information content (E) of an event is defined as $E = -\log P$, where P is the probability of the happening of that event. An event with a probability of one (that is the event is certain to occur) has an information content equal to zero. On the other hand if the event has all freshness in the sense that the probability of its occurrence is very low, then its information content is very high. E is a monotonically decreasing function of P and this function maps the closed set, [0, 1], the domain of P into the closed-open set, $[0, \infty)$, the range of E). In many plains states of the country the problems of unemployment are almost a century-old and a small rise in its rate does not make it immediately unbearable. In a small State like Arunachal Pradesh or other hill states of the North-East India where only in a few decades ago there was scarcity of labour so that the labour market suffered from excess demand, the unemployment among the local youths is a new phenomenon to which

neither its victim nor the society at large knows how to adjust. The condition is more or less the same in case of economic inequalities.

- In the plains society with a large population there are anonymity and (ii) impersonality in the operations of the government and many people do not link their condition, good or bad, to the outcome of the operations of the government. In general, the size of the government in the large states is small relative to the size of their economies, but in Arunachal Pradesh or in other North-Eastern hill states, the government is very large relative to their economies. So people tend to link their conditions, good or bad, to the operations of the Government. In Arunachal Pradesh as well as in other small hill states the Government is the largest employer in the nonagricultural sectors especially in the service sector and the Government tries to take credit for it. The Government's inability to create jobs for all exposes its weaknesses. In case of inequalities also, the Government's link to their origins is accepted by almost all. So the ineffectiveness of the Government policy is readily linked to the misfortunes of the people not getting employment or sources of livelihood.
- (iii) In the plains states religious and cultural values and norms absorb a part of the shocks arising from the economic inequalities and unemployment but in the tribal religions and cultures economic inequalities and unemployment can hardly be accommodated. So in the tribal socio-cultural space, the shockabsorption being small, the tolerance limits for these phenomena become low.
- (iv) People in the plains are accustomed to living a competitive life: for jobs they are to compete and in the market place competition is the usual condition. But to the people of Arunachal Pradesh both market and competition are emerging and so these are new. In the plains when a candidate fails in a competition for job, he tends to blame himself for his incompetence and lack of abilities. The situation is different in Arunachal Pradesh where a candidate's failure is not attributed to his inabilities but to unfairness of a selected few. When a person identifies his misfortune or accident to a few people, he develops grievances and tries to ventilate it (Hirshleifer 1987).

By all indications the tolerance to the inequalities and unemployment is decreasing in the State, though their limits were quite high in the past when the large-scale inequalities were first emerging. The reason might be the well-known *tunnel effect* (Hirschman and Rothschild 1973, Ray 1998). According to the *tunnel effect* hypothesis when the emerging inequalities give a person an expectation of a better future he

tolerates the fortunes of others though he may be placed for the time being in the unfortunate situation. But when the inequalities yield a hopeless future for an individual, his tolerance evaporates. So from the 1950s to the 1980s the rising inequalities were tolerable to the people in view of the expanding opportunities and absorption of all the educated youths in employment. The situation changed in the 1990s with the contraction of job opportunities and decreasing chance of betterment of one's conditions.

Given the seriousness of the problems, the urgent remedial measures should be taken. Already two districts of Arunachal Pradesh, Tirap and Changlang, both adjacent to Nagaland have plunged in instability. So there is possibility that instability would spread to other districts. This possibility demands urgent action. The remedial steps can be spelled out as follows:

- (a) Creating a congenial atmosphere for the expansion of manufacturing industries in the State. As our survey results show there is no mechanism in the State to attract the industrial capital. Trade capital in small amounts flows into the State because of high profitability in trading but the surplus or profit from trading tends to flow out of the State. So trade capital does not get transformed into the manufacturing capital. There is no reason to think that without building a manufacturing base the State economy can take off. In order to make an industrial base it is necessary that the contract-enforcing mechanisms in the State should be developed further and judicial services should be provided to the people.
- (b) The potential local entrepreneurs should be given training, loan, and marketing facilities. They should be encouraged to take up industrial projects in collaboration with the reputed firms of other states.
- (c) To date the recovery rate of loans from nationalised banks has been quite low. So banks tend to be overcautious in extending loan facilities. A strengthening of the contract-enforcing mechanism can facilitate the rise of credit-deposit ratio in the State. Moreover, the agricultural land in the State has not yet been cadastrally surveyed and so land is not accepted by the banks as collateral.
- (d) The high inequalities in the distribution of landholdings and probably also in landownership – demand that there should be land reform in the State but that requires the cadastral survey to be undertaken first.

The State's dependence on the Central Funds can decrease only if the State can build an industrial base of at least modest scale. The possibility of establishing large-scale industries appears dim in view of hilly terrains, low density of population (and so low demand), poor infrastructure facilities, etc. but medium and small-scale industries can be established in a number of sectors such as fruit-processing, horticulture, forest products, paper and hardboard, etc. It is the industrialisation which can expand job opportunities for the growing numbers of educated youth and can ensure stability in the State.

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APPENDICES

Year	Agri	Forest	Fishing	MQ	Primary	Manu	Const	EGW	Secondary
1970-71	38.33	20.72	0.04	0.10	59.19	0.85	19.58	-0.10	20.33
1971-72	37.20	20.35	0.04	0.13	57.71	0.95	19.98	-0.09	20.84
1972-73	36.61	18.90	0.05	0.13	55.69	1.19	21.94	-0.13	23.01
1973-74	39.09	21.05	0.09	0.03	60.26	1.35	17.95	-0.12	19.19
1974-75	41.37	20.46	0.08	0.05	61.96	1.54	16.74	-0.12	18.16
1975-76	41.04	19.41	0.08	0.08	60.61	1.67	16.41	-0.11	17.97
1976-77	40.45	18.02	0.07	0.10	58.64	1.69	15.49	-0.38	16.80
1977-78	38.15	13.25	0.06	0.08	51.54	1.58	17.55	-0.20	18.92
1978-79	35.49	13.11	0.07	0.10	48.78	1.51	22.72	-0.14	24.09
1979-80	33.99	10.92	0.11	0.37	45.38	1.73	23.69	-0.13	25.28
1980-81	36.91	10.23	0.08	0.06	47.28	6.51	18.69	-2.99	22.21
1981-82	35.47	15.29	0.07	0.21	51.04	6.09	16.73	-3.00	19.82
1982-83	36.63	9.90	0.10	0.11	46.75	6.36	19.73	-3.26	22.83
1983-84	39.19	13.15	0.12	1.65	54.11	6.42	13.74	-3.37	16.8
1984-85	35.32	12.14	0.35	2.67	50.49	6.30	18.22	-3.50	21.02
1985-86	38.22	11.68	0.35	2.68	52.93	6.06	16.91	-3.08	19.90
1986-87	36.56	13.93	0.38	1.96	52.83	6.13	14.75	-3.34	17.55
1987-88	41.49	7.33	0.48	1.33	50.63	6.25	16.04	-3.43	18.85
1988-89	41.84	10.65	0.53	1.06	54.09	6.26	13.57	-2.94	16.89
1989-90	39.46	7.92	0.68	0.91	48.97	6.6	18.3	-3.35	21.54
1990-91	35.09	9.58	0.72	0.79	46.19	6.04	17.98	-2.47	21.56
1991-92	37.66	8.47	0.77	0.68	47.59	5.74	16.3	-2.12	19.91
1992-93	35.61	11.34	0.79	1.42	49.16	6.08	15.25	-2.93	18.40
1993-94	34.55	11.48	0.91	1.41	48.35	3.12	20.25	-2.02	21.35
1994-95	32.12	13.27	1.00	0.79	47.18	3.34	18.13	0.70	22.17
1995-96	28.45	11.95	0.89	0.45	41.74	3.35	25.93	-0.39	28.90
1996-97	30.58	12.48	1.02	0.52	44.61	4.48	18.29	-0.60	22.17
1997-98	31.18	3.91	1.06	0.44	36.59	3.1	17.49	1.99	22.58
1998-99	29.46	4.72	1.11	0.72	36.02	3.2	17.11	3.09	23.41
1999-00	31.48	4.74	1.11	0.72	38.04	2.84	14.97	2.27	20.07
2000-01	31.16	3.81	1.12	1.35	37.45	2.65	16.40	-0.50	18.54
2001-02	28.48	4.45	1.21	1.34	35.47	3.03	15.19	-1.77	16.45
2002-03	29.69	4.09	1.15	1.40	36.33	3.02	16.10	-2.90	16.23

Table A 4.1: Structure of NSDP in Arunachal Pradesh

Meanings: Agri = Agriculture, Forest = Forestry & Logging, MQ = Mining & Quarrying, Manu = Manufacturing, Const = Construction, EGW = Electricity, Gas & Water Supply,

Conted.....

Nirod Chandra Roy

Year	TSC	THR	Bank	REO	PA	OS	Tertiary	NSDP
1970-71	1.55	1.96	0.10	0.79	9.98	6.09	20.47	100
1971-72	1.48	2.30	0.15	0.83	10.74	5.95	21.45	100
1972-73	1.75	2.78	0.13	0.81	9.68	6.16	21.3	100
1973-74	1.66	3.16	0.12	0.79	9.24	5.59	20.55	100
1974-75	2.30	3.41	0.12	0.67	9.40	3.97	19.87	100
1975-76	2.17	4.10	0.15	0.69	10.08	4.23	21.42	100
1976-77	2.00	3.86	0.24	0.64	13.31	4.50	24.55	100
1977-78	2.10	5.48	0.26	0.67	13.8	7.22	29.53	100
1978-79	1.80	5.13	0.50	0.61	12.37	6.74	27.13	100
1979-80	1.87	4.54	0.91	0.63	12.82	8.56	29.33	100
1980-81	0.36	4.42	0.60	7.79	10.36	6.98	30.51	100
1981-82	0.36	4.24	0.84	7.13	8.91	7.66	29.13	100
1982-83	0.44	4.50	0.78	7.18	10.71	6.81	30.42	100
1983-84	0.45	4.63	0.83	6.98	9.75	6.45	29.09	100
1984-85	0.51	4.64	1.67	6.61	7.80	7.26	28.49	100
1985-86	0.51	4.54	1.30	6.13	7.81	6.88	27.17	100
1986-87	0.47	4.68	1.85	6.04	8.32	8.27	29.62	100
1987-88	0.49	4.85	1.76	6.00	8.79	8.63	30.52	100
1988-89	0.56	4.95	1.71	5.76	8.06	7.98	29.03	100
1989-90	0.64	5.31	1.88	5.89	8.29	7.48	29.49	100
1990-91	0.65	4.95	1.49	5.29	8.16	11.72	32.25	100
1991-92	0.83	5.56	1.55	4.84	8.19	11.52	32.50	100
1992-93	1.29	5.95	1.51	4.88	8.09	10.71	32.44	100
1993-94	3.60	6.64	1.22	2.00	9.62	7.22	30.30	100
1994-95	3.86	5.80	1.39	2.16	10.17	7.28	30.65	100
1995-96	3.37	5.10	1.34	1.99	9.20	8.36	29.37	100
1996-97	3.96	5.78	1.70	2.25	10.72	8.81	33.22	100
1997-98	5.73	5.86	1.88	2.37	13.84	11.16	40.83	100
1998-99	5.60	4.15	2.13	2.44	14.39	11.86	40.57	100
1999-00	6.23	5.10	2.14	2.51	15.96	9.94	41.88	100
2000-01	6.44	4.85	2.57	2.67	16.67	10.80	44.01	100
2001-02	7.05	6.05	2.76	3.03	17.73	11.47	48.08	100
2002-03	6.81	5.70	2.63	3.17	17.82	11.31	47.44	100

Table A 4.1: Structure of NSDP in Arunachal Pradesh

Meanings:

TSC = Transport, Storage & Communication, THR = Trade, Hotel & Restaurant, Bank = Banking & Insurance, REO = Real Estate, etc. PA = Public Administration, OS = Other Services,

S1.	Sostore	Year					
No	Sectors	1971	1981	1991			
1	Primary Sector	216823	235948	263666			
2	Cultivators	211160	223358	235987			
3	Agricultural labourers	5292	7796	20054			
4	Livestock, fishing, hunting forestry and logging	366	4744	6917			
5	Mining and Quarrying	5	50	708			
6	Secondary Sector	1196	27960	33859			
7	Household industry	830	995	742			
8	Non-household industry	103	5134	9725			
9	Construction	263	21831	23392			
10	Tertiary Sector	51523	49525	93451			
11	Trade and Commerce	1551	6950	12923			
12	Transport, Storage, Communications, etc.	11	1295	4417			
13	Other Services	49961	41280	76111			
	Total workers	269542	313433	390976			

Table A 4.2: Sectoral Distribution of Workers in Arunachal Pradesh

Source: Population Censuses of India (Arunachal Pradesh), Economic tables, 1971, 1981 and 1991.

Neer		Ре	ercentage of I	nflow	
rear	Share of Tax	Grant	Loan	Tax + Grant	Inflow
1986-87	3.32	91.76	4.92	95.08	100
1987-88	25.18	67.87	6.95	93.05	100
1988-89	27.52	66.09	6.38	93.62	100
1989-90	17.76	70.11	12.13	87.87	100
1990-91	22.72	66.85	10.43	89.57	100
1991-92	22.76	71.63	5.61	94.39	100
1992-93	23.91	70.25	5.84	94.16	100
1993-94	23.32	70.91	5.77	94.23	100
1994-95	23.01	70.75	6.25	93.75	100
1995-96	15.46	79.01	5.53	94.47	100
1996-97	20.6	73.47	5.93	94.07	100
1997-98	26.45	67.25	6.3	93.7	100
1998-99	27.26	66.26	6.49	93.51	100
1999-00	34.01	64.32	1.67	98.33	100
2000-01	13.78	84.21	2.01	97.99	100
2001-02	6.56	91.29	2.14	97.86	100
2002-03	11.52	82.17	6.31	93.69	100
2003-04	9.96	68.51	21.53	78.47	100

Table A 6.1: Composition of Inflow of Central Funds in Arunachal Pradesh

Source: Budgets of the Government of Arunachal Pradesh, different years.

Table A 6.2: Share of the Central Funds in the Arunachal Government's Finance

Year	Tax	Non- Tax	Revenue	Other Loan	State's Revenue	Central Tax	Grant	Central Loan	Central Fund	Total Receipt
1987	0.8	10.6	11.4	1.38	12.79	2.9	80.02	4.29	87.21	100
1988	0.58	8.03	8.61	0.66	9.27	22.85	61.58	6.31	90.73	100
1989	1.96	8.35	10.3	2.06	12.36	24.12	57.92	5.59	87.64	100
1990	1.31	11.02	12.33	0.17	12.5	15.54	61.35	10.62	87.5	100
1991	1.4	10.08	11.47	2.66	14.13	19.51	57.41	8.95	85.87	100
1992	1.62	10.29	11.91	1.98	13.9	19.6	61.68	4.83	86.1	100
1993	1.56	9.96	11.52	1.86	13.38	20.71	60.85	5.06	86.62	100
1994	1.67	14.56	16.23	1.86	18.09	19.1	58.08	4.72	81.91	100
1995	1.73	11.74	13.47	6.76	20.23	18.35	56.44	4.99	79.77	100
1996	3.21	9.84	13.06	3.9	16.95	12.84	65.61	4.6	83.05	100
1997	3.54	7.28	10.82	4.29	15.11	17.49	62.37	5.03	84.89	100
1998	5.06	6.06	11.11	1.88	12.99	23.01	58.51	5.48	87.01	100
1999	3.42	6.15	9.57	5.13	14.7	23.25	56.52	5.53	85.3	100
2000	3.77	5.72	9.49	12.56	22.05	26.51	50.14	1.3	77.95	100
2001	1.2	6.39	7.6	1.77	9.37	12.49	76.32	1.82	90.63	100
2002	8.13	6.11	14.24	1.53	15.77	5.53	76.9	1.81	84.23	100
2003	11.33	5.44	16.76	7.53	24.29	8.72	62.21	4.78	75.71	100
2004	9.52	6.27	15.79	6.96	22.75	7.7	52.92	16.63	77.25	100

(Percentage of the different sources)

Note: **Tax** means the own tax of the state as the percentage of the total receipt of the Government of Arunachal Pradesh. **Non-tax** means the percentage of non-tax revenue in the total receipt. **Other Ioan** is the percentage of loans from sources other than Central Government in the total receipt. **State's Revenue** is the percentage of state's own revenue and other Ioan in the total receipt. **Central tax** is the percentage of the state's share of the central taxes in the total receipt. **Grant** is the grants-in-aid as the percentage of the total receipt. **Central Loan** is the central Ioan as the percentage of the total receipt. **Central fund** means central fund as the percentage of the total receipt. **TR** is the total Receipt.
Table A 6.3: Different Sources of Receipts in Arunachal Pradesh

(In Real Terms)

Year	Tax	Non Tax	Revenue	Other Loan	State Revenue	Central Tax	Grant	Central Loan	Central Revenue	Total Receipt
1986-87	320.54	4235.19	4555.73	552.94	5108.67	1157.97	31966.27	1712.91	34837.14	39945.82
1987-88	293.23	4052.41	4345.64	333.3	4678.94	11532.51	31082.41	3183.64	45798.56	50477.5
1988-89	1060.45	4526.15	5586.59	1115.65	6702.24	13076.65	31402.01	3032.48	47511.14	54213.38
1989-90	655.17	5492.05	6147.22	83.05	6230.27	7743.62	30577.68	5292.11	43613.42	49843.69
1990-91	784.72	5662.16	6446.88	1491.79	7938.67	10962.46	32255.17	5029.95	48247.58	56186.25
1991-92	941.54	5963.11	6904.66	1148.76	8053.41	11359.12	35747.17	2799.19	49905.47	57958.88
1992-93	935.45	5981.53	6916.98	1116.54	8033.52	12437.46	36548.02	3040.76	52026.24	60059.76
1993-94	978.98	8516.79	9495.76	1086.97	10582.74	11173.72	33972.15	2761.93	47907.81	58490.54
1994-95	1081.37	7349.7	8431.07	4231.51	12662.58	11489.04	35331.3	3120.93	49941.26	62603.84
1995-96	2260.27	6920.81	9181.08	2739.13	11920.22	9025.73	46134.18	3230.79	58390.7	70310.92
1996-97	2502.42	5152.31	7654.73	3037.63	10692.36	12371.73	44118.16	3559.36	60049.25	70741.61
1997-98	3389.03	4057.79	7446.82	1257.45	8704.27	15419.31	39204.79	3672.25	58296.35	67000.62
1998-99	2423.5	4356.1	6779.61	3631.21	10410.82	16467.55	40030.29	3919.82	60417.66	70828.48
1999-00	2878.86	4371.45	7250.31	9596.84	16847.15	20257.03	38310.39	992.24	59559.66	76406.81
2000-01	747.75	3979.26	4727.01	1104.45	5831.46	7770.49	47496.88	1135.68	56403.05	62234.51
2001-02	5617	4221.08	9838.09	1054.82	10892.91	3819.27	53132.33	1248.29	58199.89	69092.8
2002-03	9251.99	4441.47	13693.46	6151.7	19845.16	7124.98	50820.77	3901.27	61847.02	81692.18
2003-04	10927.89	7189.34	18117.24	7981.79	26099.03	8831.56	60722.19	19083.91	88637.67	114736.7

Year	Tax	Non Tax	Revenue	Other Loan	State Revenue	Central Tax	Grant	Central Loan	Central Revenue	Receipt
1986-87	0.76	10.1	10.86	1.32	12.18	2.76	76.21	4.08	83.05	95.23
1987-88	0.66	9.07	9.73	0.75	10.48	25.82	69.6	7.13	102.55	113.03
1988-89	2.19	9.37	11.56	2.31	13.87	27.06	64.99	6.28	98.33	112.21
1989-90	1.32	11.05	12.36	0.17	12.53	15.57	61.5	10.64	87.71	100.24
1990-91	1.33	9.62	10.95	2.53	13.48	18.62	54.78	8.54	81.95	95.43
1991-92	1.4	8.86	10.26	1.71	11.96	16.87	53.1	4.16	74.14	86.1
1992-93	1.37	8.79	10.16	1.64	11.8	18.28	53.7	4.47	76.45	88.25
1993-94	1.21	10.49	11.69	1.34	13.03	13.76	41.83	3.4	58.99	72.02
1994-95	1.36	9.24	10.59	5.32	15.91	14.44	44.4	3.92	62.76	78.67
1995-96	2.47	7.57	10.04	2.99	13.03	9.87	50.44	3.53	63.84	76.88
1996-97	2.91	5.99	8.9	3.53	12.44	14.39	51.31	4.14	69.84	82.27
1997-98	3.83	4.59	8.42	1.42	9.85	17.44	44.34	4.15	65.94	75.78
1998-99	2.66	4.78	7.45	3.99	11.44	18.09	43.97	4.31	66.37	77.8
1999-00	3.04	4.61	7.65	10.13	17.78	21.37	40.42	1.05	62.85	80.62
2000-01	0.75	4.01	4.77	1.11	5.88	7.84	47.92	1.15	56.91	62.79
2001-02	5.89	4.43	10.32	1.11	11.42	4	55.71	1.31	61.03	72.45
2002-03	9.23	4.43	13.66	6.14	19.8	7.11	50.7	3.89	61.7	81.49
2003-04	10.3	6.78	17.08	7.53	24.61	8.33	57.26	18	83.58	108.19

Table A 6.4: Different Receipt as Percentages of NSDP in Arunachal Pradesh

Year	I1	Learning	K exp	I2	Invest	capital
1970-71	24.51	112	-	24.51	3220	63980
1971-72	25.14	247	-	25.14	3558.85	64979.65
1972-73	27.63	418	-	27.63	3977.75	66358.21
1973-74	23.98	619	-	23.98	3563.2	67267.09
1974-75	22.04	858	-	22.04	3421.9	67998.3
1975-76	22.61	1128	-	22.61	3664.85	68943.22
1976-77	21.82	1436	-	21.82	3966.8	70152.29
1977-78	26.92	1775	-	26.92	5779.85	73126.05
1978-79	30.88	2144	-	30.88	7532.65	77733.66
1979-80	33.01	2549	-	33.01	7740.75	82365.06
1980-81	30.84	4169	-	30.84	7676.85	86747.31
1981-82	29.21	5914	_	29.21	8375	91652.42
1982-83	31.63	7799	-	31.63	9374	97360.32
1983-84	27.21	9837	-	27.21	8633.3	102099.2
1984-85	32.47	12030	_	32.47	11293.45	109308.7
1985-86	30.73	14409	_	30.73	12060.3	116996.6
1986-87	29.5	16982	35.83	30.77	12906.04	125222.8
1987-88	30.71	19772	41.5	32.87	14678.77	134892.7
1988-89	27.91	22798	39.22	30.17	14577.95	144074.9
1989-90	32.24	26079	50.34	35.86	17828.53	156140.5
1990-91	34.32	29638	32.88	34.03	20038.05	169932.9
1991-92.	32.82	33500	28.05	31.87	21453.05	184588.6
1992-93	32.86	37698	26.6	31.61	21512.69	198717.8
1993-94	32.44	40234	21.67	30.28	24593.45	215362.5
1994-95	29.64	42895	29.95	29.7	23633.64	230381.6
1995-96	36.69	45962	29.33	35.21	32206.76	253373.1
1996-97	31.65	49817	28.72	31.06	26706.37	269944.6
1997-98	31.58	52555	25.74	30.41	26888.55	286035.4
1998-99	30.68	55471	21.01	28.75	26170.61	300764.5
1999-00	27.78	58163	31.25	28.48	26988.97	315722.9
2000-01	29.8	60787	19.94	27.83	27581.99	330676
2001-02	30.47	63673	21.89	28.75	27417.44	344866.4
2002-03	30.93	66705	20.86	28.92	28990.14	360061.9

Table A. 6.5: Estimated Capital, Investment and cumulative Manufacturing Output (at constant
prices of 1993-94) in Arunachal Pradesh

Note: In is the percentage of Investment in NSDP. Learning is the cumulative manufacturing output. Kexp is the percentage of capital expenditure in NSDP. Iz is the weighted average of I₁ and Kexp. Invest is the total investment. Cumulative manufacturing output, investment and capital are Rs in lakh at constant prices of 1993-94. Hyphen means not available.

Year	W	S	Ν	K	Y	Y/N (Rs)	K/N (Rs)
1970-71	269542	0.90	242588	63980	13140.00	5417	26374
1971-72	273646	0.90	246281	64980	14157.00	5748	26384
1972-73	277812	0.88	244475	66358	14396.00	5889	27143
1973-74	282042	0.88	248197	67267	14860.00	5987	27102
1974-75	286336	0.89	254839	67998	15525.00	6092	26683
1975-76	290695	0.89	258719	68943	16207.00	6264	26648
1976-77	295121	0.90	265609	70152	18176.00	6843	26412
1977-78	299614	0.92	275645	73126	21470.00	7789	26529
1978-79	304176	0.93	282884	77734	24390.00	8622	27479
1979-80	308806	0.92	284102	82365	23447.00	8253	28991
1980-81	313496	0.90	282146	86747	24889.00	8821	30745
1981-82	320496	0.90	288446	91652	28667.00	9938	31775
1982-83	327657	0.91	298168	97360	29635.00	9939	32653
1983-84	334975	0.93	311527	102099	31729.00	10185	32774
1984-85	342457	0.90	308211	109309	34784.00	11286	35466
1985-86	350106	0.91	318596	116997	39242.00	12317	36723
1986-87	357927	0.92	329293	125223	41947.00	12739	38028
1987-88	365921	0.90	329329	134893	44658.00	13560	40960
1988-89	374093	0.91	340425	144075	48316.00	14193	42322
1989-90	382449	0.91	348029	156140	49722.00	14287	44864
1990-91	390976	0.89	347969	169933	58876.00	16920	48836
1991-92	393174	0.92	361720	184589	67315.00	18610	51031
1992-93	395384	0.91	359799	198718	69055.00	18915	55230
1993-94	397607	0.91	361822	215363	81213.00	22446	59522
1994-95	399843	0.93	371854	230382	79578.00	21400	61955
1995-96	402091	0.90	361882	253373	91460.00	25273	70015
1996-97	404351	0.80	323481	269945	85982.00	26580	83450
1997-98	406624	0.90	365962	286035	88410.00	24158	78160
1998-99	408910	0.82	335306	300765	91037.00	27150	89698
1999-00	411209	0.83	341303	315723	94772.00	27768	92505
2000-01	413521	0.89	368034	330676	99110.00	26930	89849
2001-02	421809	0.85	358538	344866	95365.00	26598	96187
2002-03	425678	0.89	378853	360062	100245.00	26460	95040

Table A. 6.6: Estimated Labour Force, capital-Labour Ratio and Productivity of Labour

Note: **W** is the number of workers from the censuses. The census data are used to estimate the number of workers in all inter-censal years and the years beyond 2001. **S** is a scale factor estimated by taking into a consideration the employment situation in Arunachal Pradesh. **N** is the estimated number of person years of employment in the Arunachal economy. **K** is the estimate of capital, and **Y** is the NSDP of the State. Both **K** and **Y** are in lakh of rupees at constant prices of 1993-94.

Year	Inflow (Rs in 10 ⁵)	Population	Per capita Inflow (Rs)
1970-71	15191.15	462121	3287.27
1971-72	16085.18	473009	3400.61
1972-73	16070.25	486531	3303.03
1973-74	16292.50	500657	3254.22
1974-75	16714.22	515424	3242.81
1975-76	17125.94	530871	3226.01
1976-77	18844.88	547043	3444.86
1977-78	21892.96	563986	3881.83
1978-79	24319.27	581750	4180.36
1979-80	22912.41	600388	3816.27
1980-81	23826.24	619991	3843.00
1981-82	26875.31	639962	4199.52
1982-83	27193.08	659878	4120.93
1983-84	28483.12	680525	4185.46
1984-85	30568.18	701941	4354.81
1985-86	33669.64	724158	4649.49
1986-87	33120.99	747211	4432.62
1987-88	42611.55	771136	5525.82
1988-89	44475.66	795973	5587.58
1989-90	38322.05	821761	4663.41
1990-91	43216.41	848530	5093.09
1991-92	47108.58	873216	5394.84
1992-93	48985.67	894337	5477.32
1993-94	45147.00	915969	4928.88
1994-95	46821.50	938124	4990.97
1995-96	55161.76	960815	5741.14
1996-97	56489.06	984054	5740.44
1997-98	54622.63	1007856	5419.69
1998-99	56496.97	1032234	5473.27
1999-2000	58567.42	1057202	5539.85
2000-01	55267.37	1082773	5104.24
2001-02	56951.60	1108963	5135.57
2002-03	57945.75	1135786	5101.82

Table A 6.7: Per capita Inflow of Central Funds in Arunachal Pradesh

Note: Inflow is the sum of grants-in-aid and the State's share of Union taxes. Inflow and per capita in flow are at constant prices of 1993-94. Population is the estimated mid-year population (1st October Population)

Year	Per Capita NSDP (in Rs)	Per Capita NNP (in Rs)	Wa/W	Literacy Rate	
1970-71	2808	5001.8	123.33	11.3	
1971-72	2925	4914.3	122.97	12.73	
1972-73	2879	4763.00	122.61	14.15	
1973-74	2874	4880.40	122.25	15.58	
1974-75	2913	4830.00	121.89	17.00	
1975-76	2947	5167.10	121.53	18.43	
1976-77	3211	5102.50	121.17	19.85	
1977-78	3688	5374.60	120.81	21.28	
1978-79	4072	5551.40	120.45	22.70	
1979-80	3813	5092.20	120.09	24.13	
1980-81	4001	5352.20	119.73	25.55	
1981-82	4458	5554.80	119.37	27.15	
1982-83	4470	5554.70	119.01	28.76	
1983-84	4639	5854.30	118.65	30.36	
1984-85	4934	5955.60	118.29	31.97	
1985-86	5398	6081.90	117.93	33.57	
1986-87	5593	6188.80	117.57	35.17	
1987-88	5770	6260.30	117.21	36.78	
1988-89	6047	6777.30	116.85	38.38	
1989-90	6020	7086.60	116.49	39.99	
1990-91	6902	7320.70	116.13	41.59	
1991-92.	7676	7212.30	115.77	42.91	
1992-93	7681	7433.30	115.41	44.22	
1993-94	8733	7689.60	115.05	45.54	
1994-95	8342	8069.90	114.69	46.85	
1995-96	9352	8489.30	114.60	48.17	
1996-97	8590	9007.20	113.01	49.48	
1997-98	8634	9243.60	108.45	50.80	
1998-99	8712	9649.90	107.71	52.11	
1999-00	8890	10071.10	107.62	53.43	
2000-01	9135	10313.00	107.90	54.74	
2001-02	8654	10774.20	107.65	56.06	
2002-03	8958	10964.10	107.12	57.37	

Table A 6.8: Per-Capita Income, Relative Wages and Literacy Rate in Arunachal Pradesh

Note: NSDP per capita and NNP per capita at constant prices of 1993-94. Wa is the wage rate of Arunachal and W is the wage rate in the rest of the country. Literacy rate is the percentage of people literate in Arunachal Pradesh.

Year	Revenue Expenditure	Capital Expenditure	Total Expenditure	
1986-87	82.59	35.83	118.43	
1987-88	98.33	41.5	139.83	
1988-89	72.26	39.22	111.47	
1989-90	88.56	41.46	130.02	
1990-91	64.35	29.32	93.67	
1991-92	55.22	24.59	79.82	
1992-93	57.27	24.85	82.12	
1993-94	50.73	20.06	70.79	
1994-95	52.78	27.5	80.28	
1995-96	49.96	26.72	76.67	
1996-97	58.72	25.54	84.25	
1997-98	56.88	24.62	81.5	
1998-99	59.54	17.21	76.75	
1999-00	57.36	27.6	84.96	
2000-01	63.9	17.6	81.51	
2001-02	67.41	18.82	86.23	
2002-03	63.91	16.84	80.75	

Table A 7.1: Government Expenditure as Percentage of NSDP in Arunachal Pradesh

	Expenditure									
Year	Revenue	Capital 1	Debt Payment	Total Capital	Total					
1986-87	69.74	30.26	0	30.26	100					
1987-88	70.32	29.68	0	29.68	100					
1988-89	64.82	35.18	0	35.18	100					
1989-90	61.28	31.88	6.84	38.72	100					
1990-91	64.9	31.3	3.8	35.1	100					
1991-92	64.85	30.81	4.33	35.15	100					
1992-93	67.61	30.26	2.13	32.39	100					
1993-94	69.38	28.33	2.28	30.62	100					
1994-95	62.69	34.26	3.05	37.31	100					
1995-96	61.75	34.84	3.41	38.25	100					
1996-97	65.91	30.31	3.78	34.09	100					
1997-98	68.41	30.21	1.38	31.59	100					
1998-99	72.63	22.42	4.95	27.37	100					
1999-00	63.22	32.48	4.3	36.78	100					
2000-01	72.61	24.19	3.2	27.39	100					
2001-02	74.62	21.82	3.56	25.38	100					
2002-03	74.16	20.86	4.98	25.84	100					

Table A 7.2: Composition of the Government Expenditure in Arunachal Pradesh

Note: Capital 1 is the percentage of expenditure excluding debt payment.

	T (())	Units o	T-1-1	
51. No	Type of activity	APST	Non-APST	Total
1.	Fruit – processing	1	0	1
2.	Medicine – manufacturing	2	0	2
3.	Weaving	1	0	1
4.	Bakery	0	2	2
5.	Wine-and Bear-making	3	0	3
6.	Cane furniture-making*	1	1	4
7.	Studio (photography)	0	3	3
8.	Meat-selling (butchery)	0	2	2
9.	Cosmetic and cloth store	2	11	13
10.	General store	8	22	30
11.	Hardware shop	0	13	13
12.	Medicine shop	0	2	2
13.	Hotels and Restaurants	1	4	5
14.	Public Call Office (telephone booth)	0	2	2
15.	Wine shop	2	3	5
16.	Tailoring	0	3	3
17.	Vehicle repairing	2	4	6
18.	Hair-cutting saloon	0	3	3
	Total*	23	75	100

Table A 8.1: Activity-wise Distribution of Operators Surveyed

* Two units are operated jointly by the locals and migrants (from other states).

Note: APST means the people who are non-migrants the autochthons and the category of non-APST includes those who are largely migrants or their descendents.

Sampling Area	Male	Female	Literacy rate (%)
There are	80.44	79.05	94.96
Itanagar	89.44	78.95	84.80
Rono	90.7	77.27	83.91
Emchi	82.76	71.79	76.47
Gumto	84.91	77.78	81.31
Along	88.37	72.97	81.25
Gumin-Nagar	89.66	79.07	85.15
Kabu	76.36	59.46	69.57
Yigi-Kaum	66.67	47.17	58.2
Bagra	67.68	47.44	58.76
Rural	77.59	63.79	71.22
Urban	89.16	77.27	83.89
Papum Pare	87.90	77.16	82.71
West Siang	75.62	58.47	68.18
Total	80.94	6750	74.81

Table A 9.1: Literacy Rates (in percentage) of Surveyed Population

Sl. No	Village / town	Average income	Range	Variance	CV sq.	Т	L	Sample size
1	Itanagar	28.00	6.94	0.97	1.85	0.57	0.54	46
2	Along	56.12	2.88	1.10	0.83	0.38	0.47	19
3	Urban	36.22	5.36	1.11	1.47	0.54	0.57	65
4	Rono	16.76	2.96	0.40	0.60	0.23	0.20	14
5	Emchi	11.43	2.07	0.81	0.55	0.26	0.32	11
6	Gumto	6.55	3.21	0.55	0.46	0.19	0.22	20
7	Gumin Nagar	26.70	5.54	0.89	1.36	0.41	0.40	20
8	Kabu	9.24	2.08	0.45	0.34	0.16	0.19	16
9	Yigi Kaum	6.77	3.42	0.35	0.55	0.21	0.19	27
10	Bagra	9.01	2.67	0.41	0.44	0.19	0.19	27
11	Rural	11.85	12.60	0.68	1.60	0.41	0.37	135
	Total	19.77	10.00	1.00	2.31	0.64	0.58	200

Table A 9.2: Income Inequality of the Surveyed Villages

Note: Symbols of different measures are described in the text (Chapter 9)

Table A 9.3: Size-class distribution of holding in Arunachal Pradesh: 1995-96

(Area in hectares)

Size- class of holdings	Number of holding	Area (ha)	Percentage of holdings	Percentage of Area	Cum % of holdings (X)	Cum % of Area (Y)	Average farm size
< 0.5	9593	2697	9.25	0.78	9.25	0.78	0.28
0.5-1	11264	7408	10.86	2.16	20.11	2.94	0.66
1-2	20077	25600	19.35	7.45	39.46	10.39	1.28
2-3	17188	38045	16.57	11.07	56.03	21.46	2.21
3-4	12188	39033	11.75	11.36	67.78	32.82	3.20
4-5	10806	45574	10.41	13.26	78.19	46.08	4.22
5-7.5	13234	76632	12.76	22.29	90.95	68.37	5.79
7.5-10	3839	32011	3.70	9.31	94.65	77.68	8.34
10-20	4823	56956	4.65	16.57	99.30	94.25	11.81
> 20	722	19763	0.70	5.75	100.00	100.00	27.37
Total	103734	343719	100.00	100.00	100	100	3.31

Note: **Cum** means cumulative

 $\begin{array}{l} Gini-coefficient \; = \; \sum \; x_i \; y_i + 1 - \sum \; x_i + 1 \; y_i \\ \quad = (\; 37306.7653 - 32535.425) \; / \; 100 = 4771.3403 = 0.477 \\ Source: \; Agricultural \; census \; of \; Arunachal \; Pradesh, \; 1995-96 \end{array}$

Age	Number	Percent	Self-employed			Paid	Unemployed
group (years)	of People		Non- agricultural Sector	Farmers	Housewife	Job	
15-19	2	0.41	1	0	1	0	0
20-24	23	4.75	1	9	3	2	8
25-29	86	17.77	9	18	21	15	23
30-34	90	18.60	14	26	21	22	7
35-39	108	22.31	27	26	23	32	0
40-44	51	10.54	11	14	11	14	1
45-49	56	11.57	13	22	12	9	0
50-54	36	7.44	7	16	6	7	0
55-59	31	6.40	6	17	4	4	0
Age not stated	1	0.21	1	0	0	0	0
Total	484	100.00	90	148	102	105	39

Table A 10.1: Age-wise employment Status of the Surveyed Population: Age (15-59)

Table A 10.2: Distribution of the Hours of Work

Hours of Work	Number of Respondents	Percentage of Respondents
0	18	3.7
1	8	1.7
2	29	6.0
3	44	9.1
4	34	7.0
5	26	5.4
6	117	24.2
7	16	3.3
8	39	8.1
9	66	13.6
10	72	14.9
11	1	0.2
12	14	2.9
Total	484	100

Note: Hours refer to the number of hours

Impact of Central Funds on the Economic Development of Arunachal Pradesh

ABOUT THE AUTHOR

Prof. Nirod Chandra Roy is currently a Senior Professor in the Department of Economics, Rajiv Gandhi University, Itanagar, Arunachal Pradesh. He has served in the department in various capacities for more than 30 years. He received his education and obtained his Masters from University of Dhaka and Katholicke University Leuven, Belgium and did his pre-doctoral in Population Studies from IIPS, Mumbai and his PhD from Kalyani University. His area of specialization is Development Economics, Population Economics and Monetary and Financial Economics. He has co-authored an often cited pioneering book on *Land Reforms in Arunachal Pradesh*, (Classical Publishing Company, 2001) and has Co-ordinated and co-authored the prestigious Human Development Report of Arunachal Pradesh (2005). He has also contributed to the *Arunachal Pradesh State Development Report* (2010) and has contributed in projects like the Evaluation of Flagship Programmes and Evaluation of State Finances of Arunachal Pradesh (2019).

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Design & printing: govindsrawat@gmail.com

Centre for Development Studies Department of Economics School of Social Sciences Rajiv Gandhi University Rono Hills, Itanagar– 791 112 Arunachal Pradesh, India

Tel.: +0360-2277371 (office) Fax: +0360-2277317 Email: cds.rgu.itanagar@gmail.com