EFFECTS OF EXPORT PROMOTION POLICIES ON RURAL INCOME, OUTPUT, AND EMPLOYMENT: THE CASE OF INDIA (1955-1970)

By

NATHAN AMBLE

Bachelor of Arts
University of Mysore
Mysore, Karnataka
1968

Master of Arts
Meerut University
Meerut, India
1970

Master of Arts
University of Alabama
University, Alabama
1978

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
December, 1984

EFFECTS OF EXPORT PROMOTION POLICIES ON

RURAL INCOME, OUTPUT, AND EMPLOYMENT:

THE CASE OF INDIA (1955-1970)

Thesis Approved:

Gerald M Lage
Thesis Adviser

John D. Rea

Albert M

Daryll E. Ray

Norman N. Durham
Dean of the Graduate College

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to Dr. Michael Applegate, for his guidance and assistance through this study. Appreciation is also expressed to the other committee members, Dr. Gerald Lage, Dr. Daryll Ray, and Dr. John Rea, for the assistance in the preparation of the final manuscript.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

The role of international trade in the development process is a subject of controversy and is an important issue in the debate between inward-looking and outward-looking strategies of development. Inward-looking policies are those which aim at replacing imports, especially of industrial goods, by domestic production. Outward-looking policies, on the other hand, emphasize economic development via the production of goods for export. Since in most developing countries, exports originating in the agriculture and mining sectors constitute a sizable portion of total exports, the policy of outward-looking primarily focuses on the development of the agricultural sector.

Inward-looking or import substitution policy was prevalent in the 1950's and early 1960's when several developing countries in Asia and Latin America began to realize the need to ease their balance of payments problems and to promote their industries. The motive behind this policy was that the domestic market for the commodity concerned already existed; therefore, to substitute imports of that particular commodity with a domestic source should save the nation's

exchange. To do so, a system of protection such as tax barriers was erected to protect domestic industries from foreign competition. Also, the exchange rates were often artically overvalued to help domestic industries through importation of cheap intermediate and capital goods.

Growing support for the export-pessimism hypothesis in the early 1950's was largely responsible for the wide acceptance of import substitution as an ideal strategy of development. The idea of the export pessimism hypothesis was advocated mainly by the structuralist economists such as Prebisch (45) and Singer (53). These economists advanced two reasons in support of their hypothesis. One related to export earnings and the other to a terms of trade effect. The former was based on the relative instability of export earnings resulting from wide fluctuations in export prices or volumes. As to the later, it was argued that the terms of trade for the raw materials exports of less-developed countries would fall over the years.

The validity of the structuralist's hypothesis has been questioned in recent years by a number of economists. Massel (33) for example, finds export earnings of primary products to be more stable than those of manufactured commodities. In the subsequent studies (34, 35) the same author finds a low correlation between the export instability index and the ratio of primary products to total exports. In addition to the findings of Massel, both Dutta (16) and Agarwala (1) find a positive relation between gross national

product and exports in the case of Ceylon. Emery (19) concludes that countries wanting to increase their economic growth rates must follow the type of policies that will stimulate exports. In addition to the above findings, works of Beckerman (5), Thorbecke and Condos (59), Chenery (11), and Shirley (51) all attempt to demonstrate the positive role of exports in the process of economic development.

Although debate still continues as to which strategy of development is ideal, there seems to be no disagreement among development economists as to the goals of development policies. Development policies, in general, should aim at attaining higher standard of living for the people. This, to a large extent, depends on the eradication of poverty, income inequality, and unemployment. Changes in the standard of living are often measured in terms of gross national product. Rising GNP is generally considered as an indication of a rising standard of living. But the experience of the 1950's, and 1970's seems to suggest that an increase in GNP, though necessary, is not a sufficient condition for improvement in the economic welfare. During the above stated decades, there was a steady rise in GNP in almost all less-developed countries. But the problems of unemployment and low income remained unsolved. India, to which the present research work is devoted, is no exception to this.

Statement of the Problem

India is an agrarian nation. Agriculture accounts

directly for nearly half of the national product and provides a major portion of both raw materials and the market for the industrial sector. Agriculture will dominate an employment-oriented strategy of development because it contains over two-thirds of the labor force, including the bulk of the reserve army of low productive labor. It will also produce the principal consumer goods needed to sustain a rapid increase in incomes of the newly employed. Agriculture also provides a major net stimulus to demand for the output of other sectors. Unfortunately, this sector has faced several obstacles which make it slow to develop and progress. These problems are underscored by heavy dependence on weather, inadequate investment in the rural infrastructures, price controls, export controls, and overvalued exchange rates, etc.

Under the growing influence of export pessimism, top priority was assigned to the development of import competing industries. This began in 1956 with the adoption of an import substitution policy which aimed at promoting domestic production through the erection of import competing industries. The Indian government has used several measures to set up industries both in the public and private sectors. These measures included high import tariffs, quantitative restrictions, foreign exchange controls, favorable exchange rate policies, and industrial control which regulated entry and expansion (6), export controls, price controls, and credit assistance. To promote import substitution policy, the

government increased tariffs on imported products and reduced tariffs on raw materials. Consequently, the content of imports was changed from finished products to faw materials. The balance of trade, therefore, did not improve. Further, the benefits from this policy did not accrue to the vast majority of the Indian population, especially in the rural areas. The economic benefit was enjoyed mainly by the manufacturing sector, especially in the urban areas.

It turned out that during 1955-1970 import substitution industries grew considerably. As a result, there was a steady decline in the ratio of imports to national products and domestic supply in a majority of industries (49, 29). But India is not completely free of import dependence especially for crucial raw materials and basic metals, upon which the operation of heavy industries largely depends. Their timely and adequate supply is so vital that any shortage or non-availability results in underutilization of industrial capacity. The consequences of excess capacity are wastage of resources, shortage of output, and unemployment. Although underutilization of industrial capacities may be attributed to a number of reasons, such as strikes, power shortages, transport bottleneck, etc., the most important cause in recent years lies in the shortage of imported raw materials caused by scarcity of export earnings to pay for imports. Failure of the export sector to earn adequate foreign exchange must be attributed to poor performance of the agricultural sector from where a major portion of India's exports originate.

The poor performance of the agricultural sector, in turn, had deleterious effects on the agricultural income, output, and employment.

Effects on the Agricultural Sector

Indian agriculture is characterized by a dualistic system of farming. Its existence can be identified on the basis of peasant subsistence farming and capitalist or commercial farming. Production techniques and objectives may vary between these two subsectors of the agricultural sector. In the capitalist sector, the structure of production is dialectical in the sense that the owner does not cultivate the land. In the peasant sector, this structure is monolithic and harmonic in the sense that owner of the land is also the tiller. Further, the objective of the wage-based technology is to maximize surplus in the commercial farming sector. The peasant sector, on the other hand, operates on a family-labor based technique of farming with a view to maximize total output.

The agricultural sector, in general, has received little attention from the policy makers under the import substitution program of development. A large portion of the resources allocated was absorbed in the industrial sector. As a result of this policy, both land and labor productivity have failed to increase substantially. Table I, presents the productivity trends in the Indian agricultural sector for the period 1955, 1965, and 1970. It reveals that the

increase in the productivity of land and labor under the import substitution program of development was low and unsatisfactory.

TABLE I

ELEMENTS OF INDIA'S AGRICULTURAL PRODUCTIVITY

Year		1955	1965	1970
Q/L:	Output/worker	2.397	2.190	2.350
Q/T:	Output/hectare	0.936	1.129	1.290
T/L:	Land/labor ratio	2.562	1.940	1.824

Source: William Paul McGreevey, 'Third-World Poverty' (D.C. Heath and Company, Lexington, Massachusetts, 1980. Page 152.)
Note: Output is measured in thousands of units.
Land is measured in thousands of hectares.
Labor is measured in thousands of male workers.

Table I reveals that the increase in the productivity of land and labor under the import substitution program of development was low and unsatisfactory. Low productivity, in turn, had a negative impact on the agricultural output, employment, and income. Agricultural income was squeezed

by price controls, export quotas, export taxes, and overvalued exchange rates. Agricultural price policy of the government was such that the periodic food shortages were met not by increasing domestic supply, but through the imports of food grains. For example, at the end of 1970, of the $13,688 million of agricultural commodity shipments to less-developed countries under the U.S. Public Law-480, India received almost one-third of the shipment (52). The motive behind such huge import was to depress the domestic farm prices and thereby supply food and agricultural raw materials at relatively low prices to the industrial sector. This policy affected not only the production of food grains for domestic consumption, but also the production of commercial crops for exports.

In addition to price controls, export taxes and export quotas were also used to generate revenue receipts and stabilize the domestic price level. These restrictions had the effect of preventing the farmers from selling their output in foreign markets at relatively higher prices.

Thus, the domestic investment, price, and trade policies were proven to be biased against the agricultural sector. The consequences of such biases are low income, output, and employment. In addition to affecting the performance of the agricultural sector, the above strategy of development also resulted in the widening of economic imbalance between rural and urban sectors. Imbalance exists as to the rural-urban wages, prospects of securing jobs,

education, etc. The economic imbalance is largely responsible for the rural-urban migration and the observed over-crowded cities in many parts of India (13).

Thus, the above is a brief description of the nature of the problem being confronted by India's rural sector under the import substitution program of development. Since the import substitution policy left the rural sector under low levels of income, output, and employment, the present study attempts to investigate the scope for an alternative strategy of development, i.e., the outward-looking strategy of development.

Purpose and Nature of the Study

The purpose of this study is to investigate empirically the effects of an outward-looking strategy of development on India's rural income, output, and employment. In order to investigate this, a two-sector macro-econometric model for India will be specified. The major sectors to be considered in this study are the agricultural and the non-agricultural sectors. The disaggregation is carried out in terms of agricultural and non-agricultural incomes, output, employment, wages, and investments. Further, the agricultural sector is subdivided into an agricultural commercial sector and an agricultural subsistence sector.

In its structural form the model has fifteen equations, of which thirteen are behavioral and two are identities. Separate equations are specified for agricultural income,

output, wage, investment, and employment levels. In addition to these, three other equations representing subsistence sector output level, export demand, and import demand are also included. The model is constructed to evaluate the effects of export promotion policies - exchange rate and export taxes - on India's agricultural income, output, and employment. Further, the model also investigates the effect of the development of agricultural sector on the non-agricultural sector. This linkage effect is studied by linking the agricultural sector to the non-agricultural sector labor market.

The main feature of the model is its structuralist approach to development emphasizing the dualistic nature of the Indian economy. The present study covers the period 1955-1970. This was the period during which the import substitution policy was highly emphasized.

Organization of the Study

This dissertation is divided into four chapters. Chapter II, presents a brief review of the existing literature on export-pessimism hypotheses with particular reference to India. In this chapter, this researcher also presents the theoretical development of the model along with the specification of exogenous and endogenous variables. This chapter also includes the derived reduced form equations for the agricultural income, output, and employment. Besides, a reduced form equation for the non-agricultural

sector is also included in this chapter, along with the theoretical hypotheses. Chapter III, presents empirical results and finally, in Chapter IV, the conclusions and policy recommendation along with the limitations of the present study are made.

CHAPTER II

THEORETICAL DEVELOPMENT

This chapter reviews the literature on trade and development with particular reference to the Indian economy. As we saw in the preceding chapter, a number of empirical studies questioning the validity of the export-pessimism hypothesis exist in the trade and development literature. It is the purpose of this chapter to extend the same analysis to the case of India. In addition to reviewing the literature on trade and development, this chapter also presents the theoretical development of a two-sector macro-econometric model to conduct the investigation specified in Chapter I.

Exports and Economic Development

As we noted in Chapter I, structuralist economists, notably Prebisch (45) and Singer (53), put forth two reasons for disfavoring the outward-looking strategy of development. One relates to the export earnings and the other to the terms of trade effect. The former is based on the idea of relative instability of export earnings resulting from fluctuations in export earnings or volumes. As to the later, it is argued that the terms of trade for the raw materials

exports of less-developed countries tend to fall over the years. Guided by these reasonings and a false prediction that the price of raw materials of the Indian exports would fall over the years, the policy makers were led to opt for an inward-looking strategy of development. The above two export pessimism hypotheses are empirically examined in the case of India by a number of economists. Notable among them include Bhatia (7), Halder and Richards (22), and Ram (32). Their findings invalidate the export pessimism hypotheses in the case of India and place emphasis on the outward-looking strategy of development. Bhatia's work goes back to the period of British-India (1861-1939). From his findings, Bhatia rejects the hypothesis that primary-goods-producing countries have in the past suffered a secular deterioration in the terms of trade with industrial countries. His findings reveal that instead deterioration, the secular trend in India's terms of trade from 1861 to 1914 was toward improvement and even after World War I the terms of trade moved in favor of India. He attributes the failure of foreign trade to be an engine of growth largely to the biased nature of the British commercial policies.

In a related study, Halder and Richards (22) find export earnings instability of primary-goods-producing countries to be due largely to commodity and geographic concentration. They use regression analysis to explore the relation among these variables. The explanatory variables include commodity concentration (C_X), geographic concentration (G_X), and concentration on primary exports (C_{pe}). The dependent variable

is export earnings, which is given as (D_t/X_t), where D_t is the absolute difference between actual exports (X_t) and the predicted value of exports derived from a semi-log arithmetic trend equation [given as follows: $\log Y_e = \log a + X(\log b)$] on commodity export earnings. The equation estimated by them for India, along with their R-squares and the standard errors of the regression coefficients are presented below.

$$D_t/X_t = -0.107 + 0.0020C_{xt} + 0.0020G_{xt} \qquad (2.1)$$

$$(0.002) \quad (0.004)$$

$$R^2 = 0.22$$

$$D_t/X_t = -0.058 + 0.040C_{xt} + 0.040C_{xt} - 0.073C_{pt} \qquad (2.2)$$

$$R^2 = 0.16$$

$$D_t/X_t = -0.03 + 0.002C_{xt} \qquad (2.3)$$

$$(0.002) \qquad R^2 = 0.18$$

On the basis of the above estimated equations, Halder and Richards (22) conclude that India's export instability can not be explained in terms of either commodity or geographic concentration, and/or concentration on primary export commodities. Thus, they reject the traditionally held view that the instability in the export earnings of primary-goods-producing countries is due to commodity and geographic concentrations. In their view, economic development of India can be accelerated by implementing appropriate trade policies.

In addition to the above findings, the work of Ram (32)

also questions the validity of the export-pessimism hypothesis in the case of India. He introduces the concepts of 'net barter' (or commodity terms of trade) and income terms of trade into the analysis. His findings reveal that the terms of trade on the whole were favorable to India during the period of 1955-1971. He rejects the terms of trade argument as advanced by Prebisch and others. His study shows that even the income terms of trade during this period was on the upward trend. However, the decade 1950-1960 saw a downward trend in the commodity terms of trade and improvement in the income terms of trade. The implication of falling commodity terms of trade and improving income terms of trade is that India would have been able to sell more at lower prices.

In addition questioning the validity of the export-pessimism hypothesis, his regression results show that exports in the case of India did act as an engine of growth, especially during the period of 1950-1971. The estimated regression results for India reveal that on average, a one per cent increase in total export earnings and manufactured exports are independently associated with 0.73 and 0.55 per cent increase in the gross national product. The estimated equations along with their R-squares and the standard errors of the regression coefficients are given below.

$$\log_e GNP = 5.983 + 0.735 \log X \qquad (2.4)$$

$$(1.02) \quad (0.09)$$

$$R^2 = 0.91$$

$$\log_e GNP = 8.48 + 0.551 \log_e X_m \qquad (2.5)$$

$$(0.46) \quad (0.04)$$

$$R^2 = 0.78$$

where

X_t = total exports and X_m = manufactured exports

The above regression results show not only the existence of a strong and significant relation between exports and economic growth, but also that the manufactured exports were outperformed by total exports. Since the traditional exports form a large portion of the total exports, the poor performance of the manufactured exports need not be surprising. For example, in 1970, manufactured exports accounted for only 10% of the total exports. In addition to these, the works of Morgan (25) also seem to indicate that the relative price ratio - agricultural raw materials to that of industrial products - in the case of India was rising until 1910, irregular until 1930's, and later was rising again.

Having rejected the export-pessimism hypotheses in the case of India, we now proceed to specify a two-sector model to explore the relation between exports and rural income, output, and employment. Although a number of economists such as Ahluwalia (2), Desai (15), Marwah (30), and Pandit (41) have attempted to build macroeconomic models for India, there seems to be no attempt to build a model to deal exclusively with the rural development problems. Further, most of the above works are along the lines of Keynesian macro-

economics whose validity to less-developed countries such as India is questionable. These models (based on the Keynesian income-expenditure approach) focus heavily on the influence of the market mechanism for the allocation of resources. As opposed to this school of thought, structuralists, led by Prebisch, Singer, Lewis, and others, point to the structural rigidities that prevent allocation of resources based on the market forces of supply and demand. They also recognize the dualistic nature of underdeveloped countries, i.e., the existence of a well developed modern sector with all modern facilities such as banking, credit, transport and communication, and an underdeveloped rural sector lacking in all these facilities. It is this dualistic nature which prevents the validity of Keynesian economics in these countries. Marwah (30), for example, specifies a macroeconomic model based on the Keynesian income-expenditure approach to explain the sources of inflation in India. He works with a four sector model. The four sectors include food grains, faw materials, semi-manufactures and manufactures. Four separate price equations for each sector are also specified.

In the first three sectors, prices are determined by the market mechanism. Price behavior in the manufacturing sector is explained by the cost-push hypothesis. Behavior of the general price level is explained in terms of aggregate supply and demand, money supply, velocity of money, food prices, and by the price of imported goods. The supply

function is based on Harrod-Domar growth theory in which capital stock plays a crucial role in the determination of output. On the aggregate demand side, separate equations for private consumption and investment are specified. Private consumption is determined in the Keynesian fashion in which income plays a crucial role.

Private investment is influenced by the supply of imported raw materials and capital goods. In the foreign sector import and export demand equations are specified. Imports are affected by the relative prices, import duties, population, real national income, and foreign exchange reserves. Exports are determined by the relative price of India's exports to the price of LDC's exports. In the monetary sector, Keynesian liquidity preference theory is used to explain the demand for money. The general price level is determined by the excess money supply (excess money supply is defined with respect to a normal or safe money which is computed on the basis of variations in output and velocity), food prices, and imported prices. In the food sector, demand for food is measured in terms of fool imports. Food grain supply is determined by the previous year's food prices and total agricultural production.

In short, Marwah's model has fourty-eight equations. After estimating the model, using ordinary least squares and two stage least squares, he derives impact multipliers for the purpose of policy analysis. The results of his study show food prices as having a stronger impact on the general

price level than the money supply. Increase in food supply reduces the severity of inflation in the economy. Although Marwah's model is in the Keynesian tradition, it nevertheless recognizes the role of the agricultural food sector in explaining the behavior of prices in the Indian economy. But the treatment of the foreign sector, especially the export side of the problem is rather narrow and does not include the policy analysis.

In a similar study, Ahluwalia (2) combines the elements of structural, demand-pull, cost-push, and monetary theories of inflation. He analyzes the behavior of prices and output for the Indian economy within the framework of a general equilibrium analysis. In addition to demand side, the role of supply constraints arising from the agricultural and foreign sectors are also used to analyze the behavior of prices and output in the Indian economy. He specifies a two-sector model incorporating agricultural and non-agricultural sectors. Agricultural sector is further subdivided into food grain sector and commercial sector. Food grain sector is linked to the rest of the economy. Food shortages, he argues, form a major constraint on the absorption of labor into the modern sector in spite of the existence of the surplus labor in the economy. The effects of food shortages are felt on the food prices, which in turn, affect the money wages. Higher wages result in cost-push inflation. Further, the manufacturing sector is linked to the agricultural commercial sector and the government sector.

In his model, the foreign sector is linked with the monetary sector by endogenizing the changes in foreign reserves. The later is achieved by specifying separate import functions for capital and intermediate materials. Exports, capital flows, and import of food grains are all exogenous to the model. Further, the budgetary operations of the government are endogenous to the model. As a result, the effect of the agricultural sector on the fiscal sector and the effect of the fiscal sector on the monetary sector are explicitly traced in his model.

The above is a brief description of Ahluwalia's work. In short, his model has 23 equations and seven identities. Most of the equations are linear in nature. The model is estimated for the period 1951-1973, using ordinary least squares techniques. The results of his study reveal the dominance of the agricultural sector in the Indian economy. It plays a significant role in the determination of prices and output. Apart from dealing with the price and output issues, the role of foreign trade, especially the export sector, has not received much attention from the author.

Another econometric model dealing primarily with the price issue comes from the works of Pandit (41). His ideas are primarily in the Keynesian tradition, with its usual GNP and components. His model incorporates separate equations for private consumption, investment, exports, and imports. Government expenditure is exogenous to the model. Private investment is determined by GNP and previous year

investments. Interest rate, rate of profit, and liquidity in the economy which form part of the standard investment theories do not appear to be significant in the context of the Indian economy. This must be attributed to the dominance of the rural sector with underdeveloped money and credit markets. Since his objective is to explain the behavior of the general price level for the Indian economy, he specifies wage and price determination equations. Wages are determined by the food prices and by the output of the non-agricultural sector as well as by the level of employment.

The results of his study shows that the general price level to a large extent is influenced by the performance of the agricultural sector.

In addition to the economy-wide models described above, Dutta (17) specifies a foreign sector model incorporating six equations and one identity. Endogenous variables include import of merchandise, import of service items, and exports to dollar, sterling, OECD, and rest of the world areas. Exogenous variables are the following: industrial output in India, a variable to reflect the trade barriers, time trend, industrial output in the U.S., U.K., West Germany, and Japan, a variable to incorporate export promotion activities, and a relative price ration. His study reveals that the substitution effect of a price change between tea and coffee in the world market to be insignificant.

The above is a brief description of the sectoral model as developed by Dutta. Apart from estimating a few elasticities,

his model does not extend to include the effects of export trade on the domestic economy.

As we have seen above, all of the three economy-wide models deal primarily with the domestic price issues, and the treatment of the foreign sector does not include the export side of the problem. Further, these works are mainly in the Keynesian tradition.

In contrast to the above works, models built on the realistic features of the Indian economy are relatively few. The only model available to the knowledge of this researcher is that of Agarwala, whose work may be found in the survey article published by Desai (15). Agarwala, specifies a two-sector macroeconomic model to analyze the economic development of India in terms of the supply of food grains from the agricultural to the non-agricultural sector. The main feature of his model is his emphasis on the structuralist views of development, as opposed to the models built on the Keynesian views. Agarwala's model is in the framework of the two-sector models of Rains-Fei (29) applicable to labor surplus, agricultural dominated underdeveloped countries such as India. His model has twenty-four equations and twenty predetermined variables. The model is estimated by using the ordinary least squares and two stage least squares techniques.

Agarwala's model has two production functions, one for the agricultural income and the other for the non-farm income. He has separate investment functions for the agricultural

and the non-agricultural sectors. Both are in the framework of the acceleration principle. Further, relative prices - agriculture to that on non-agriculture - also play a crucial role in the determination of agricultural investment. Agricultural income is determined by the current year agricultural capital stock and by the index of rainfall. For the non-agricultural income, the Cobb-Douglas production function with its usual assumption of constant returns to scale is employed. Non-agricultural employment is determined by the supply of agricultural subsistence sector and the agricultural commercial sector output levels. Imports also play an important role in the determination of non-agricultural employment. In the monetary sector, money supply is explained by currency and time trend. The general price level is determined by money supply and real output and the consumer price level is determined by agricultural commodity prices. Non-agricultural price is influenced by the price of manufactured goods. The price of manufactured goods, in turn, is determined by the consumer price level and also by the lagged money wages.

Agarwala's model also incorporates a foreign sector. In the foreign sector, exports are determined by world income and by the relative price ratio - domestic price of exports to that of the export prices of less-developed countries. Total imports are disaggregated into capital goods, consumer goods, and food grains.

The above is a brief description of Agarwala's two-sector

macroeconomic model. The merits of his work lie in his attempt to deviate from the traditional Keynesian type of analysis where demand factors play a crucial role in explaining the behavior of the economy. He estimates only structural equations and does not perform any hypothesis testing. Most of the estimated equations show high R-squares reflecting the goodness of the fit.

Thus, except for the works of Agarwala, the models discussed above are mainly in the Keynesian nature. Further, all these works deal primarily with the domestic price and output issues, although, the dominance of agriculture sector is recognized in these models. Since to the knowledge of this researcher, no such study dealing exclusively with the export side of the problem exists for India, the present research work is directed towards exploring this issue in depth.

Theoretical Hypotheses

This section is devoted to the development of the theoretical hypotheses. Since the present study is essentially policy oriented, two policy instruments are identified in this section. These policy instruments are the exchange rate and the export duty. Under the import substitution program of development, the exchange rate was used as a policy instrument to help imports of industrial faw materials and capital goods. Although the policy of overvalued exchange rate helped the import of industrial raw materials and capital

goods by lowering the cost of imports, it adversely affected the exports of traditional items such as tea, coffee, tobacco, jute, raw cotton, etc., by making the Indian goods less competitive in the world market.

In addition to exchange rate, export duty and export quotas were also used as policy instruments to achieve the objective of industrialization. Export duties were levied for various purposes. The pre-war export duties were imposed for producing revenue receipts from commodities which had a comparatively strong position in export markets. In the post-war period, export duties have also been levied for purposes other than revenue. Export duties were imposed for protective purposes and for preventing the impact on domestic markets of inflationary conditions abroad or for stabilizing domestic prices (61). Evidence shows (6, 31), these taxes did adversely affect the performance of the traditional exports by changing the relative prices in favor of competitors in the world market. In turn, declining exports resulted in the decline of agricultural income, output, and employment.

Since the purpose of this study is to evaluate the effects of the above stated policies on agricultural income, output, and employment, we hypothesize that the exchange rate and the edport duty will have positive and negative impacts, respectively, on the agricultural income, output, and employment. In this study, exchange rate is defined as the number of units of domestic currency required to buy

a unit of foreign currency. An increase in the exchange rate (or devaluation), which by making the domestic goods less expensive in foreign markets, is assumed to increase foreign demand for the domestic exports and thereby stimulate exports. Higher exports are expected to cause export earnings to increase and the increase in export earnings is expected to have a positive influence on the agricultural income, output, and employment. Export taxes, on the other hand, are assumed to have a negative impact on the export earnings, income, output, and employment.

In order to investigate the effect of the development of the agricultural sector on the non-agricultural sector, the former is linked to the non-agricultural sector labor market. The linkage effect study is crucial due to the fact that the agricultural sector is the major supplier of food and raw materials to the non-agricultural secotr. This linkage effect is studied in terms of the effect of agricultural sector output on the non-agricultural sector employment. The study hypothesizes that the farm output will have a positive effect on the non-agricultural sector employment level.

In order to investigate the above hypotheses, a two-sector macroeconometric model for India is specified. This model is based on the framework of an earlier model done for India by Agarwala. Agarwala's model is built around the ideas of Prof. Lewis. In his two-sector model, Lewis assumes development with unlimited supplies of labor at a

given wage level. The present model continues to maintain the same assumption.

Structural Characteristics of the Model

a. Since India attained independence in 1947, the economy has made considerable progress. Although government controls exist, the market mechanism has not completely lost its role. Structural rigidities exist. But they are gradually disappearing from the economy. Due to these reasons, the model incorporates both the Keynesian and the structuralist views of development.

b. The economy is assumed to consist of two major sectors, an agricultural sector and a non-agricultural sector. Agricultural sector is further subdivided into a capitalist sector and a peasant sector.

c. In the present model, relative prices play a crucial role in influencing the investment decisions of farmers in the agricultural sector and of producers in the non-agricultural sector.

d. The model establishes a link from agriculture to non-agricultural sector, besides linking the capitalist sector with the subsistence sector through the relative prices. As noted earlier, the link between commercial or capitalist sector and the peasant or the subsistence sector is crucial in the context of the Indian economy. Non-agricultural sector economic activities are to a large extent influenced by the activities of the agricultural commercial

sector which is the major supplier of food and raw materials. Thus, the industrial or non-agricultural employment is to a large extent affected by the activities of the rural sector.

e. The model links both the agricultural sector and the non-agricultural sector to the foreign sector in order to evaluate the effects of trade policies on the sectoral levels of output, income, and employment.

f. Both the institutional and non-institutional factors play a role in the determination of sectoral wage levels.

g. The model also focuses on the behavioral responses of subsistence farmers to changes in the relative price ratio - the ratio of the price of food commodities to that of the commercial crops. A fall in this ratio is assumed to induce subsistence farmers to switch over from food commodities to commercial crops. Whether the price incentive alone is sufficient to induce farmers to make such a switch is still a controversial issue in the development literature. Controversy centers around the issue of the rationality of subsistence of farmers, i.e., whether the small farmers in less-developed countries are rational to respond to price incentives or not. In our view, such a switch, in addition to price incentives, also depends on the supply of complementary inputs such as land, capital, irrigation facilities, etc. The amount of risk involved in such a switch is also vital. Risk arises due to the fluctuating nature of the

farm prices. Appropriate farm price policies are crucial in stabilizing the income of the farmers. In addition to price policies, non-price policies which focus on the development of the rural infrastructures, such as roads, electricity, communications, agricultural research, etc., are also vital in preventing farmers income from being subject to wide fluctuations.

Difference Between the Present Model and the Agarwala's Model

a. Agarwala's model determines the non-agricultural employment in terms of both agricultural output and net imports of food. The present model disaggregates the agricultural sector into a subsistence sector and a commercial sector. Non-agricultural employment is determined in terms of agricultural food and non-food output.

b. Agarwala's model does not attempt to determine the agricultural employment. The present model attempts to introduce a separate employment determination equation for the agricultural sector.

c. The crucial difference between the two models is to be found in regard to the specification of the export demand equations. Agarwala considers world income and relative prices as explanatory variables. The present model, in addition to the world income, includes exchange rate and export taxes as explanatory variables.

d. In the present model, all prices are exogenous

to the model.

e. The present model unlike Agarwala's does not include a monetary sector.

f. Agarwala's model does not perform any hypothesis testing. The present model does.

Specification of the Model

The following model has fifteen structural equations, of which thirteen are behavioral and two are identities. The model, except for the non-agricultural sector labor market, is essentially 'recursive' in nature. The economy is disaggregated into (a) agricultural sector and (b) non-agricultural sector. The agricultural sector includes activities such as farming, animal husbandry, forestry, fishery, etc., and the non-agricultural sector includes the activities of both secondary and tertiary sectors.

Equation 2.6 explains the factors influencing the demand for India's exports in the world market. The specifications of the export demand equation is different from those of the earlier specifications by Houthaker and Megee (23), Sharma (50), Murti and Sastry (40), Patil (44), Dutta (18), and Khan (26). The earliest to attempt such estimates for India was by Murti and Sastry. They use a single equation model to estimate the elasticities of import and export demand for India. Their results covering 1927-1938 appear to be satisfactory judging from the short-run elasticities with respect to each of the following variables: relative

prices, world income, and domestic production. Similar elasticities estimated by Houthaker and Megee (23) for the period 1951-1966 also appear satisfactory and of correct signs. The estimated elasticities with respect to export price and world income are -0.23 and 0.54 respectively. Although these studies estimate price and income elasticities, they do not consider other possible explanatory variables such as the exchange rate and export duty. The present study incorporates the following export demand equation:

$$\ln E = \ln Q_1 + B_1 \ln ER + B_2 \ln TE + B_3 \ln YW + e_1 \qquad (2.6)$$

$$(+) \quad (-) \quad (+)$$

In the above equation, ER is the exchange rate, TE is the export tax and YW is the world income. World demand for the domestic (India's) exports is assumed to be influenced by the exchange rate, export tax, and world income. We expect the exchange rate to have a positive effect on world demand for the domestic exports. The export tax and world income are expected to have negative and positive effects, respectively. The expected signs of the coefficients are given in the parentheses.

Equation 2.7 explains the factors determining the level of investment in the agricultural sector. A number of empirical studies dealing with the corporate investment behavior are available for India. Notable among them are Bhele (8), Sastry (48), Rao and Misra (47). These studies attempt to explain the corporate investment behavior by

incorporating such variables as sales, profits, interest rates, retained earnings, and other liquidity variables. In regard to the agricultural sector, investment studies are relatively scarce. A few empirical studies done in this area seem to support the existence of a positive relation between rural income and rural investment. For example, the work of Krishna and Chaudhari (27) seems to support the hypothesis of a positive relation between rural investment and rural income.

The failure of interest rate and other liquidity variables stated above should be attributed to the nature of the economic environment, i.e., the lack of a competitive mechanism and the dominance of underdeveloped rural banking and credit markets. Due to these reasons, the present model specifies a different varsion of the investment demand equation for both the agricultural and the non-agricultural sectors. In the agricultural sector, investment behavior of the farmers is determined by exports and by the ratio of the price of agriculture to that of non-agricultural prices. Private investment in agriculture includes investment in land improvements, tractors, electric generators, etc. The equation for the agricultural sector investment level is specified as follows:

$$\ln I_{ag} = \ln Q_2 + B_4 \ln E + B_5 \ln E_{t-1} + B_6 \left(-\frac{P_{ag}}{P_{nag}}\right) + e_2 \qquad (2.7)$$

$$(+) \quad (+) \qquad (+)$$

Agricultural investment is determined by the current and the previous years exports and by the ratio of the price of agricultural commodities to that of non-agricultural commodities. We expect both the exports and the price ratio to exert positive influences on the investment decisions of the farmers.

Equation 2.8 explains the factors influencing the agricultural income. It is affected by the level of agricultural capital stock and by the government expenditure on rural development programs. Capital stock affects the rural income both directly and indirectly. Indirectly, the accumulation of capital stock enhances the land and labor productivity and thereby contributes to higher levels of output, employment, and income. Directly, ownership of capital stock in the form of tractors, electric generators, pumpsets, etc., represents a form of assents which are used in determining the income of the farm sector. Due to the assumption of zero marginal productivity of labor in the agricultural sector, labor as an explanatory variable is excluded from the model. The agricultural income equation is given as follows:

$$\ln Y_{ag} + \ln Q_3 + B_7 \ln K^{ag}_{t} + B_8 \ln GE^{ag}_{t-1} + e_3 \qquad (2.8)$$

$$(+) \qquad (+)$$

In the above equation, we expect capital stock and the government expenditure to have positive effects on the rural

income. Government expenditure includes expenditure on irrigation and other rural development programs.

Equation 2.9 is simply an identity where the current year capital stock is defined as equal to the initial capital stock or the previous year capital stock and the net investment in agriculture.

$$\ln K_t = \ln K_{t-1} + I_{ag} \tag{2.9}$$

Equation 2.10 determines the agricultural commercial sector output level. This equation is given as follows:

$$\ln K_{agc} = \ln Q_4 + B_9 \ln Y_{ag} + B_{10} \ln\left(\frac{P_{agc}}{P_{Ir}}\right) + e_4 \tag{2.10}$$

The above equation determines the level of agricultural commercial sector output. It is determined by the agricultural income and by the ratio of the price of cash crops to that of industrial faw materials such as energy, fertilizers, and other fuels. These faw materials are used as inputs by the farm sector. We expect both the income and the price ratio to have positive impacts on the level of output. Higher income induces farmers to increase supply if they expect the same trend to continue in the future.

Equation 2.11 determines the supply of agricultural subsistence sector output, which essentially includes rice, wheat, etc. Supply in this sector is influenced by the level of income as well as by the ratio of the price of food commodities to that of the commercial crops. Due to

the non-availability of disaggregated data on the subsistence sector income level, we incorporate the aggregate farm income as an explanatory variable for determining the level of output in the subsistence sector. This equation is represented as follows:

$$\ln X_{agf} = \ln Q_5 + B_{11} \ln Y_{ag} + B_{12} \ln\left(\frac{P_{agf}}{P_{agc}}\right) + e_5 \qquad (2.11)$$

$$(+) \qquad (+)$$

In the above equation, we expect both the income and the ratio of the price of food commodities to that of non-food commodities to have positive impacts on the level of food output.

Equation 2.12 determines the level of employment in the agricultural sector. Level of employment in this sector depends to a large extent upon the level of economic activity. Level of economic activity is measured in terms of the level of output of the commercial sector. Another factor influencing the level of employment in the farm sector is the level of farm wages. The reason for including the sectoral level of output is due to the recent evidence showing the positive relation between employment and output levels in certain parts of India (14, 46). We expect output to have positive effect upon the level of employment and wages to have negative impact on the level of agricultural employment. This equation is represented as follows:

$$\ln N_{ag} = \ln Q_6 + B_{13} \ln X_{agc} + B_{14} \ln W_{t-1} + e_6 \qquad (2.12)$$

$$(+) \qquad (-)$$

In the above equation, X_{agc} is the agricultural commercial sector output level and W_{t-1} is the previous year agricultural wages.

Equation 2.13 attempts to explain the determination of agricultural wages. It is determined by the level of agricultural employment and the general price level. We expect the employment level to have a positive impact on the agricultural wages and the general price level, also, to affect the agricultural wages positively. This equation is represented as follows:

$$\ln W_{ag} = \ln Q_7 + B_{15} \ln N_{ag} + B_{16} \ln PC + e_7 \qquad (2.13)$$

$$(+) \qquad (+)$$

Equation 2.14 determines the factors influencing the non-agricultural employment level. It is determined by the level of agricultural output - both subsistence and commercial sectors. In addition to agricultural output, non-agricultural wages are also assumed to play a crucial role in determining the level of employment in the non-agricultural sector. We expect the output and the wages to affect the level of non-agricultural employment positively and negatively, respectively. In this equation, we attempt to investigate the effects of the development of the agricultural sector on the non-agricultural sector

employment level. The linkage effect study is crucial due to the fact that the agricultural sector is the major supplier of food and agricultural raw materials to the non-agricultural sector. Thus, the non-agricultural employment to a large extent is affected by the activities of the agricultural commercial and subsistence sectors. The past development policies of India did fail to consider the importance of this linkage effect. As a result, the development of heavy industries did fail to contribute substantially to the expansion of the industrial employment.

Non-agricultural employment equation is represented as follows:

$$\ln N_{nag} = \ln Q_8 + B_{17} \ln X_{agf} + B_{18} \ln X_{agc}{}_{t-1} + B_{19} \ln W_{nag}{}_{t-1} + e_8 \qquad (2.14)$$

$$(+) \qquad (+) \qquad (+)$$

Equation 2.15 determines the non-agricultural wages, which are assumed to be influenced by the level of employment, the general price level, and the lagged non-agricultural wages. This equation is given as follows:

$$\ln W_{nag} = \ln Q_9 + B_{20} \ln N_{nag} + B_{21} \ln PC + B_{22} \ln W^{nag}_{t-1} + e_9 \qquad (2.15)$$

$$(+) \qquad (+) \qquad (+)$$

In the above equation, we expect both the employment and price level to have positive effect on the level of industrial wages. Lagged wages are expected to exert positive influence on the level of wages.

Equation 2.16 determines the non-agricultural investment level. It is determined by the level of exports and by the ratio of the current to previous year price levels. This equation is given as follows:

$$\ln I_{nag} = \ln Q_{10} + B_{23} \ln E_{t-1} + B_{24} \ln E + B_{25} \ln\left(\frac{PC}{PC_{t-1}}\right) + e_{10} \qquad (2.16)$$

$$(+) \qquad (+) \quad (+)$$

In the above equation, we expect exports and the price ratio - the current year to the previous year - to have positive impacts on the level of non-agricultural investment.

Equation 2.17 is simply the identity which determines the current year non-agricultural capital stock. It is determined by the initial or previous year capital stock and the net investment in the non-agricultural sector.

$$\ln K_{nag} = \ln K^{nag}_{t-1} + I^{nag} \qquad (2.17)$$

Equation 2.18 determines the non-agricultural income. It is determined by the capital and labor. We expect both capital and labor to exert positive influences on the level of non-agricultural income. This equation is given as follows:

$$\ln Y_{nag} = \ln Q_{11} + B_{26} \ln K_{nag} + B_{27} \ln N_{nag} + e_{11} \qquad (2.18)$$

$$(+) \qquad (+)$$

Equation 2.19 determines the non-agricultural or in-

dustrial output. It is determined by the level of non-agricultural income. We expect income to have a positive impact on the level of output. This equation is given as follows:

$$\ln X_{nag} = \ln Q_{12} + B_{28} \ln Y_{nag} + e_{12} \qquad (2.19)$$

$$(+)$$

Equation 2.20 determines the level of aggregate imports. This is determined by the exchange rate, import duty, and the foreign exchange reserves. This equation is represented as follows:

$$\ln M = \ln Q_{13} + B_{29} \ln ER + B_{30} \ln TM + B_{31} \ln F + e_{13} \qquad (2.20)$$

$$(-) \quad (-) \quad (+)$$

In the above equation, we expect the exchange rate to have negative impact on the level of imports. An increase in the exchange rate, which by making the foreign goods relatively expensive in the domestic market, is assumed to discourage imports. Import duty is also expected to have negative effect on the level of imports. Finally, the foreign exchange reserves position is expected to have positive impact on the country's ability to import.

Summary of the Structural Equations

Export Demand Equation

$$\ln E = \ln Q_1 + B_1 \ln ER + B_2 \ln TE + B_3 \ln TW + e_1 \qquad (2.6)$$

Agricultural Investment Equation

$$\ln I_{ag}=\ln Q_2+B_4\ln E+B_5\ln E_{t-1}+B_6\ln\left(\frac{P_{ag}}{P_{nag}}\right)+e_2 \qquad (2.7)$$

Agricultural Income Equation

$$\ln Y_{ag}+\ln Q_3+B_7\ln K+B_8\ln GE_{t-1}+e_3 \qquad (2.8)$$

Agricultural Capital Stock

$$\ln K=\ln K_{t-1}+\ln I \qquad (2.9)$$

Agricultural Output (Commercial sector)

$$\ln X_{agc}=\ln Q_4+B_9\ln Y_{ag}+B_{10}\ln\left(\frac{P_{agc}}{P_{Ir}}\right)+e_4 \qquad (2.10)$$

Agricultural Output (Subsistence sector)

$$\ln X_{agf}=\ln Q_5+B_{11}\ln Y_{ag}+B_{12}\ln\left(\frac{P_{agf}}{P_{agc}}\right)+e_5 \qquad (2.11)$$

Agricultural Employment

$$\ln N_{nag}=\ln Q_6+B_{13}\ln X_{agc}+B_{14}\ln W_{t-1}+e_6 \qquad (2.12)$$

Agricultural Wages

$$\ln W_{ag}=\ln Q_7+B_{15}\ln N_{ag}+B_{16}\ln PC+e_7 \qquad (2.13)$$

Non-agricultural Employment

$$\ln N_{nag}=\ln Q_8+B_{17}\ln X^{agf}_{t-1}+B_{18}\ln X^{agc}_{t-1}+B_{19}\ln W_{nag}+e_8 \qquad (2.14)$$

Definition of Variables

The Exogenous and the Predetermined variables

GE_{t-1} = Government expenditure on rural development programs at 1970 prices

ER = Exchage Rate (rs./$)

TE = Export Duty (%)

TW = World income (1970 = 100)

$(\frac{P_{ag}}{P_{nag}})$ = The ratio of the price of agriculture to that of non-agriculture (1970 = 100)

K^{nag}_{t-1} = Non-agricultural sector capital stock at 1970 prices

PC = Consumer price level (1970 = 100)

E_{t-1} = Previous year exports at 1970 prices

TM = Import Duty (%)

$(\frac{P_{agc}}{P_{Ir}})$ = The ratio of the price of cash crops to that of industrial raw materials (1970 = 100).

$(\frac{P_{agf}}{P_{agc}})$ = The ratio of the price of food crops to that of cash crops (1970 = 100).

$(\frac{P_{t}}{P_{t-1}})$ = The ratio of the current year consumer price level to that of the previous year (1970 = 100).

W^{ag}_{t-1} = Previous year agricultural wages at 1970 prices.

W^{nag}_{t-1} = Previous year non-agricultural wages at 1970 prices.

X_{t-1}^{agf} = Previous year food output (1970 = 100).

X_{t-1}^{agc} = Previous year commercial sector output (1970 = 100).

K_{t-1}^{ag} = Initial capital stock in the agricultural sector at 1970 prices.

F = Foreign exchange reserves at 1970 prices.

The Endogenous Variables

E = Exports at 1970 prices.

I_{ag} = Agricultural investment (net) at 1970 prices.

Y_{ag} = Agricultural income at 1970 prices.

K_{ag} = Agricultural capital stock at 1970 prices.

X_{agc} = Agricultural commercial sector output (1970 = 100).

X_{agf} = Agricultural subsistence sector output (1970 = 100).

N_{ag} = Agricultural employment (in thousands).

N_{nag} = Non-agricultural employment (in thousands).

W_{ag} = Agricultural wages at 1970 prices.

W_{nag} = Non-agricultural wages at 1970 prices.

K_{nag} = Non-agricultural capital stock at 1970 prices.

I_{nag} = Non-agricultural investment (net) at 1970 prices.

Y_{nag} = Non-agricultural income at 1970 prices.

X_{nag} = Non-agricultural output (1970 = 100).

M = Aggregate imports at 1970 prices.

The Reduced Form Equations

In this section, we present five reduced form equations derived from the above structural equations. Of the five reduced form equations, four are related to the agricultural sector and one to the non-agricultural sector labor market. Reduced form equations are derived after making the appropriate substitutions of various structural equations.

The four reduced form equations of the agricultural sector are the agricultural income, agricultural subsistence sector output, agricultural commercial sector output, and the agricultural employment. Besides these, there is also a reduced form equation for the non-agricultural employment. This equation is used to investigate the effects of the development of the agricultural sector on the non-agricultural sector employment level. The explanation of the various reduced form equations are given below.

Agricultural Income

$$\underset{ag}{\ln Y} = \ln B = \underset{(+)}{b_0 \ln K_{t-1}} + \underset{(+)}{b_2 \ln ER} + \underset{(-)}{b_3 \ln TE} + \underset{(+)}{b_4 \ln YW} + \underset{(+)}{b_5 \ln E_{t-1}} + \underset{(+)}{b_6 \ln\left(\frac{P_{ag}}{P_{nag}}\right)} + \underset{(+)}{b_7 \ln GE_{t-1}} \qquad (2.21)$$

The above equation explains the factors influencing the level of agricultural income. The expected signs of the coefficients given in the parentheses follow logically from the structural equations. Correctness of these signs may be demonstrated by relating the reduced form coefficients to the structural coefficients in the following manner:

$$b_1 = B_7 \ln K_{t-1}, \quad b_2 = \frac{B_7 B_5}{B_1}, \quad b_3 = \frac{B_7 B_5}{B_2}, \quad b_3 = -\frac{B_7 B_5}{B_2},$$

$$b_4 = \frac{B_7 B_8}{B_3}, \quad b_5 = \frac{B_7}{B_{24}}, \quad b_6 = \frac{B_7}{B_6}, \quad b_7 = \frac{B_7}{B_8},$$

$$B_0 = \ln Q_3 + B_7 \ln Q_{12} + B_7 B_5 \ln Q_1$$

In the above equation, capital stock is assumed to affect the level of income positively. Exchange rate and export duty are expected to affect the level of income positively and negatively, respectively. An increase in the exchange rate, by stimulating exports and investment, is expected to affect the agricultural income positively. The relative price ratio - the ratio of the price of agriculture to that of the non-agricultural - is expected to have a positive effect on the level of income. Finally, the government expenditure on the rural development program is also expected to have a positive influence on the agricultural income.

Agricultural Output (Commercial sector)

$$\ln X_{agc} = \ln b^*_c + b^*_1 \ln K_{t-1} + b^*_2 \ln ER + b^*_3 \ln TE + b^*_4 \ln YW + b^*_5 \ln E_{t-1}$$

(+) (+) (-) (+) (+)

Agricultural Output (Commercial sector) con't.

$$+ b_6^* \ln\left(\frac{P_{ag}}{P_{nag}}\right) + b_7^* \ln GE_{t-1} + b_8 \ln\left(\frac{P_{agc}}{P_{Ir}}\right) \qquad (2.22)$$

$$(+) \qquad (+) \qquad (+)$$

The above equation explains the variables determining the commercial sector output level. In the above equation, coefficients with stars are used to distinguish between the 'b' coefficients that appear in the reduced form agricultural income equation (equation #2.21) and the coefficients that appear in the commercial sector output determination equation (for example, $b_1 \neq b_1^*$). The expected signs of the reduced form coefficients and their relation to the structural coefficients are shown below.

$$b_1^* = B_7 B_9 \ln K_{t-1}, \quad b_2^* = \frac{B_7 B_9 B_5}{B}, \quad -b_3^* = -\frac{B_9 B_7 B_5}{B}, \quad b_4^* = \frac{B_9 B_7 B_5}{B},$$

$$b_5^* = \frac{B_7 B_9}{B_4}, \quad b_6^* = \frac{B_9 B_7}{B_6}, \quad b_7^* = \frac{B_9 B_7}{B_8}, \quad b_8 = \frac{1}{B_{10}},$$

$$b^* = \ln Q_4 + B_9 \ln Q_3 + B_7 B_9 \ln Q_{12} + B_9 B_5 \ln Q_1$$

In the above equation, we expect capital stock to affect the agricultural commercial sector output level positively. An increase in the capital stock, by supplying the agricultural laborer with additional implements to work with, is expected to enhance the productivity of labor and thereby contribute to higher levels of output and income. The exchange is expected to have a positive impact on the level

of output. Export duty, on the other hand, is expected to have negative impact on the commercial sector output level. Exports and relative price ratios, such as the ratio of the price of agriculture to that of non-agricultural and the ratio of the price of cash crops to that of industrial raw materials, are expected to influence the level of output positively. Finally, both the world income and the government expenditure are expected to have positive effects on the level of agricultural commercial sector output.

Agricultural Output (Subsistence sector)

$$\ln X_{agf} = \ln R_0 + \underset{(+)}{r_1 \ln K_{t-1}} + \underset{(+)}{r_2 \ln ER} + \underset{(-)}{r_3 \ln TE} + \underset{(+)}{r_4 \ln YW} + \underset{(+)}{r_5 \ln E_{t-1}}$$

$$+ \underset{(+)}{r_6 \ln\left(\frac{P_{ag}}{P_{nag}}\right)} + \underset{(+)}{r_7 \ln GE_{t-1}} + \underset{(+)}{r_8 \ln\left(\frac{P_{agf}}{P_{agc}}\right)} \quad (2.23)$$

The above reduced form equation explains the factors influencing the level of subsistence sector output. Again, the expected signs of the reduced form coefficients and their relation to the structural coefficients are shown below.

$$r_1 = B_7 B_{11}, \quad r_2 = \frac{B_5 B_7 B_{11}}{B_1}, \quad -r_3 = -\frac{B_7 B_5 B_{11}}{B_2}, \quad r_4 = \frac{B_7 B_5 B_{11}}{B_3},$$

$$r_5 = \frac{B_7 B_{11} B_5}{B_4}, \quad r_6 = \frac{B_7 B_{11}}{B_6}, \quad r_7 = \frac{B_7 B_{11}}{B_8}, \quad r_8 = \frac{1}{B_{12}}$$

In the above reduced form equation, capital stock is expected to have a positive impact on the level of subsistence sector output level. Both the exchange rate and the export duty are expected to have positive and negative effects, respectively, on the output level. World income and the exports are also expected to have positive effects on the output level. The ratio of the price of agriculture to that of non-agricultural and the ratio of the price of food commodities to that of agricultural non-food commodities are expected to have positive influences on the level of output. Finally, the government expenditure is also expected to have a positive impact on the level of output.

Agricultural Employment

$$\ln N = \underset{0}{\ln S} + \underset{1}{s}\ln K_{t-1} + \underset{2}{s}\ln ER + \underset{3}{s}\ln TE + \underset{4}{s}\ln YW + \underset{5}{s}\ln E_{t-1}$$

$$(+) \qquad (+) \qquad (-) \qquad (+) \qquad (+)$$

$$+ \underset{6}{s}\ln\left(\frac{P_{ag}}{P_{nag}}\right) + \underset{7}{s}\ln GE_{t-1} + \underset{8}{s}\ln\left(\frac{P_{agc}}{P_{Ir}}\right) + \underset{9}{s}\ln W_{t-1} \qquad (2.24)$$

$$(+) \qquad (+) \qquad (+) \qquad (-)$$

The above equation explains the factors influencing the level of employment in the agricultural sector. The expected signs of the reduced form coefficients and their relation to the structural coefficients are given below.

$$s_1 = B_{13} B_7 B_9, \quad s_2 = \frac{B_{13} B_9 B_7 B_5}{B_1}, \quad -s_3 = -\frac{B_{13} B_9 B_5}{B_2 B_2}, \quad s_4 = \frac{B_{13} B_7 B_9 B_5}{B_3},$$

$$s_5 = \frac{B_{13} B_9 B_7}{B_4}, \quad s_6 = \frac{B_{13} B_9 B_7}{B_6}, \quad s_7 = \frac{B_9 B_7 B_{13}}{B_8}, \quad s_8 = \frac{B_{13}}{B_{10}}, \quad s_9 = \frac{1}{B_{14}}$$

In the above equation, the capital stock is expected to have a positive impact on the level of employment. The reason behind this assumption is due to the recent evidence (14) showing the positive effects of agricultural mechanization on the rural employment. Exchange rate and export duty are expected to have positive and negative impacts, respectively, on the agricultural employment. Both the world income and the exports are expected to have positive influence on the level of employment. The ratio of the price of agriculture to that of the non-agricultural prices is expected to have a positive impact on the level of employment. Both government expenditure and agricultural wages are expected to have positive and negative effects, respectively, on the level of agricultural employment. Finally, the ratio of the price of cash crops to that of the industrial raw materials is assumed to have a positive impact on the level of rural employment.

Non-Agricultural Employment

$$\ln N_{nag} = \ln C_o + c_1 \ln X^{agf}_{t-1} + c_2 \ln X^{agc}_{t-1} + c_3 \ln PC + c_4 \ln W^{nag}_{t-1} \qquad (2.25)$$

$$(+) \qquad (+) \qquad (+) \qquad (-)$$

The above equation determines the level of employment in the non- agricultural sector. The expected signs of the reduced form coefficients and their relation to the structural coefficients are given below.

$$C_o = \frac{Q_8 - B_{19}\ln Q_9}{1 - B_{20}B_{19}}, \quad c_1 = \frac{B_{17}}{1 - B_{19}B_{20}}, \quad c_2 = \frac{B_{18}}{1 - B_{19}B_{20}}, \quad c_3 = \frac{B_{21}}{1 - B_{19}B_{20}},$$

$$-c_4 = \frac{B_{22}}{1 - B_{19}B_{20}}$$

In the above equation, we expect both the agricultural commercial sector and the subsistence sector output levels to have positive effects on the non-agricultural employment level. Activities of the commercial sector are assumed to contribute significantly to the expansion of the industrial sector and thereby maintain the industrial employment. Both the price and wage levels are expected to have positive and negative effects, respectively, on the level of industrial employment.

Summary

To summarize, the present chapter attempted to show the positive role of exports in the process of India's economic development. This chapter also reviewed the macro-econometric models built for India. As noted above, most of these models were essentially in the Keynesian tradition and focused on issues other than trade and rural development.

This researcher, due to the non-availability of macroeconomic models dealing exclusively with the trade and rural development issues, specified a two-sector macroeconomic model for India.

The model in its structural form consisted of fifteen equations. Reduced form equations were derived for five endogenous variables after making appropriate substitutions of structural equations. The reduced form equations of the rural sector will be used to evaluate the effects of trade policies on rural income, output, and employment, in Chapter III.

CHAPTER III

EMPIRICAL RESULTS

This chapter presents the data used for estimating the policy parameters and also the empirical results obtained for the model outlined in the preceding Chapter.

Export duties constitute a well-known feature of the Indian fiscal system, having been levied on different commodities from time to time. During the early part of the British rule export duties were levied at small ad valorem rates on many articles of export. Export duties are levied for various purposes. The pre-war export duties were mainly imposed for generating revenue receipts from commodities which had a comparatively strong position in export markets. In the post-war period, export duties were imposed for preventing the impact on the domestic economy of inflationary conditions abroad. The dutiable items accounted for roughly sixty per cent of total exports. The hardest hit were the traditional items such as tea, manganese ore, cigarettes, jute, etc. The incidence of duty was not even; jute goods and tea which accounted for 37 per cent of exports bore a substantial tax burden. The levels at which these were fixed reduced their competitiveness in the world market. High raw material cost together with export duty rendered Indian

traditional exports uncompetitive in the world market, and the share of the Indian exports, as will be demonstrated later, registered a steady decline. The export duty revenue as a percentage of the value of export has fluctuated between 30.3 and 3.1 in the years after 1955. Table II was developed to show the trend in Indian exports and export duty revenue as a percentage of total exports.

TABLE II

EXPORT DUTY REVENUE AS A PERCENTAGE OF THE VALUE OF EXPORTS

Year	Indian Exports in U.S. dollar	Export duty revenue	Export duty (%)
1955	1276	387	30.3
1956	1300	321	24.7
1957	1379	291	21.1
1958	1221	218	17.8
1959	1308	203	15.5
1960	1331	206	15.4
1961	1387	198	14.2
1962	1403	165	11.7
1963	1631	111	6.8
1964	1749	56	3.2
1965	1686	66	3.9
1966	1606	117	7.3
1967	1612	124	7.7
1968	1760	129	7.3
1969	1836	134	7.3
1970	2026	63	3.1

Source: International Financial Statistics, Supplement to 1966-1967 issues, March 1968, October 1973, IMF. For Export duty revenue: International Trade Statistics, 1958 and 1969. Economic Survey of Asia and Far East, 1966-1968. The Eastern Economist, 1982.

In addition to export duties, other forms of restrictions such as export quotas and exchange rates were also used to attain the objective stated at the outset.

Being a member of the International Monetary Fund, India adhered to the rules of the game. Under the rule, India has to declare par value for the rupee in terms of the U.S. dollar (until 1973). As a result, the rupee-dollar exchange rate was 'pegged' at the par values. This means that the exchange rate was allowed to fluctuate under the influence of market supply and demand within a narrow band ranging from 2.25 per cent above par to 2.25 per cent below par (the limits were only one per cent until December 1971). Furthermore, the government of the country in question was obligated under IMF rule to intervene and prevent the movements of exchange rates beyond the upper and lower limits. In addition to allowing for limited market intervention, the rules also allowed for changing the par values (adjust the peg) in either of two slightly different ways. One was immediately to declare a new par value above or below the original or initial value. The other was temporarily to float the currency. This means letting it find a new equilibrium value under the influence of supply and demand without government intervention. A new par value would later be fixed at the market-determined rate when things seemed to have settled down. The government of India did follow the former method of declaring new par values. This was done when the rupee was devalued in 1949, 1966, and partially in 1971.

The September 1949 devaluation followed the devaluation of British-pound sterling. As a result, a new par value was established and maintained until June 1966. In June 1966, the rupee was devalued by 57.5 per cent primarily to ease the external payments problems. The 1966 devaluation left the new 'par' at Rs.7.50 per U.S. dollar. The benefits that accrued to traditional exporters from devaluation were largely offset by new export duties on several traditional items. Again, in 1971, another attempt to change the 'par value' was made. This time the rupee was devalued vis-a-vis the old dollar; but, given the larger devaluation of dollar itself, the rupee parity with the dollar actually moved up from Rs. 7.50 to Rs. 7.28 per U.S. dollar.

In this study, exchange rate refers to the units of domestic currency needed to buy a unit of foreign currency (Rs./$). The data required for the present study are obtained from the time series of exchange rates published in the International Financial Statistics. The International Financial Statistics publication includes five series of exchange rates. Series aa, ae, af, de, and rf. Series aa, ae, and de refer to the end of period national currency values of the SDR (Special Drawing Rights). Series af and rf refer to monthly average exchange rates for countries quoting rates in units of national currency per U.S. dollar. These are calculated as arithmetic averages. Series beginning with code a are termed Market/Par or Central Rate. Series beginning with code d are termed Par or Central/Market Rate.

Finally, series beginning with r are termed Par/Market Rate.

The a lines, Market Rate/Par or Central Rate provide conversion factors that report a market rate in preference to 'par' rates, i.e., the official rates, or par value or central rates agreed with the Fund at all dates. For the period average rates, af, the data are monthly average rates in the market of the country or if those not available, monthly average rates in New York. The r lines, Par Rate/ Market Rate, provide conversion factors for trade and other flow or average statistics. The d lines, Par or Central Rate/Market Rate, extend the use of official rates through those effective par or central rates in which obligation to maintain market rates was within the margins as wide as two-and-half per cent of the par.[1]

The exchange rate series used in this study refers to the af series and is presented in Table III.

The data presented in the Tables II and III above clearly support the earlier view that the high export duties coupled with the overvalued exchange rates were largely responsible for the poor performance of the Indian traditional export in the world market. Table IV is presented below to demonstrate the falling trend in the Indian exports caused mainly by the overvalued exchange rate and high export taxes.

---

[1] International Financial Statistics, 1969, International Monetary Fund.

TABLE III

TIME SERIES OF EXCHANGE RATES, 1955-1970

Year	Rs./$	Year	Rs./$
1955	4.778	1963	4.785
1956	4.805	1964	4.795
1957	4.791	1965	4.775
1958	4.766	1966	6.414
1959	4.783	1967	7.564
1960	4.773	1968	7.628
1961	4.765	1969	7.559
1962	4.775	1970	7.576

Source: International Financial Statistics, 1980

In addition to our own findings, the empirical works of Bishwas (9) also renders support to the view that the overvalued exchange rate policy was largely responsible for the declining competitive ability of the Indian exports in the world market. Our own estimated structural equations for export demand further reinforces the above view. The estimated regression results show a strong positive relation between exports and the exchange rate on the one hand, and a negative relation between exports and export taxes on the other.

TABLE IV

INDIA's EXPORTS AND SHARE OF TOTAL VALUE OF WORLD EXPORTS, 1955-1970

Year	World Exports	Indian Exports	Indian Exports as percentage of world exports
1955	83,200	1276	1.5
1956	92,600	1300	1.4
1957	99,300	1379	1.4
1958	94,800	1221	1.3
1959	100,600	1308	1.4
1960	113,400	1331	1.2
1961	118,600	1387	1.2
1962	124,700	1403	1.1
1963	136,000	1631	1.2
1964	152,600	1749	1.2
1965	165,400	1886	1.0
1966	181,400	1606	0.89
1967	191,200	1612	0.84
1968	213,700	1760	0.82
1969	244,900	1836	0.75
1970	280,500	2026	0.72

Source: International Financial Statistics, supplement to 1966-67 issues, March 1968, October 1973, IMF.

This researcher has estimated thirteen structural and five reduced form equations using the ordinary least squares and two stage least squares techniques. Since the present study is based mainly on the works of Agarwala's two-sector model of development, the results of the structural equations are used to compare with those of Agarwala's. These results are presented in Appendix B.

In order to separate the significant variables from the insignificant ones, the researcher used both the restricted and unrestricted versions of the model for the agricultural income, output, and employment. The unrestricted version consisted of all the explanatory variables - significant and insignificant - while the restricted version consisted of only the significant variables. Both versions of the model are estimated using the ordinary least squares techniques. The estimated results of the unrestricted model is presented in Appendix A. From the unrestricted model, all the insignificant variables are eliminated by performing the joint F-tests.[2] This test is applied to the agricultural income, output, and employment models. The variables which are included for the F-test are the agricultural capital stock (K), exports (E_{t-1}), the price ratios, and the government expenditure (G_{t-1}). Further, for the agricultural employment equation, variables such as the capital stock (K), the relative price ratio - the ratio of the price of agriculture to that of non-agriculture (P_{ag}/P_{nag}) - and the ratio of the price of cash crops

---

[2] The formula used for calculating the F-statistics in this study is as follows:

$$F = \frac{(R_u^2 - R_{un}^2)/K}{(1 - R_u^2)/(n-K_{un})}$$

Where R_u^2 and R_{un}^2 are the coefficients of determination of the restricted and unrestricted models. K_r is the number of restrictions imposed on the model, and 'n' is the number of observations. K_{un} is the number of regressors, including the intercept term, in the unrestricted model.

to that of industrial raw materials (P_{agc}/P_{Ir}) are also included in the F-test. In addition to these, lagged agricultural wages are also incorporated into the F-test. The F-test is used to see whether the coefficients of the above variables are significantly different from zero. If the 'null' hypothesis is true, then the coefficients of the above variables are not significant in explaining the dependent variables. The results of the F-test shows that the coefficients of the above variables are not significantly different from zero at 0.05 level. On the basis of the results of the F-tests, the above explanatory variables are eliminated from the agricultural income, output, and employment models. The results of the restricted model incorporating only significant variables - exchange rate, export taxes, and world income - are presented in this chapter.

The estimated equations given below shows the changes in dependent variables that result from a change in each explanatory variable - exchange rate, export tax, and world income. A test is made to see if each of these coefficients differ significantly from zero. In order to assess the precision of the estimates, we have computed the standard errors of the regression coefficients along with the t-ratio's. T-test has been applied to the significance of each policy parameters. These are enclosed in the parentheses below their respective estimates. In addition to these, both the R-square and the adjusted R-square (adjusted for the

degrees of freedom) have been computed and presented, along with the Durbin-Watson 'd' statistic used to test for the first order autocorrelation.

Agricultural Income

$$\ln Y_{ag} = -1.56 + 0.66\ \ln ER - 0.15\ \ln TE + 1.20\ \ln YW \quad (3.1)$$
$$(-2.0) \qquad (5.41) \qquad (-5.87) \qquad (6.44)$$

where $R^2 = 0.90$ $\qquad$ df = 12

$\bar{R}^2 = 0.88$ $\qquad$ N = 16 $\qquad$ D-W = 2.10

The estimated equations above explains 90 per cent of the variations in the agricultural income. The coefficient of the exchange rate is positively and significantly related to the agricultural income. In this case on average, a one per cent increase in the exchange rate (or if devaluation of rupee in terms of U.S. dollar) is associated with 0.66 per cent rise in agricultural income. The exchange rate coefficient is significant at 0.005 level. This suggests that the agricultural income is negatively and significantly related to the export duty. In this case on average, a one per cent decrease in export duty is associated with 0.15 per cent rise in the agricultural income. The coefficient of the world income is positive and significant at 0.005 level, which suggests that the agricultural income is positively and significantly related to the world income. In this case on average, a one per cent increase in the world income is associated with 1.20 per cent rise in agricultural income. The coefficient of the intercept term is negative.

Its implications is that in the absence of export policy measures, the agricultural income is negative. Although the regression results reveal this, one has to be cautious in relying on the results of the intercept term, since its main role is to absorb the mean effects of all the omitted variables in the model.

On the whole, the above regression results support the hypothesis of a strong relationship between the export policy parameters and the agricultural income.

Agricultural Output (Commercial sector)

$$\underset{agc}{\ln X} + \underset{(6.0)}{2.63} + \underset{(6.02)}{0.42}\ \ln ER - \underset{(-5.72)}{0.81}\ \ln TE + \underset{(2.63)}{0.24}\ \ln YW$$

where

$R^2 = 0.85$ $\quad df = 12$

R^2 (adjusted) $= 0.83$ $\quad N = 16$ $\quad D\text{-}W = 2.09$

The above equation explains 85 per cent of the variations in the agricultural commercial sector output. The coefficient of the exchange rate is 'positive' and significant at 0.005 level. In this case on average, a one per cent increase in the exchange rate is associated with 0.42 per cent increase in the supply of cash crops. The coefficient of export tax is 'negative' and significant at 0.005 level, suggesting that supply of cash crops output is negatively and significantly related to the export tax. In this case on average, a one per cent reduction in the export duty is associate with 0.81 per cent increase in the supply of cash crops. The coefficient of world income is 'positive'

and significant at 0.025 level, which suggests that the output supply is positively and significantly related to the world income. In this case on average, a one per cent rise in the world income is associated with 0.24 per cent increase in the supply of agricultural commercial sector output.

Agricultural Output (Subsistence sector)

$$\ln X_{agf} = 3.68 + 0.41\ \ln ER - 0.03\ \ln TE + 0.15\ \ln TW$$
$$(4.6) \quad (3.76) \quad (-3.12) \quad (0.05)$$

where

$R^2 = 0.61$ df = 12

R^2 (adjusted) = 0.59 D-W = 1.62

N = 16

The above equation explains only 61 per cent of the variation in the agricultural subsistence sector output level. This result is not surprising, since a major portion of the subsistence sector output is normally consumed within the domestic economy. The coefficient of the exchange rate is 'positive' and significant at 0.05 level, which suggests that the supply of food output is positive and significantly related to the exchange rate. In this case on average, a one per cent increase in the exchange rate is associated with 0.41 per cent increase in the food output. The coefficient of the export duty is 'negative' and significant at 0.05 level, suggesting that the supply of food output is negatively and significantly related to the export duty. In this case on average, a one per cent reduction in export duty is associated with 0.03 per cent rise in

in the output. The coefficient of the world income is positive and insignificant as expected.

The reasons for obtaining high levels of significance with respect to the policy parameters are not difficult to rationalize. As output of the agricultural commercial sector responds to changes in the export policy parameters, it will have an immediate impact on the agricultural and non-agricultural employment levels. Changes in the levels of employment, in turn, will have impact on the income of the agricultural and non-agricultural labor force. Higher income will then affect the demand for the subsistence sector output (this is especially true in the case of India where a large portion of family's budget goes to the purchase of food and related items).

Agricultural Employment

$$\ln N_{ag} = 2.97 + 0.41 \ln ER - 0.03 \ln TE + 0.15 \ln YW$$
$$(4.64) \quad (7.97) \quad (-2.60) \quad (1.99)$$

where

$R^2 = 0.86$ $\quad$ df = 12

R^2 (adjusted) = 0.84 $\quad$ D-W = 1.41

N = 16

A statistical estimate is given of the changes in the agricultural employment that results from a change in each of the changes in the agricultural employment that results from a change in each of the explanatory variables in the above equation. The equation explains 86 per cent of the variation in the agricultural employment. This result is

not surprising, since a major source of employment to the landless labor is the capitalist farms, whose output is largely export oriented.

The coefficient of the exchange rate is 'positive' and significant at 0.005 level. This suggests that the agricultural employment is positively and significantly related to the exchange rate. In this case on average, a one per cent increase in the exchange rate is associated with 0.41 per cent increase in the agricultural employment. The coefficient of the export duty is 'negative' and significant at 0.025 level, which suggests the existence of a negative relationship between the employment and the export duty. In this case on average, a one per cent reduction in export duty is associated with 0.03 per cent increase in the agricultural employment. The coefficient of the world income is 'positive' and significant at 0.025 level, thus suggesting a positive and significant relationship between the agricultural employment and the world income. In this case on average, a one per cent increase in the world's income is associated with 0.15 per cent increase in the agricultural employment.

Non-Agricultural Employment

$$\ln N_{nag} = 0.56 - 1.01 \ln X^{agf}_{t-1} + 2.21 \ln X^{agc}_{t-1} + 0.93 \ln PC - 0.23 \ln W^{nag}_{t-1}$$

$$(0.19) \quad (-1.40) \quad (2.02) \quad (2.02) \quad (-0.62)$$

Where

$R^2 = 0.86$ $\quad$ df=11

R^2 (adjusted) $= 0.84$ $\quad$ N=16 $\quad$ D-W=1.94

The above equation explains 86 per cent of the variations in the non-agricultural employment. The coefficient of the subsistence sector output (X_{t-1}^{agf}) is significant at 0.05 level, but it is of incorrect sign. One possible explanation for this is as follows: as the supply of food to the non-agricultural sector increases, price of food commodities tend to fall. Lower food prices will in turn induce workers to reduce the hours of labor that they are willing to supply. As a result, non-agricultural employment declines in response to increase in food supply from the agricultural sector. The coefficient of the commercial sector output is positive and significant at 0.05 level, thus suggesting a positive relationship between the non-agricultural employment and the commercial sector output level. In this case on average, a one per cent increase in the supply of non-food or agricultural raw materials to the non-agricultural sector is associated with 2.21 per cent increase in the non-agricultural employment. The positive sign of this coefficient supports the hypothesis of the positive linkage effect from agriculture to industry. This view is also supported by many development economists such as Johnston (26) and Fei-Rains (20). These economists assign a greater role to the agricultural sector in the overall development of underdeveloped countries. The coefficient of price is positive and significant at 0.05 level, thus suggesting a positive and significant relationship between the non-agricultural employment and the price level.

Rising price level generally implies rising profits, which in turn induce employers to expand business operations. This will increase the demand for labor. In this case on average, a one per cent increase in the price level is associated with 0.93 per cent increase in the non-agricultural employment. The coefficient of the previous year non-agricultural wages is negative and insignificant. But it is of correct sign. Higher wages reduce the demand for labor and hence, the level of employment.

In addition to applying the 't'-test to each of the export policy parameters, the Durbin-Watson test has also been applied to the agricultural subsistence sector output and the agricultural employment models to see whether the error terms in these models are serially independent. If the error terms are serially independent, then the 'd' statistic has a theoretical distribution with mean two. At times, due to sampling fluctuations, the computed 'd' statistic may deviate substantially from the theoretical distribution even though the true errors are serially independent. Due to these reasons, in this chapter the test developed by Durbin-Watson is used to see whether the error terms in the case of the agricultural subsistence sector output and the agricultural employment models are serially independent. Since the computed 'd' statistic in the case of agricultural income, agricultural commercial sector output, and the non-agricultural employment models are close to two, we accept the 'null' hypothesis of 'noautocorrelation'

in these cases. In the case of agricultural subsistence sector output model, the computed 'd' statistic (1.62) does not show the evidence of either positive or negative autocorrelation. In the case of the agricultural employment model, the computed 'd' statistic (1.49) shows significant evidence against the negative autocorrelation at 5 per cent level of significance. For the positive autocorrelation, the test remains inconclusive.

Summary

To summarize, the present chapter empirically investigated the relationship between export promotion policies - exchange rate and export duty - on rural income, output, and employment. The study revealed that the export policies were statistically significant and suggested the existence of a strong relationship between policy measures and the rural income, output, and employment. Further, the results also revealed the existence of a positive linkage effect from agriculture to industry.

TABLE V

SUMMARY OF REGRESSION RESULTS

	Exchange Rate	Export Duty	World Income	R^2	$\bar{R}^2$	D
Agricultural Income	0.66	- 0.15	1.02	0.90	0.88	2.10
	(5.41)*	(-5.87)*	(6.44)*			
	(0.005)**	(0.005)**	(0.005)**			
Agricultural Employment	0.41	-0.03	0.15	0.86	0.85	1.41
	(7.79)*	(-2.60)*	(1.99)*			
	(0.005)**	(0.025)**	(0.025)**			
Agricultural Output Commercial Sector	0.42	-0.08	0.24	0.85	0.83	2.09
	(6.02)*	(-5.72)*	(2.63)*			
	(0.005)**	(0.005)**	(0.025)**			
Agricultural Output Subsistence Sector	0.47	-0.08	0.008	0.61	0.59	1.62
	(3.76)*	(-5.72)*	(0.05)*			
	(0.05)**	(0.05)**				

Note. * = t- ratio ** = Level of significance

CHAPTER IV

CONCLUSION AND RECOMMENDATION

The purpose of this study is to evaluate statistically the effects of exchange rate and export duty on India's rural income, output, and employment.

A two-sector macro-econometric model, which is specified in Chapter II, is used for the policy analysis. The model incorporates the structuralist's views of development. The model has fifteen equations, of which thirteen are behavioral and two are identities. Both the structural and the reduced form equations are estimated using the ordinary least squares and two stage least squares techniques for the period 1955-1970.

Reduced form equations of the rural sector are used to analyze the effects of export promotion policies on the agricultural income, output, employment. Further, the effects of the development of the agricultural sector on the non-agricultural sector are also investigated in the present study. The performance of the model with respect to export policy parameters appears satisfactory and the results support the export-led development strategy.

Conclusions and Recommendations

Given the large size of the domestic market and diversified nature of the resources endowment, foreign trade may not appear to be lucrative for India. But as the present study reveals, foreign trade can still make significant contributions to the overall development of the economy. Due to these reasons, an export-led development strategy should be stressed over the inward-looking strategy of development.

Development of a viable export sector requires action both on the national and international levels. On the international level, new markets for the traditional items should be created through geographic diversifications. Unfavorable geographic composition of markets in the past largely contributed to poor performance of India's exports. Findings by Bishwas (9) show that the declining trend in export earnings over the years was largely due to poor market distribution. Further, unfavorable exchange rate policy in the past also contributed to the declining trend in India's exports. Bishwas (9) finds steady declining export earnings largely due to declining competitive ability of Indian products resulting mainly from the overvalued exchange rates. Since the present study shows the existence of a strong relationship between exchange rate and exports, favorable exchange rate policy should be implemented in order to increase the competitive ability of India's exports in the world market.

In the past, the policy makers viewed some of the traditional exports, such as tea, jute, tobacco, etc., as having monopoly power in world market. Therefore, they imposed export duties ranging from 30 to 40 per cent on these items (6). This also contributed to the decline in India's export. Higher export duties adversely affected the incentive of farmers to produce for export markets.

Income Effect

The results of the present study reveal that the agricultural income responds positively to export policy measures. Higher income, in turn, results in higher savings, investment, and output. Higher savings are possible due to a high marginal propensity to save on the part of the rural households.

Empirical findings by Krishna (27) seem to suggest a positive relationship between rural income and rural savings on the one hand, and rural income and rural investment on the other. In another empirical study, Gupta (20) found the marginal propensity to save out of transitory income to be significantly different from zero for the rural sector. This was not found to be true for the urban sector. His findings also indicate that the marginal propensity to consume out of transitory income was greater than the marginal propensity to consume out of permanent income for the rural sector. Further, his study also reveals that savings responds positively to rural interest rates. This

is true of the urban sector also. Panikar (43) found an ability of rural families in India to save a large proportion of their income even during the normal years. His findings show that the rural families savings are almost 13 per cent of their gross income, and cultivating families (or large farmers) account for the bulk of rural savings. In the case of the labor class, his findings show that their consumption exceeds their family income. This is also supported by the findings of Mellor (35) who found that landless workers spend as high as 59 per cent of their income on food and other necessary items alone, while large farmers spend only 16 per cent of their income on food.

The above findings render support to our conclusion that higher agricultural income resulting under the export promotion policies results in higher savings, investment, and output. In this connection, Mellor (37) observes that increased rural savings not only finance a large portion of agricultural capital needs, but they also partially finance expansion of the non-agricultural sector. In addition to these, higher agricultural income also creates demand for the consumer goods produced in the non-agricultural sector and thereby contributes to its expansion. This phenomenon was observed in certain parts of India by Day and Singh (14) and Randhwa (46). The higher income that accrued under the 'Green Revolution' program not only increased demand for the agricultural related inputs manufactured in the non-agricultural sector, but also created

new demand for consumer goods such as, television sets, radios, and other electronic appliances. Higher income resulting under this program also create a need for a broader range of provincial-based public health and educational facilities.

Output Effect

The results of the present study reveal, that agricultural output is highly responsive to export policy measures. Growth in food and non-food output in turn increases effective demand for the rural infrastructure, such as roads, electricity, transport and communication which can in combination with other reinforcing elements of rural development, support such improvement and development of rural infrastructure, that are essential for the development of provincial institution. Further, development of infrastructure reduces the disparities in the rural-urban price relations and thereby stimulates exchange of goods between the sectors.

In addition to its positive contribution to the development of the rural infrastructures, higher agricultural commercial sector output produces two other beneficial effects: (1) it increases employment opportunities to landless labor in the rural areas, and (2) it supplies raw materials, such as raw cotton, raw wool, sugar cane, etc., to the non-agricultural sector and thereby contributes to higher output and employment in the non-agricultural sector.

Empirical findings by Pandit (41), Sharma (50) and others seems to suggest that fluctuations in the supply of food output are a major factor in explaining the inflationary trends in the Indian economy. Since food supply is responsive to export policy measures, it contributes to the stabilization of the general price level and, thereby, lowers the inflationary pressure in the economy.

Employment Effect

One of the main objectives of economic planning in India was to eliminate poverty and unemployment. The ideal way to achieve these objectives is to increase employment opportunities, especially in the rural areas where a majority of the country's population is concentrated. Higher employment opportunities under export promotion policies enhance the income earning opportunities and reduce the severity of poverty. Thus, the level of rural employment and poverty to a large extent depend on the performance of the agricultural sector. This view has received support by Ahluwalia (3) who finds an inverse relation between the incidence of rural poverty and agricultural performance.

Further empirical evidence on rural poverty and agricultural performance comes from the works of Day and Singh (14) and Randhwa (46). Their findings in the state of Punjab suggest that improved agricultural performance goes a long way in eradicating the problems of unemployment and poverty. Under the green revolution program, the introduction of new agricultural technology had positive effects

on both employment and wages.

Finally, higher employment and income resulting under export promotion policies acts to mitigate the problem of rural-urban migration. Unlike most LDC's, rural-rural migration dominates the migration picture of India. Although rural-urban migration can be explained by a number of factors, empirical studies seems to indicate that about 25 per cent of the migration occurs for economic reasons alone (13). The effects of such migration on rural areas or agricultural output may be either positive or negative. If the migration is temporary or seasonal and is synchronized with the agricultural needs in the village, the impact may be zero. On the other hand, if migration results in shortage of manpower during peak seasons, its impact on the agricultural output may be negative. Since both income and employment respond positively under the export promotion policies, the incentive for rural-urban migration is reduced.

Limitations

a. Although agricultural income responds positively to the export promotion measures, lack of disaggregated data on the rural income prevents this study from analyzing the effects of export promotion policies on the three categories of rural population - the capitalist, the subsistence, and the landless working class. In other words, it is not possible to know from this study whether the capitalist or the subsistence farmers or landless labor benefit from export policy measures.

b. Although, the present study shows a strong relation between exports and economic growth, one should recognize that the export policy measures alone cannot bring about a complete transformation of the economy. Appropriate monetary and fiscal policies should also be implemented along with the trade policies.

A SELECTED BIBLIOGRAPHY

1. Agarwala, M. R. "Export Earnings Instability and Economic Development in Less Developed Countries: A Statistical Varification." The Indian Journal of Economics, 63 (1982), p. 60

2. Ahluwalia, I. J. "Price and Output Behavior." Journal of Development Economics, 6 (1979), pp. 361-390.

3. Ahluwalia, I. J. "Rural Poverty and Agricultural Performance in India." Journal of Development Studies, 14 (1977-78), pp. 298-323.

4. Baklanoff, Eric. Expropriation of U.S. Investments in Cuba, Mexico, and Chile, (Praeger Publishers, New York, 1975)

5. Beckerman, W. "Projecting Europe's Growth." Economic Journal, 72 (1962), pp. 912-925.

6. Bhagwati, J. N. and Srinivasan, T. N. Foreign Trade Regimes and Economic Development, (Columbia University Press, New York, 1975).

7. Bhatia, B. M. "Terms of Trade and Economic Development: A Case of Study of India, 1861-1939." The Indian Economic Journal, 16 (1969), pp. 414-433.

8. Bhole, L. M. "Interest Rate and Corporate Investment." The Indian Economic Journal, 19 (1971-72), p. 580.

9. Bishwas, B. "Constant-Market Share Analysis of Exports." The Indian Economic Journal, 30 (1982), p. 41.

10. Cassidy, H. J. Using Econometrics: A Beginner's Guide, (Preston Publishing Company, Inc., Reston, Virginia, 1981)

11. Chenery, H. B. "Patterns of Industrial Growth." The American Economic Review, 31 (1960), pp. 624-654.

12. Chenery, Shishido and Watanbe, "The Patterns of Japan's Growth." Econometrica, 30 (1962). pp. 98-139.

13. Dasgupta, B. Migration and Development, (UNESCO Publication, 1982).

14. Day and Singh. Economic Development As a Adaptive Process, (Cambridge University Press, Cambridge, 1977).

15. Desai, Meghand J. "Marcoeconometric Models for India: A survey." Sankhya, The Indian Journal of Statistics, 35 (1973). pp. 169-206.

16. Dutta, Amit M. "Foreign Labor Contribution to Ceylon's Income and Export Supply, 1929-1938." The Indian Economic Journal, 14 (1971), p. 25.

17. Dutta, M. "India's Foreign Sector." International Economic Review, 5 (1964), pp. 82-105.

18. Dutta, pp. 82-105.

19. Emery, R. F. "The Relation of Exports and Economic Growth." Kyklos, 20 (1967), pp. 470-495.

20. Fei, J. C. and Rains. "A Theory of Economic Development." The American Economic Review, 51 (1961), pp. 533-565.

21. Gupta, "On Some Determinations of Rural and Urban Household Saving Behavior." Economic Record, 40 (1970), pp. 578-583.

22. Halder, A. and Richards, J. H. "Structural Characteristics of India's Foreign Trade and Its Effects on the Instability of Export Receipts." The Indian Economic Journal, 16 (1973), pp. 132-148.

23. Houthaker, H. S. and Magee, S. P. "Income and Price Elasticities in World Trade." Review of Economics and statistics, 43 (1969), pp. 111-125.

24. Government of India. A Reference Annual, (Ministry of Information, 1955-1978).

25. Johnston and Mellor. "Agriculture in Development." The American Economic Review, 51 (1961), 566-593.

26. Khan, M. S. "Import and Export Demand in Developing Countries." International Monetary Fund Staff Papers, 21 (1974), pp. 678-693.

27. Krishna, R. and Chaudhri. "Trends in Rural Savings and Capital Formation in India, 1950-51 to 1973-74." Economic Development and Cultural Change, 56 (1981-82), pp. 271-297.

28. Lancaster, K. Introduction to Modern Microeconomics, (Rand McNally and Company, Chicago, 1969).

29. Leela, P. "Import Dependence of the Non-Ferrous Metals in India." The Indian Economic Journal, 26 (1980), pp. 1-11.

30. Marwah, K. "An Econometric Model of India: Estimating Prices, Their Role and Sources of Changes." The Indian Economic Review, 7-8 (1972-73), pp. 53-92.

31. Mason, Edward. Economic Development in India and Pakistan, (Center For International Affairs, Harvard University Press, 1966).

32. Mangat, Ram. "Trade - An Engine of Economic Growth: The Case of India During the Planning Period." The Indian Journal of Economics, 26 (1975-76), pp. 401-413.

33. Massel, B. F. "Export Concentrations and Fluctuations in Export Earnings: A Cross Sectional Analysis." The American Economic Review, 54 (March, 1984), pp. 47-63.

34. Massel, B. F. "Export Instability and Economic Structure." The American Economic Review, 31 (1970), pp. 618-630.

35. Massel. B. F. Pearson, J. R. and Fitch, J. B. "Foreign Exchange and Economic Development: An Empirical Study of the Selected Latin American Countries." Review of Economics and Statistics, 55 (1972), pp. 208-212.

36. Mellor, J. W. "Accelerated Growth in Agricultural Production and the Inter Sectoral Transfer of Resources." Econ. Development and Cultural Change, 22:1 (October, 1973), pp. 1-16.

37. _____ The New Economics of Growth, (Cornell University Press, Ithaca, New York, 1976).

38. Morgan and Betz. Economic Development, (Wordsworth Publishing Company, Belmont, California, 1970).

39. Morgan, T. "The Long-Run Terms of Trade Between Agriculture and Manufacturing." Econ. Development and Cultural Change, 7 (1959), pp. 1-23.

40. Narasimha, M. V. and Sastry. "Elasticities of Demand for certain Indian Imports and Exports." Sankhya, The Indian Journal of Statistics, 11 (1951), pp. 309-336.

41. Pandit, V. "An Analysis of Inflation in India: 1950-1975." The Indian Economic Review, 13-14 (1978-79), pp. 89-115.

42. _____. "Income and Price Level in India." Sankhya, The Indian Journal of Statistics, 35 (1973), pp. 451-466.

43. Panikar. "Rural Savings in India." Econ. Devpt. and Cult. Change, 10 (October, 1961-62), pp. 64-85.

44. Patil, S. K. "Relative Prices in India's Import Function." The Indian Economic Review, 21 (1976-77), pp. 133-149.

45. Prebisch, R. "Commercial Policies in Underdeveloped Countries." The American Economic Review, 23 (1959), pp. 251-273.

46. Randhawa. Green Revolution, (Halsted Press Book, John Wiley and Sons, Inc., 1974).

47. Rao, V. S. and Misra. "Investment Financing in Corporate Sector." The Indian Economic Journal, 19 (1976), pp. 311-318.

48. Sastry, V. D. "Investment Behavior in Indian Capital Goods Industries." The Indian Economic Journal, 17 (1975), pp. 56-77.

49. Sharma, U. C. "Import Substitution in Chemicals, Case Study: Soda-Ash, Caustic Soda, Bleaching Powder." The Indian Economic Journal, 29 (1981), pp. 78-87.

50. Sharma, O. P. "Determinants of Price Behavior in India: Testing Some Hypotheses." The Indian Economic Journal, 22 (1974), pp. 102-110.

51. Shirley, W. Y. The Taiwan Economy in Transition, (Western Press/Boulder, 1983).

52. Shony, B. R. "Aid to India under U.S. Public Law-480." The Indian Economic Review, 5-6 (1971-72), pp. 71-89.

53. Singer, H. "The Distribution of Gains Between Investing and Borrowing Countries." The American Economic Review, 40 (1950), pp. 663-687.

54. Spivey, A. W. and Wroblenski, W. J. Econometric Model Performance in Forecasting and Policy Assessment, (The American Enterprise Institute, 1979).

55. Syran, R. F. and Walsh, B. M. "The Relation of Exports and Economic Growth: A Note." Kyklos, 21 (1968), pp. 541-545.

56. Todaro, M. P. Economic Development of Third World Countries, (London: Logman Group, Ltd., 1977).

57. Tarlok, S. "Employment and Planning." The Indian Economic Journal, 26 (1975-76), pp. 319-363.

58. Taylor, Lance. Structuralist Macroeconomics, (Basic Book Inc., Publishers, New York, 1983).

59. Thorbecke, E. and Condos, A. "Macroeconomic Growth and Development Models of the Peruvian Economy." Theory and Design of Economic Development, ed., by Irma Adleman and Thorbeck (Baltimore: The John Hopkins Press, 1966).

60. Yotopoulos, P. A. and Nugent, J. B. Economic Development, (New York: Harper and Row Publishers, 1976).

61. United Nations Organization. Economic Survey of Asia and Far East, (1968-69), pp. 42-49.

APPENDIXES

APPENDIX A

REGRESSION RESULTS FOR THE UNRESTRICTED MODEL

TABLE VI

REGRESSION RESULTS FOR THE UNRESTRICTED MODEL

Depen. var.	E t-1	X_{agf}	X_{agc}	P	W_{t-1}	K	ER	X_1	X_2	X_3	YW	TE	G t-1	R^2	D
N_{nag}		-1.0	2.2	0.93	-.23									0.86	1.94
		(-1.4)	(2.0)	(2.1)	(-.6)										
Y_{ag}	-.72					-.02	1.1	-.91			.44	-.13	-.10	0.84	1.71
	(-1.8)					(-.54)	(3.8)	(-1.6)			(1.8)	(-3.5)	(-.7)		
X_{agc}	-.23					-.08	.61	-.31	-.008		.31	-.09	.10	0.88	2.29
	(-.91)					(-.54)	(3.1)	(-1.5)	(-.04)		(1.5)	(-4.2)	(.01)		
X_{agf}	-.64					-.22	.87	-.65		-.14	.20	-.10	-.05	0.69	1.90
	(-1.3)					(-.6)	(2.3)	(-2.1)		(-.14)	(.4)	(-2.1)	(-.5)		
N_{ag}	-.25					-.01	.14	.18	.03		.31	-.02	.01	0.82	2.9
	(-1.6)					(-.7)	(1.89)	(1.6)	(.6)		(3.4)	(-1.8)	(.58)		

Note. $X_1 = P_{ag}/P_{nag}$, $X_2 = P_{agc}/P_{Ir}$, $X_3 = P_{agf}/P_{agc}$, 't'- ratios are in the parantheses

APPENDIX B

REGRESSION RESULTS FOR THE STRUCTURAL EQUATIONS

TABLE VII

SUMMARY OF REGRESSION RESULTS FOR THE STRUCTURAL EQUATIONS (AGRICULTURAL SECTOR)

Endogen. Vari.	N	K	X1	X2	X3	W_{-1}	P	Y	E	E_{-1}	G_{-1}	W	X_{agc}	R^2	D-W
N						0.31							.69	0.82	1.90
						(2.1)							(6.0)		
W				0.22			-4.1							0.97	2.07
				(1.2)			(-3.1)								
Y		0.54									0.12			0.69	1.78
		(1.80)									(0.62)				
I			1.0						0.07	-1.0				0.11	1.57
			(0.90)						(0.06)	(-.9)					
X_{agc}				0.22			.38							0.72	1.66
				(1.2)			(5.7)								
X_{agf}					3.6		.23							0.22	0.78
					(.17)		(1.3)								

TABLE VIII

SUMMARY OF REGRESSION RESULTS FOR THE STRUCTURAL EQUATIONS(NON-AGRICULTURAL SECTOR)

Endogenous Variables	N	X_{agc}	X_{nag}	E	ER	X_4	E_{t-1}	W_{t-1}	T_m	P	Y	X_{agf}	T_e	Y_w	K	W	F	R^2	D-W
Y	.13 (1.1)														.86 (4.8)			.96	1.90
X_{nag}											1.1 (19.2)							.96	1.80
N_{nag}		3.1 (3.1)										-.53 (-.56)				-.22 (-.93)		.76	2.18
W_{nag}								.34 (1.6)		-.90 (-3.0)								.53	1.50
I				.46 (.78)		.09 (.27)	-.007 (-.0)											.06	0.50
E				1.2 (9.6)									-.06 (-1.9)	.21 (1.6)				.87	1.80
M				-.20 (1.9)					-.06 (-1.6)								-.17 (-.6)	.66	1.60

Note. t-values are given in the parantheses, $X_4 = P / P_{t-1}$

APPENDIX C

THE SOURCES OF DATA

The data required for this study are obtained from the following sources: International Financial Statistics, International Trade Statistics, Year Book of Labor Statistics, The Year Book of National Accounts, Central Statistical Orgainzation, The Eastern Economist, The Indian Economic Review, The Reserve Bank of India: Monthly and Annual Reports, and Yojana.

Exchange Rate: Data on the exchange rate are obtained from the publications of the International Financial Statistics Year Book, 1980, pages 533-534. Series af, line 3. Series af refers to the monthly average rates prevailing in the market of the country, or if those not available, monthly rates in New York. These are quoted in units of national currency per U.S. dollar.

Agricultural and Non-agricultural Income: Three types of data on agricultural and non-agricultural income are available. Periodic estimates of Gross Domestic Product originating from these two sectors are made by the Central Statistical Organization of the Government of India. Estimates of National Income originating from these two sectors are also made by the Reserve Bank of India. Further, The Year Book of National Income Statistics (UNO, publication) also publishes data on gross and net domestic products originating from these two sectors. For the purpose of the present study, the data published by the Central Statistical Organization is used. These data may be found in the Eastern Economist, January 22, 1982. Pages 237-241.

Agricultural and Non-agricultural Output: Data on these are obtained from the publications of the Central Statistical Organization. These data may be found in the Eastern Economist, January 22, 1982. Page 255.

Export and Import Duty Receipts: Data on these are obtained from the following sources: The Economic Survey of Asia and Far East 1968, pp. 653-654), and International Trade Statistics (1968, page 386).

Agricultural and Non-agricultural Capital Stock: Data on these are obtained from the publication of the Central Statistical Organization. These data may be found in the Indian Economic Review, 1974-1975, pages 67-85. Capital stock in agriculture includes private ownership of tractors, electric generators, pumpsets, etc.

Agricultural and Non-agricultural Wages: Data on these are obtained from the publications of the Year Book of labor Statistics, 1974. Data available on agricultural wages includes only daily rates. For the purpose of the present study, daily rates are converted into annual rates.

Government Expenditure: Data on the government expenditure on rural development programs are obtained from the Eastern Economist, March 19, 1982, pages 762-764.

Price Ratio's: Data on various price ratios are obtained from the various issues of the Eastern Economist, 1955-1974.

Agricultural and Non-agricultural Employment: Data on these are obtained from two different sources: The Year Book of Labor Statistics, 1974, 1965, 1956, and 1968.

Another source is the Eastern Economist, 1968. Agricultural labor force is measured in thousands of persons employed. Household and self-employed are excluded from these figures.

Exports and Imports: Data on these are obtained from the Eastern Economist, January 22, 1982. P. 262.

Foreign Exchange Reserves: Data on these are obtained from the Eastern Economist, January 1982.

World Income: Data on these are obtained from the Year Book of National Accounts, 1958, 1964, 1969, 1974, and 1976.

VITA

Nathan Amble

Candidate for the Degree of

Doctor of Philosophy

Thesis: EFFECTS OF EXPORT PROMOTION POLICIES ON RURAL INCOME, OUTPUT, AND EMPLOYMENT: THE CASE OF INDIA (1955-1970)

Major Field: Economics

Biographical:

Personal Data: Born in Mysore, Karnataka, June 14, 1947, the son of Venkatasubbian and Lakshmma.

Education: Received Bachelor of Arts Degree in Economics and psychology from the University of Mysore in 1968; received Master of Arts Degree in Economics from Meerut University in 1970; received Master of Arts Degree in Economics from the University of Alabama in May, 1978; completed requirements for the Doctor of Philosophy Degree at Oklahoma State University in December 1984.

Professional Experience: Lecturer in Economics, B.M.S. College, Konanur, Karnataka State, November 1971 to May 1974; Graduate Assistant, Department of Economics, Univeristy of Alabama, January 1977 to May 1977; Tutor in Economics, Minority Tutorial Programs, Oklahoma State University, January 1979 to May 1979.