Doctoral Thesis

The impacts of policy environment on rural-urban linkages
the case of Ghana

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Publication Date:
1994

Permanent Link:
https://doi.org/10.3929/ethz-a-000931005

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THE IMPACTS OF POLICY ENVIRONMENT ON RURAL–URBAN LINKAGES: THE CASE OF GHANA

A dissertation submitted to the
SWISS FEDERAL INSTITUTE OF TECHNOLOGY, ZURICH
for the degree of
Doctor of Technical Sciences

presented by
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Zurich 1994
Acknowledgements

A number of people have directly and indirectly contributed to the accomplishment of this dissertation. I would first of all like to express my deep gratitude and appreciation to Prof. Dr. Peter Rieder who employed me as a research fellow for the period that the study was undertaken. His guidance and advice during the study contributed enormously to the success of this manuscript.

I am also deeply grateful to Prof. Dr. Rolf Kappel for his guidance and valuable comments on drafts I submitted at every stage of this study. His acceptance of the responsibility of my co-examiner, despite his heavy schedule at the Institute of Postgraduate Studies on Developing Countries, Zurich, is particularly appreciated.

Thanks also go to all my colleagues at the Department of Agricultural Economics, who in various ways contributed to the completion of this dissertation. Of particular mention is Benno Bueler who provided excellent computer assistance. I am indebted to those farmers and non-farm enterprise owners who were willing and patiently provided the necessary information. I wish to thank individuals at the Ministries of Agriculture and Finance and Economic Planning in Accra, as well as the Ghana Permanent Mission in Geneva who provided me with secondary information used for the analysis in this study.

I am equally grateful to the three main enumerators of the surveys, A. Ziblim, A. Nnae, and A. Awal, without the help of whom the field survey could not have been possible. I also wish to put on record my appreciation for the opportunity offered me by Dr. L. Badoux of the Students Exchange Office of the Swiss Federal Institute of Technology, Zurich, to pursue a program of graduate study. My thanks also go to R. Goetz, U. Egger, K. Dzobo and C.L. Delgado for useful comments. I also wish to recognise the moral support given to me by Jaqueline Magnin throughout the study. Finally, I would like to thank E. Hov and E. Herz for the secretarial support they gave me during the study.
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Chapter 1

Summary

1.1 Abstract

The objective of this study is to examine and analyse how macroeconomic policies and sectoral policies influence the resource allocation decisions of rural dwellers, with special emphasis on factors that particularly affect rural poverty, rural-urban migration, as well as overall economic growth and development.

The study begins by assessing the role of developing strategies in economic development and poverty alleviation (chapter 3). A review of the available literature revealed that many governments in developing countries have adopted development strategies that have discriminated against agriculture, which have often led to rapid economic decline. In an attempt to analyse factors influencing rural incomes, theoretical framework of the determinants of real agricultural wage rates and urban unemployment is developed in chapter four. The model which is estimated by a co-integrated and error-correcting system, shows that agricultural labour productivity, favourable agricultural terms of trade, and wages in the manufacturing sector have positive impacts on real agricultural wages, whereas rural population and urban unemployment are negatively related to real agricultural wage rates. The results also reveal that the urban unemployment rate in Ghana is positively related to the urban population, the minimum wage rate, and the labour productivity in the manufacturing sector, but negatively related to the real agricultural wage rate, and output in the manufacturing sector.

The fifth chapter took a look at the forward, backward, and final demand linkages, as well as the capital and labour flows that obtain between the agricultural and non-agricultural sectors, in the course of economic development of a nation. An empirical model was also developed in this sector, within the framework of the Kaldor Growth Laws to simultaneously examine the growth linkages between the agricultural and non-agricultural sectors. The findings of the analysis revealed that there exists strong linkages between the two sectors, and that in developing countries characterised by predominant agricultural sectors, the agricultural sector can serve as an “engine of growth”. The results of a field survey of rural non-farm enterprises conducted by the author in the Northern Region of Ghana are also reported here. The findings show that the sector is quite labour-intensive, and technology used is mostly adapted. Barriers to entry are quite low, since the cost of equipment and level of skills required to operate to it are quite low. Moreover, it reveals that the non-farm sector is an area capable of expanding to provide employment avenues for the increasing population, and to supplement incomes of most agricultural households.
CHAPTER 1. SUMMARY

With the help of econometric models, the impacts of exchange rate policies, macroeconomic policies as well as agricultural pricing policies on agricultural output are examined in chapter six. A co-integrated and error correcting system is used in the estimation of a dynamic incentive response of Ghanaian cocoa farmers. The results showed that price incentives do encourage farmers to increase the supply of their output, within their limitations. However, both supply response was found to be inelastic both in the long- and short-runs. The availability of manufactured goods was also found to have a positive effect on output supply, indicating that in a situation of shortages or rationing of basic consumer goods, where farmers cannot buy commodities with the income from the sale of their products, they may reduce output. A General Equilibrium Approach was also used to examine the impacts of trade policies on the real exchange rate, and on agricultural exports. The findings showed that over the period considered, import tariffs fell entirely on producers of exportables, notably cocoa farmers, supporting the widely held view that trade policy is a major source of exchange rate distortion and price bias against agriculture.

The findings of the study show that helping rural dwellers to improve their productivity, as well as ensuring favourable agricultural terms of trade can contribute significantly to increasing rural incomes and poverty alleviation. Improved rural incomes and better rural living conditions are also important prerequisites needed to reduce the rural-urban migration, and the resulting urban unemployment. The price bias against agriculture resulting from trade and exchange rate policies translates into an effective transfer of resources out of agriculture, that is quite substantial relative to the amount transferred into the agricultural sector through government spending. Moreover, if rural non-farm enterprises are to achieve their full potential for income generation, policy makers will have to redress the common urban-bias policies. This requires massive investments in rural infrastructure to help reduce production and transaction costs, and also to make life in the rural areas more attractive.

1.2 Zusammenfassung

Das Ziel dieser Studie ist es zu untersuchen, in wieweit die Wirtschaftspolitik und institutionelle Rahmenbedingungen die Entscheidungen der ländlichen Bevölkerung bei der Allokation ihrer Ressourcen beeinflussen. Dabei stehen die Faktoren im Vordergrund, die insbesondere auf die ländliche Armut, die Land-Stadt Abwanderung als auch auf das allgemeine ökonomische Wachstum bzw. die Entwicklung einwirken.

Im Kapitel 3 wird die Rolle Entwicklungsstrategien für die ökonomische Entwicklung und Armutsbekämpfung beurteilt. Eine Übersicht der verfügbaren Literatur machte deutlich, dass Regierungen in Entwicklungsländern den landwirtschaftlichen Sektor vielfach diskriminierten. Als Folge dessen sank die wirtschaftliche Prosperität, insbesondere in Afrika, in dem Mittleren Osten, Lateinamerika und der Karibik. Im Gegensatz dazu entwickelten sich die asiatischen Länder, die eine ausgeglichene Wirtschaftspolitik verfolgten, vergleichsweise gut, das Einkommen stieg rapide und die Armut verringerte sich.

Im vierten Kapitel wird auf der Basis des Erwartungseinkommen–Modelles eine theoretische Basis geschaffen, um die Bestimmungsgründe fuer landwirtschaftliche Löhne und städtische Arbeitslosigkeit zu analysieren. Das dazu gehörige Model wurde in Form einer "Error Correction" und Kointegrations Model geschätzt. Es führte deutlich vor Augen, dass die landwirtschaftliche Arbeitsproduktivität, günstige landwirtschaftliche "terms of trade" und die Löhne im industriellen Sektor die realen landwirtschaftlichen Löhne anheben, wohingegen die ländliche Bevölkerung und die städtische Arbeitlosigkeit die realen landwirtschaftlichen Löhne senken.
1.2. ZUSAMMENFASSUNG


Die Schlussfolgerungen erlauben, mögliche Politikalternativen zu formulieren, um bestimmte exogene Kerngrössen positiv zu beeinflussen. Dabei steht die Verbesserung der landwirtschaftlichen Produktivität und der landwirtschaftlichen "terms of trade" im Vordergrund, um das Einkommen der ländlichen Bevölkerung zu steigen und die Armut zu bekämpfen.
Ghana: Regional Boundaries and Capitals 1983
Chapter 2

Introduction

2.1 Statement of the Problem

Despite the significant economic progress developing countries in general have made in the past three decades, poverty, hunger and malnutrition have increased in a majority of these group of countries. The World Bank estimated that over a billion people had to survive with an annual per capita income of 350 dollars. Research conducted at the International Food Policy Research Institute (IFPRI) reveals that the number of malnourished (underweight) children throughout the developing regions increased from 166 million to 188 million between 1975 and 1990. Projections to the year 2000 also suggest that although the prevalence of malnutrition will probably continue to decline worldwide, the number of malnourished children will increase, particularly in Sub-Saharan Africa and South Asia. As will be shown later in this study, it has been widely documented that in several developing countries, the poverty and malnutrition in the rural areas is several times the level in the urban areas.

Available evidence for Ghana indicates that at the national level, the daily per capita calorie supply declined from 1983 Kcal in 1977 (86% of requirements), to 1759 Kcal (76% of requirements) in 1986, before increasing to 2209 Kcal in 1988 (96% of requirements) whilst the percentage of babies with low birth weights, an indicator used to measure malnutrition, rose from 15 per cent in 1984 to 17 per cent in 1985. The incidence of poverty in rural Ghana is, however, more than eleven times that of Accra (World Oti Boateng et al. 1992). Before proceeding further to make any analysis of the rural-urban disparities, it is essential to distinguish between the two settlements. As stated by Haggblade et al. (1989), the progression from rural to urban extends across a continuum of settlement patterns, population and functional densities, making any attempt to divide the universe into parts necessarily arbitrary. Like Anderson and Leiserson (1980) and Haggblade et al. (1989), rural is considered in this study as any locality that exists primarily to service an agricultural hinterland. On the other hand, urban areas refer those dominated by manufacturing, government or some other motor independent of agriculture. That is, the term rural depends more on the function than the size of the locality. Rural areas may therefore include towns of substantial size.

The preceding discussion shows that although a small fraction of the population enjoys an extremely high standard of living, the majority of the population in developing countries have not experienced any significant gains in their standard of living for the past one and half decades. It is increasingly evident that growing number of households in rural areas are finding it difficult to earn enough income to purchase food, resulting in a flow of the
population to the cities. In Ghana, for example, while the urban population constituted 12.3% of the total population in 1948 it rose gradually to 23% and 36% in 1960 and 1985, respectively, before declining to 33% in 1989 (World Development Reports, various years).

This continuous and large-scale migration between the rural and urban areas, in both directions is what actually links the two areas together. It is an established fact that most decisions about location of labour (or individuals) are private decisions in response to a perceived set of economic and other conditions. Many of these signals are influenced by public policy, and the experiences from several developing countries, particularly in Sub-Saharan Africa is generally biased in favour of urban locations and against rural locations. These urban biased government policies have significantly contributed to the above-mentioned increasing disparity in incomes and consumption between the rural and urban areas.

The principal objective of this study is to examine and analyse how policy environment — macroeconomic and sectoral policies — affects rural poverty and the decisions of rural dwellers to allocate resources (including labour) efficiently. In line with the last pro-urban policy bias mentioned in the previous section, the analysis will focus mainly on those macroeconomic factors that are believed to have substantial impacts on rural household allocation of resource. In particular, factors that affects employment and incomes in the rural areas will be examined. To the extent that raising farm labour productivity not only permits the release of labour from agriculture to non-agricultural pursuits, but also boost per capita income to levels that enable consumer diversification from foods into non-foods, emphasis will be placed on factors that can step up labour productivity both in the agricultural and non-agricultural sectors. While the analysis covers other developing regions and countries, the empirical work limits itself to Ghana. Ghana has been chosen because it has a remarkable record of macroeconomic mismanagement that followed after independence, and an unprecedented structural adjustment programme that has resulted in improved socio-economic conditions of the populace.

2.2 Policy Environment

Policy environment in the present study is defined as the socio-economic environment created as a result of the macroeconomic and sectoral policies that tend to influence the meso and micro-economic settings of a country. Macroeconomic policies include inter alia, fiscal and monetary policies, exchange rate and trade policies, as well as agricultural pricing policies. Sectoral policies include sector-specific production and marketing policies, agricultural research, and transport infrastructure creation. The economic policies adopted by many developing countries, particularly in Africa, Asia and Latin America has often tended to extract resources from the rural sector, and especially the rural poor. As Lipton (1989) asserts, rural extractions are greater if the state seeks to finance — or to ease via price manipulation — not just its own expansion, but (via cheap food and raw materials) the profitability of urban private production. The way policy environment in a country influences the development process can be illustrated in a simplified way as shown in Figure 2.1.

Particularly in many parts of Africa, this rural extraction (through agricultural pricing policies) to finance urban states has to a large extent led to a halt in overall development. In countries where the extracted resources have not been substantially recirculated in the rural areas, through, for example, agricultural development projects or improvement in rural infrastructure, rural incomes have declined rapidly over the years. This decline in incomes has then led to increasing rural poverty, as mentioned earlier. Once poverty intensifies in the rural areas, a situation often accompanied by wide rural-urban income gaps, many rural
dwellers choose to migrate to the urban centres for a better living. As has been experienced by many developing countries, in particular, Sub-Saharan African countries, the migration of rural folks to the cities (reallocation of labour) is often accompanied by a fall in agricultural production.

Figure 2.1: Policy Environment and Poverty

The declining agricultural production and the increasing population led to a tremendous increase in food imports in several developing countries, raising the food import bill of these countries over the past two decades. The rising food import bill, coupled with the decline in export earnings — partly as result of output reduction and partly due to fall in commodity prices — culminated in excessive balance of payments problems of several...
developing countries. The acute balance of payments problems of these developing countries compelled them to undertake structural adjustments programmes with the International Monetary Fund (IMF) and the World Bank. The social costs of such adjustment programmes are again borne by the poor in the society — compelling the governments of the affected countries to initiate measures in conjunction with the World Bank, to combat poverty. The way these economic policies influence rural-urban disparities and migration will be investigated in this study. A brief outline of the approach adopted in the analysis is presented below.

2.3 The Approach Adopted in the Analysis

To examine and analyse the extent to which policies and changes affect households over time, information is required at various economic levels. Analysing information at different levels, however, calls for an integral approach. The approach adopted here is therefore an integral analysis, which in modern terminology, is called macro-meso-micro analysis (World Bank, 1990). The instruments for such an analysis are presented in Figure 2.1. At the macro-level, monetary, fiscal and exchange rate policies greatly influence markets and economic and social infrastructure (meso-level). These meso-level variables, then tend to influence the behaviour of individuals and households (micro-level). That is, how individuals and households reallocate resources in response in policy changes.

Table 2.1: Elements of a Macro-Meso-Micro Analysis

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<tr>
<th>Level</th>
<th>Focus</th>
<th>Analysis</th>
<th>Data</th>
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<tbody>
<tr>
<td>Macro</td>
<td>Monetary and fiscal policies,</td>
<td>Macro-Economic Model</td>
<td>Economic, Trade, Financial and Demographic Statistics.</td>
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<td>Trade policy, Exchange Rate,</td>
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<td></td>
<td>Agricultural pricing.</td>
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<td></td>
<td>Infrastructure.</td>
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<tr>
<td>Micro</td>
<td>Individuals and Household</td>
<td>Household Analysis.</td>
<td>Household Survey.</td>
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<td>Welfare.</td>
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Source: Adapted from The World Bank, 1990.

Analysis at the macro-meso level will involve investigating the impacts of macroeconomic policy variables on the markets (both product and factor, formal and informal) and infrastructure (particularly roads, irrigation, education and health services). Such an analysis can, for example, help determine the economic prerequisites for output and income growth in agriculture and development of rural non-farm enterprises. This is because, in many areas, transport and infrastructure has collapsed, so that some local markets are poorly integrated with the national market, leading to large price differences. In such cases, improvements in marketing and investments in infrastructure may be adequate for rural inhabitants to raise
their incomes sufficiently. Policy interventions to correct distortions in agriculture could result in increased demand for goods and services by farmers as their incomes rise, with a large proportion of this being met by rural-based industries.

The meso-micro level analysis will involve examining how various policy measures have affected households through their influences on markets and infrastructure. To the extent that changes in markets and infrastructure affect household asset holdings and incomes, policies that affect the meso-level variables are most likely to have impacts on household expenditure functions and nutritional status. As noted above, by improving road and transport systems, remote regions could be drawn into national markets. This will lead to local prices being increasingly affected by national market conditions, thus improving rural farmers incomes — with all its forward and backward linkage effects.

Such a macro-meso-micro analysis would also help provide information on how households react to certain changes, which, in turn, could be of help to policy makers seeking information on how economic measures implemented affect households. Based on the findings of the study, an attempt will be made to develop a comprehensive concept for governments and institutions involved in international development aid, to help accelerate their efforts to enhance agricultural growth and the creation of non-farm employment to combat rural poverty.

The study is developed on a theoretical and empirical framework through which various macroeconomic policies are closely analysed. Both primary and secondary data are used in the analysis. While the former was obtained from a field survey in Ghana, the latter are taken from available statistics of the United Nations, World Bank and the Ghana Statistical Services. In the next chapter, a review of current literature on the impacts of development strategies on economic performance and poverty alleviation in developing countries is presented. The discussion in this chapter is aimed at examining how policies adopted in various developing regions, particularly Ghana have affected the evolution of poverty in these regions.

In view of the fact that poverty is greater in the rural than in the urban areas in Ghana, an examination of the factors that influence rural incomes is undertaken in chapter four. The real agricultural wage rate is used to represent rural income. The analysis include an empirical examination of the factors that influence the supply of and demand for agricultural labour, and how these forces interact to affect agricultural wage rates. In the framework of the expected income hypothesis, the model developed in this chapter also attempts to show that rural-urban migration is a positive function of the urban-rural income differential. Since the objective of the study is to investigate the effects of macroeconomic policies on rural-urban linkages, which involves largely the flow of people between these regions, an analysis of the impacts of low rural incomes on urban unemployment is considered here.

Due to the increasing significance of the non-farm sector in promoting economic growth and providing employment, especially in rural areas, an analysis of the role of the non-farm economy in economic development is carried out in chapter five. A careful review of the linkages that exists between the farm and non-farm sectors is also undertaken here to show how growth in the farm sector influences that in the non-farm sector. Of particular interest in this section is the employment creating and income generating role of the rural non-farm sector. Non-farm activities include all economic activities other than crop and livestock production. It, therefore, includes manufacturing, construction, services, mining and commerce.

After examining the multiplier effects of the agricultural sector, and its role in reducing poverty in chapter five, a detailed analysis of the impacts of macroeconomic policies on the agricultural sector is undertaken in chapter six. This chapter vividly shows how farmers
react to incentives, and how policies affects the incentive structures in the various sectors of
the economy. The analysis in this section is particularly important, since it demonstrates
how agricultural output can be increased. Chapter seven contains conclusions and policy
recommendations from the study.

To give a picture of the major macroeconomic policies adopted since independence in
Ghana, an overview of the post-independence macroeconomic environment is presented be¬
fore proceeding to the next chapter. As will be demonstrated in the subsequent chapters,
an idea of the policies adopted since independence is essential to follow the economic decline
of the nation since independence, and the recovery after the implementation of a structural
adjustment programme in 1983.

2.4 The Post-Independence Macroeconomic Environment

Although a liberal economic regime characterised Ghana during its period of decolonization
from 1950 to 1960, a restrictive trade policy was introduced only three years after indepen¬
dence to deal with a rapidly worsening external payments and foreign reserves situation,
precipitated by the rapid decline in cocoa prices after 1957. The latter being caused by
increases in world supply stimulated by the high prices that obtained after the second world
war. The declining cocoa prices\(^1\) and an increasing demand for imports by the government
for its large-scale investment programme, and by the private sector, due to increased income
and a liberal trade regime, culminated in a rapid increase in the current account deficit from
19.4 million US dollars in 1959 to 94.9 million dollars in 1960 and to 135.1 million dollars
in 1961. (Stryker, 1990). As the foreign exchange reserves declined sharply and budget
deficit rose rapidly, the then Nkrumah government resorted to foreign exchange controls,
high import duties and comprehensive import licensing in 1961.

There was also a significant reorientation of public investment away from the infras¬
tructure that had supported small-scale, export-oriented agriculture during the 1950s and
towards large-scale, state-owned agricultural and industrial enterprises designed to substi¬
tute domestic production for imports. Evidence of the fact that the measures adopted
negatively affected the export sector is well documented by Leith (1974). He shows a 95%
rise in the GDP deflator net of exports between 1960 and 1966, as compared to a fall in the
export price index of over 28%. This naturally resulted in a great fall in new plantings of
cocoa and an extremely limited replantings from the early 1960s.

The National Liberation Council (NLC) government that overthrew Nkrumah in 1966
instituted some measures to correct the precarious balance-of-payments situation. The sys¬
tem for allocating import licenses was changed and the domestic currency devalued in an
attempt to ensure efficient mobilization of domestic resources and adequate supplies of essen¬
tial commodities for consumers. As a result of the austerity measures adopted, the current
account deficit was reduced from 212.1 million cedis in 1965 to 42.9 million cedis in 1968.
A substantial improvement in the relative price of export goods took place, as the pressure
on the prices of non-traded goods reduced. Inspite of the 43% devaluation in July 1967, the
official exchange rate was still over-valued from 1967 to 1969 by 40 to 50% in comparison
with the equilibrium rate. As will be shown in chapter six, non-cocoa exports were under¬
mined, while cocoa production remained stagnant in the face of producer prices that were
still low in real terms compared with those that characterised the 1950s (Stryker, 1990).

---

\(^1\)This led to a fall in public revenue from cocoa in nominal terms from 67 million cedis in 1957 to 36
Although the situation was much less severe for the former sector, since they did not bear anything like the burden of export taxation that was imposed on the latter, the anti-export bias of the trade policies was still evident and significant. Consequently, the other major export commodities such as timber, gold, diamonds and bauxite all experienced substantial declines in output levels, particularly after 1972.

As world market prices for cocoa increased in 1970, the Busia government that came into power in 1969 capitalised on the increased cocoa profits and permitted the rapid expansion of imports and public expenditures. This invariably increased the balance-of-payments deficit, as the markets were flooded with imported commodities for the urban elites. The balance-of-payments deficit exacerbated as cocoa prices dropped in 1971, with the trade account surplus that had been run since 1967 to cover the services and transfer deficits totally non-existent. By the latter part of 1971, foreign exchange reserves were less than half the trade deficit over the first three quarters of that year (Leith, 1974). In December 1971, Prime Minister Busia opted for a massive 80% devaluation of the cedi from 1.02 cedis per dollar to 1.82 cedis per dollar. At the same time, import surcharges and taxes on current account payments were abolished, making the net devaluation about 12% less than the gross change in the exchange rate.

Despite some wage increases, the devaluation implied a huge loss of real income, as consumer prices soared. The result was the toppling of the Busia government in January 1972 by Colonel I.K. Acheampong. The Acheampong government gave considerable emphasis to the need for Ghanaians to live in a more self-reliant manner, and as such quickly moved to reinstate import licensing with the prime goal of reducing the country's imports. Furthermore, the cedi was revalued, leaving a residual nominal devaluation of only about 20%.

In addition to tightening import controls, the government also attempted to decrease the demand for imports by promoting import substitution activities, especially food production, in order to reduce the dependence of the country on imports. Efforts were also made to reduce the size of the budget deficit. Short-term success was recorded as the value of imports — in constant dollars — declined from 1971 to 1972 by 43%. The very favourable world market prices for gold, cocoa and timber that pertained in 1972 also helped to improve the current account deficit of 146 million dollars in 1971 to a surplus of 95 million dollars in 1972, and finally to 114 million dollars in 1973. At the beginning of 1974, net foreign exchange reserves increased to 210 million dollars (World Bank, 1984).

The period that followed (after mid-1974) was characterised by macroeconomic mismanagement with an ambitious government investment programme and large wage increases in the public sector. These policies resulted in a rising budget deficit, which was largely financed through central bank borrowing. In 1974, credit to the central government rose by 53% and that to state enterprises by 61%. The consequences were extremely damaging for the economy, as inflation increased from 9.7% in 1972 to 29.7% in 1975. The system of fixed exchange rate that obtained, together with the acute shortage of essential imports, established a massive incentive for parallel-market activity, as well as the smuggling of imports from and exports to neighbouring countries.

The continuous financing of the budget deficit by borrowing from the central bank resulted in an average growth rate of the money supply of 34% per annum between 1973 and 1976, and 45% the following year. This further raised the inflation rate to 116.3% in 1977, the highest in West Africa (see Table A.1 in Appendix A for development of the rate of inflation). Dissatisfaction with the control system grew as the balance-of-payments difficulties continued and charges of corruption and poor administration of the system mounted. As rightly phrased by Chazan (1983), "in the waning days of June 1978 the fragmentation
was so complete that it became abundantly clear the Supreme Military Council (SMC) was doomed. The only questions were whether the masses would simply withhold all support for the regime, whether the electorate would wait for the 1979 date for civilian rule, whether the military would itself intervene, whether a civilian coup would take place, or whether an all-out violent uprising would erupt." (Chazan, 1983; p.269). Acheampong was ousted by his fellow officers in 1978 and General F.W.K. Akuffo took over as head of state.

The new regime devalued the cedi in 1978 and introduced an austerity budget, together with increases in interest rates. These policies helped to bring down inflation to 54.4% in 1979. The economy, was however in a state of near collapse, with a budget deficit equal to about 65% of total revenue, as Dr. Hilla Limann took over power as the first president of the Third Republic in 1979. With high annual inflation and severe shortages of all imported goods, the gap between the official and black market exchange rates widened to about 10:1 by 1981. Efforts to reduce public public expenditures and balance the budget was heavily resisted by the working class who forced the government to raise the minimum wage, and from cocoa farmers who demanded higher prices for their products. The increasing overvaluation of the cedi undermined efforts of the government to administer the licensing system in order to control indiscretionary allocations and malpractices.

The cedi was so over-valued that government revenues from cocoa were actually negative in 1980 and 1981, since the world price at the official exchange rate was less than the producer price plus marketing costs. In the event of growing fiscal and debt crises, the government resorted to deficit spending, which equalled 139% of total revenue in 1981. Inflation therefore rose in the same year to annual rate of 116% (World Bank, 1984). With the whole economy in total shambles, Fl. Lt. Rawlings took over power for the second time on 31st December, 1981. He was earlier in power for four months between June and September 1979. Although the Rawlings government initially attempted to re-establish tighter controls, it was totally unsuccessful. The result was a severe recession in economic activity, with rising gaps between official and market prices.

In April 1983, as mentioned earlier, the government introduced the first phase of the Economic Recovery Programme (henceforth ERP) covering the period 1984-86. The main objectives of the ERP were: 1) to remove the distortions in the economy, 2) to rehabilitate the agricultural, industrial, and mining sectors; 3) to repair and restore the infrastructural base of the economy, 4) to apply sound fiscal and monetary policies to achieve and sustain reasonable economic growth over the years thereafter.

The cedi was devalued massively along side other austerity measures. The list of items whose prices were controlled were progressively reduced. With the devaluation of the cedi, the government was able to relax controls on imports. Almost all controls were lifted on imports of consumer goods paid for with importers' own foreign exchange under the Special Import Licence scheme. In addition to relaxing quantitative controls, import tariffs were simplified and reduced. Cocoa producer prices were adjusted upwards massively.

These macroeconomic policies undertaken since independence have influenced the socioeconomic development of the nation as will be argued in the next chapter. Evidence will be provided in chapter next chapter to show that most of the economic policies adopted by the various governments were urban-biased. It will be demonstrated in chapter four that the agricultural multipliers have not been exploited to provide growth for the non-farm sectors. Chapter five will clearly show that farmers react to the economic policies, and that these urban-biased policies had negative impacts on the agricultural sector, which in turn, led to the rapid decline of the economy in the 1970s and early 1980s.
Chapter 3

Development Strategies and Socio-Economic Performance

The fact that various developing countries have adopted different development strategies at various points in time with diverse socio-economic results demonstrates that these strategies affect the regional pattern of development. The increasing poverty, hunger and malnutrition in many developing countries on one hand, and the rapid economic growth and increasing prosperity in others on the other hand, have refocused attention on means of improving the welfare of the poor in the less developed economies (World Bank, 1990). It has widely been documented that the economic policies, which have been adopted along the lines of development strategies influence socio-economic performance of developing countries.

The purpose of this chapter is to review a few development strategies that have been advocated since the 1950s, and to examine their impacts on socio-economic development. First, a review of the modernization and dependency theories and their significance for socio-economic development are presented. This is followed by an analysis of the impacts of the strategies adopted by Ghana on its socio-economic development.

3.1 Agriculture and Economic Development

The major role of the agricultural sector in the overall development process of a nation in its early stages of development has been of immense importance for a long time. Although there has been widespread agreement among persons of different ideological perceptions that the sector has a significant role to play in the socio-economic development of less developed countries, the question of whether the agricultural or industrial sector should be accorded priority in the allocation of resources has remained a central point of debate among economists.

While proponents of the modernization theory presented arguments to support their view that any meaningful economic development can only occur through growth in the industrial sector (see, for example, Rostow, 1956), the supporters of the dependency theory believed that there can hardly be a universal theory to overcome the problems of underdevelopment, but that various strategies have to be developed for individual countries, depending on their specific situations (Nohlen, 1984).
The Modernization Theory

Very prominent among the modernization theory of economic growth is the stages of economic growth theory developed by W.W. Rostow (1960). According to Rostow, each development process goes through five growth stages, which he designated as follows:

1. the traditional society,
2. the preconditions for take-off,
3. the take-off,
4. the drive to maturity,¹ and
5. the age of high mass-consumption

The "take-off" is meant to be the central notion in Rostow's scheme, and it has received the most critical attention (Meier, 1989). The take-off is taken to be "a decisive transition in a society's history." It is a period "when the scale of productive activity reaches a critical level and produces changes which lead to a massive and progressive structural transformation in economies and societies of which they are a part, better viewed as changes in kind than merely in degree." (Rostow, 1960). The take-off is defined as requiring all three of the following related conditions (Meier, 1989):

1. A rise in the rate of productive investment from say, 5% or less to over 10% of national income (or net national product);
2. The development of one or more substantial manufacturing sectors, with a high rate of growth; and
3. The existence or quick emergence of a political, social, and institutional framework that exploits the impulses to expansion in the modern sector and the potential external economy effects of the take-off and gives to growth an ongoing character.

Rostow maintains that the analytic backbone of his argument is "rooted in a dynamic theory of production." He believes that his set of stages reveals a succession of strategic choices that confronts a country as it moves forward through the development process. According to Rostow and the other proponents of the modernization theory, economic development could only take place through industrial growth. Through the application of modern technique to selected sectors, these sectors could develop into the so-called 'leading sectors', with possible changes between sectors in this role in the course of the development process. Different sectors might occupy this role in different countries. History indicates that in the present-day developed countries, the main sectors that played this role are, for example, the railways in the USA, France, Germany, Canada and Russia, and the railways plus timber in Sweden.

A leading sector is characterised by the following qualities (Meier, 1989;):

a) High short-run elasticity of supply for its products to permit rapid growth rates

¹Economic maturity, according to Kaldor (1968), is a state of affairs where real income per head has reached broadly the same level in the different sectors of the economy. That is, a situation in which "surplus labour" is exhausted; or one in which "growth with unlimited supplies of labour" is no longer possible.
b) High income-elasticity of demand for its products

c) Rapid growth-rates with a high rate of plow-back of profits

d) Invention of new techniques as well as transferring it to other sectors

Although these ideas found much support when they were first put forward, they were criticized because of their insistence on the exact replication of the sequence in every country. The fact that certain policies that had been adopted in developing countries on the basis that they had successfully helped in the development process in developed countries had obviously failed, particularly raised considerable doubts on the applicability of Rostow's theory. Despite all the criticisms, Rowstow held to his ideas, and in a return to the subject defiantly defended the general applicability of his model. True, "for each society that built the preconditions for take-off and then moved into sustained growth, the experience was unique, requiring creativity, causing pain, bringing frustration as well as social and political change" but in the end the same framework applies to every one of them in detail (Rostow, 1963).

Generally, the proponents of the modernization theory argue that because the agricultural sector does not fulfill these preconditions, it cannot be assigned the role of a leading sector. The sector could at most play a complementary role in an industrially dominated development process. The role of the small-scale industrial sector in economic development has been completely ignored in this theory. A prerequisite for the success of such a development strategy is the integration of the economy in the world economy, to allow the country to exploit its comparative advantage in exchanging products it can produce at relatively low costs, for scarce resources such as capital and know-how.

The question of demand and supply factors had earlier been raised in the debate of economic growth. Following the arguments of Allyn Young, the more demand is focused on commodities with a large supply response, and the larger the demand response (direct and indirect) induced by increases in production, the higher the growth rate is likely to be. For there to be self-sustaining growth, two conditions must be present: returns must increase, and the demand for commodities must be elastic in the sense that

a small increase in [their] supply will be attended by an increase in the amounts of other commodities which can be held in exchange for [them]. Under such conditions, an increase in the supply of one commodity is an increase in the demand for other commodities and it must be supposed that every increase in demand will evoke an increase in supply (Young, 1928, p. 534).

Dependency Theory

As a result of the disappointing performance of several Latin American countries that got wholly incorporated into the world economy in the 1950s and early 1960s, dependency theories of underdevelopment were formulated in the mid-1960s. This theory of economic underdevelopment was, in principle, against the entire integration of developing economies into the world economy. They generally argue that the dependence of the developing economies on the industrialised countries precludes the economic development of the former. To explain the failure of the modernization theory, the dependency school emphasizes relationships between the metropolitan (developed) centre and the periphery (developing) countries in the third world. A single process of global economic growth occurs in a zero-sum context, in which the growth of the centre is at the direct expense of the periphery. Class relationships
in the urban-based governments of the periphery explain the perpetuation of economic policies that favour only a small urban elite (and possibly landlords). It is, however, relevant to mention that within the school of dependency, different meanings are accorded to the concept of “dependence,” and different analysis are offered to explain underdevelopment as a result of the interplay between internal and external policies.

Based on the believe that individual countries have to develop appropriate strategies, depending on their specific situations instead of a universal economic development theory, Senghaas (1977) proposed the disassociation approach. According to this approach, developing countries have to disassociate themselves from the world economy, and use their own natural resources to develop their economies and societies.

From the preceding discussion of development strategies, it can be noticed that the central point has been which sector has to be accorded priority in the development process — that is agriculture or industry. The role of microenterprises is not explicitly mentioned in any of these approaches. It is, however, interesting to note that the role this sector can play is more appreciated in the school of dependency than in the modernization approach. The fact that the former lays emphasis on the development of the internal market partly based on “Self-Realiance” approach shows that microenterprises have a significant role to play in the socio-economic development of developing countries.

The recent theories on economic development do not prescribe a universal or general explanation for underdevelopment but rather attempt to investigate parts of the reality in political economy (see for example, Schmidt and Wulffen, 1987 for reviews). For example, Menzel (1985) and Menzel and Senghaas (1986) seem to attach some importance to microenterprises in their recent writings on development economics. Particularly Menzel and Senghaas (1986) outline three prerequisites for a successful integration of a developing economy into the world economy. First, an early effective agricultural modernization. This refers to changes in production techniques, since the mobilization of productivity reserves has proved to be a major problem in every development process. However, the applied form of modernization always has to be adjusted to suit conditions in the country concerned — adoption of appropriate technology. Second, a strong and efficient government to ensure the successful design and implementation of economic measures is essential. Third, the need for the development of microenterprises to form the basis of self-development. They largely attribute the successful development of the “newly-industrialised” countries (South Korea, Taiwan, Singapore and Hong Kong) to the successful mobilization of the entrepreneurship potential of the middle class.

A study by the World Bank (1989) also hints at the significance of microenterprises in helping to provide employment for the increasing population in the Sub-Saharan Africa countries. The Bank estimates that employment in small and microenterprises will need to grow on average by 6 per cent a year, since employment growth in the other sectors alone would not be able to meet the increasing supply of labour brought about by the rapid population growth (see Table 3.1).

The foregoing discussions show that the role of small-scale enterprises, particularly rural non-farm enterprises in the socio-economic development of a nation has been underestimated in traditional development economics approach. The way this sector can contribute to socio-economic development will be shown in chapter four.
3.1. AGRICULTURE AND ECONOMIC DEVELOPMENT

Table 3.1: Indicative Projections of Employment in Sub-Saharan Africa, 1990-2020 (millions of persons unless otherwise specified)

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<tbody>
<tr>
<td>Population</td>
<td>432</td>
<td>497</td>
<td>677</td>
<td>1107</td>
<td>2.8</td>
</tr>
<tr>
<td>Labour force</td>
<td>198</td>
<td>230</td>
<td>318</td>
<td>610</td>
<td>3.3</td>
</tr>
<tr>
<td>Employment</td>
<td>168</td>
<td>199</td>
<td>279</td>
<td>549</td>
<td>3.4</td>
</tr>
<tr>
<td>Agricultural sector</td>
<td>131</td>
<td>148</td>
<td>190</td>
<td>311</td>
<td>2.5</td>
</tr>
<tr>
<td>Modern wage sector</td>
<td>10</td>
<td>12</td>
<td>17</td>
<td>32</td>
<td>3.4</td>
</tr>
<tr>
<td>Small and microenterprise</td>
<td>27</td>
<td>39</td>
<td>73</td>
<td>206</td>
<td>6.0</td>
</tr>
</tbody>
</table>


3.1.1 Impacts of Sub-Saharan Africa’s Policies on its Performance

While agriculture and urban development go hand-in-hand, many African governments have pursued macroeconomic policies with a distinct urban bias. Most of the countries rushed in for modernization after independence. The trade and credit policies they adopted encouraged the establishment of large-scale, capital-intensive industries that are located in large cities, while agricultural procurement, food subsidy, and exchange rate policies have tended to keep food prices low for urban consumers at the expense of the farmers. Partly as a response to this urban bias, Africa’s urban growth has been markedly faster than average for developing countries.

The World Bank (1989) argued that: “Africa’s deepening crises is characterised by weak agricultural growth, a decline in industrial output, poor export performance, climbing debt, and deteriorating social indicators, institutions, and environment.” The Bank further argues that:

The postindependence development efforts failed because the strategy was misconceived. Governments made a dash for “modernization,” copying, but not adapting, Western models. The result was poorly designed public investments in industry; too little attention to peasant agriculture; too much intervention in areas in which the neurial skills; and too little effort to foster grassroots development. This top-down approach demotivated ordinary people, whose energies were most needed to be mobilized in the development effort (World Bank, 1989; p. 3).

It can be observed from Table 3.2 that for developing countries, the number of the poor have increased greatly over the period — from slightly more than 1 billion in 1985 to more than 1.1 billion in 1990. As is evident from the Table, all poverty measures worsened in Sub-Saharan Africa, the Middle East and North Africa, and Latin America and the Caribbean. By contrasts, Asia with its rapid income growth continues to be the most successful at alleviating poverty. The estimates also show that Sub-Saharan Africa is the only region in which the situation is expected to deteriorate; with increases in the proportion of the
population in poverty, the number of poor would rise by about 9 million a year, on average.²

Table 3.2: Poverty in the Developing World, 1985-2000

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>47.6</td>
<td>47.8</td>
<td>49.7</td>
<td>184</td>
<td>216</td>
<td>304</td>
</tr>
<tr>
<td>East Asia</td>
<td>13.2</td>
<td>11.3</td>
<td>4.2</td>
<td>182</td>
<td>169</td>
<td>73</td>
</tr>
<tr>
<td>South Asia</td>
<td>51.8</td>
<td>49.0</td>
<td>36.9</td>
<td>532</td>
<td>562</td>
<td>511</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean</td>
<td>22.4</td>
<td>25.5</td>
<td>24.9</td>
<td>87</td>
<td>108</td>
<td>126</td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>30.6</td>
<td>33.1</td>
<td>30.6</td>
<td>60</td>
<td>73</td>
<td>89</td>
</tr>
<tr>
<td>All developing countries</td>
<td>30.5</td>
<td>29.7</td>
<td>24.1</td>
<td>1,051</td>
<td>1,133</td>
<td>1,107</td>
</tr>
</tbody>
</table>

†forecasts;

Notes:The poverty line used here — $370 annual income per capita in 1985 purchasing power parity dollars — is based on estimates of poverty lines from a number of countries with low average incomes. In 1990 prices, the poverty line would be approximately $420 annual income per capita.


The Asian countries ability to reduce poverty has been mainly achieved through income growth in the past 25 years. This led to an appreciable change in the distribution of income among developing economies. While the share of the East Asian countries of undeveloped country real incomes rose from 22% to 37% in the 1980s, Sub-Saharan Africa and Latin America experienced a decline by 5% and 6%, respectively (World Bank, 1990). According to the World Bank (1990), trends in poverty during the 1980s reflect trends in overall economic performance. Despite the paucity of data, the evidence shows that where economic performance was good, poverty declined. In many Asian countries, poverty declined (especially in India, Indonesia, Malaysia, and Pakistan), while internal and external shocks caused poverty to increase in Sub-Saharan Africa and Latin America.

As Table 3.3 shows, per capita incomes grew almost everywhere during the 1960s. However, a divergence set in during the 1970s, and accelerated in the 1980s.

The Table reveals that by the 1980s per capita incomes was growing at 6.7% in East Asia and 3.2% South Asia but was falling in both Sub-Saharan Africa and Latin America. It can further be observed that the regional differences was also present in investments. While both Asian regions increased their national saving and investment rates during these periods, Sub-Saharan Africa and Latin America experienced declines. A combination of domestic policies and external economic factors greatly influenced these levels of regional growth and investment (World Bank, 1990).

The initial position and the ability to adjust to shocks determined to a great extent the performance of countries in the 1980s. Many East Asian countries maintained a relatively

²The estimates for the year 2000 are based on projections of income under the assumption that the distribution of income within the countries remains constant.
Table 3.3: Performance Indicators, by Developing Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Growth of real per capita GDP(%)</th>
<th>Gross domestic investment/GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>3.2</td>
<td>0.1</td>
</tr>
<tr>
<td>East Asia</td>
<td>5.1</td>
<td>4.7</td>
</tr>
<tr>
<td>South Asia</td>
<td>1.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Eastern Europe†</td>
<td>4.8</td>
<td>5.3</td>
</tr>
<tr>
<td>Middle East, North Africa &amp; other Europe</td>
<td>5.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean</td>
<td>3.7</td>
<td>2.6</td>
</tr>
</tbody>
</table>

†Data for 1989 are preliminary; †Estimates

healthy balance of payments and strong trade performance at the beginning of the 1980s, alongside a disciplined fiscal expenditure policy. In contrast, a lot of countries in Sub-Saharan Africa and Latin America began the decade with greater underlying imbalances. These imbalances were, however, often hidden because several countries had borrowed to maintain growth. This group found it difficult to adjust to the shocks of the 1980s (World Bank, 1990).

A successful adjustment requires a macroeconomic stability, as well as a microeconomic environment that is favourable to new investment. A prerequisite for the former is a low and sustainable rate of inflation, a realistic exchange rate, and a manageable level of fiscal expenditures (World Bank, 1990). As will be shown later in this study, a combination of exchange rate adjustment and fiscal/monetary contraction will initiate fundamental relative price movements in favour of tradables, causing resource switching into that sector.

Besides the poverty indices and the economic indicators presented above, other key socio-economic indicators also reveal Sub-Saharan African countries generally lack behind the other developing countries (see Table A.2 in Appendix A). This pro-urban policies that have not only led to economic decline in Sub-Saharan Africa, but also to widening rural-urban incomes and poverty, resulted in massive migration of the rural dwellers to the cities (see Table 3.4).

It can be observed from Table 3.4 that between 1969 and 1990, the share of urban population increased from 18.3% to 33.9% in Africa, implying an 85.2% increase. This was more than twice that of the world as a whole, which experienced a 40.6% increase within the same period. Africa's increase was also higher than the average of the less developed world, where the proportion increased from 22.1% to 37.1% between 1960-90 (66.9% increase). Of course, it needs to be mentioned that the low level of urban populations in Sub-Saharan African countries account partly for the higher increases.
Table 3.4: Share of Urban Population, 1960–2000

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>World total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less developed regions</td>
<td>22.1</td>
<td>24.7</td>
<td>28.9</td>
<td>37.1</td>
<td>45.1</td>
</tr>
<tr>
<td>More developed regions</td>
<td>60.5</td>
<td>66.6</td>
<td>70.3</td>
<td>72.6</td>
<td>74.9</td>
</tr>
<tr>
<td>Africa</td>
<td>18.3</td>
<td>22.9</td>
<td>27.8</td>
<td>33.9</td>
<td>40.7</td>
</tr>
</tbody>
</table>

*Notes: Figures for 2000 are forecasts.*  

3.1.2 Impacts of Ghana’s Policies on its Performance

The socio-economic situation in Ghana prior to the ERP is summarised by Pickett (1989). He states that between 1955 and 1960, per capita real income grew at an average annual rate of between 2% and 3%. Economic and social infrastructure, already relatively impressive, was strengthened and industrialization began to gather pace. Gross investment was 20%, on average, of the GDP, and mostly financed by domestic savings. In the 1960s, however, the economy did not grow at all — notwithstanding a staggering increase in the capital stock in the first half of the decade. The 1970s saw the economy go into long-running decline, and between 1960 and 1982 real income per head fell at an average annual rate of 2%. At the beginning of this period Ghana had been at the same level of economic development as South Korea; by its end, average income in Korea was greater than that of Ghana by a factor of almost six. Yet in 1960, South Korea had figured in the economic development texts as a hopeless case, a poor country without prospects. In Ghana, by contrast, there were many who believed that with self-government it would be possible to transform what had been the Gold Coast into a modern economic state within a decade. That did not happen (Pickett, 1989; p. 131).

Pickett asserts that the policy failure associated with Ghana’s generally dismal economic performance between 1957 and 1982 is to be explained by the undue weight given to industrial development and the consequent neglect of agriculture, and goes on to ask that how could industrial development be causally linked to general economic failure?

The short answer is through the wrong choice of strategy. Forced and tariff-protected industrialization has been the central element in the one widely-used approach to policy, and for much of the time nowhere more so than in Ghana (Pickett, 1989; p. 132)

The urban-biased policies did not only lead to a decline in economic growth, but also contributed to widening rural-urban income gaps, and consequently rural-urban migration. The section below addresses these rural-urban dichotomies in poverty and migration.
3.1.3 Poverty and Urbanization in Ghana

In Ghana, the rapid declines in the share of rural population in total population, and the agricultural EAP, as well as the increased urbanization in the last three decades is largely due to three main reasons. First, the gap between urban wages and rural wages was enormously large, as will be demonstrated in the next section. Second, rapid acceleration of school-enrolment in the country-side has speeded up the drift of young people to the towns. Third, development and welfare expenditure have been apportioned disproportionately to towns — be it the investment in productive enterprises such as factories or the investment in infrastructure, including water supplies or medical services — thus making the towns relatively more attractive.

Most of these investment in projects outside agriculture were part of Nkrumah's industrialization strategy. However, it needs to be noted that most of the employment created was without heed to productivity. It has been widely established that most of the public corporations were not run on commercially profitable basis (see, for example, Killick, [1978] and Pickett, [1988] for reviews). The drift of the rural folks to the urban centres was because many industries were set up in the urban areas, while agriculture was virtually neglected.

For example, the Greater Accra region, which is the most urbanised region in the country recorded a population growth rate of 5.6% between 1960–70, while the national average was 2.4%. However, a 1960 post-Enumeration Sample Survey showed that the region had the least natural increase, indicating that a large proportion of the growth of the population in 1970 was due to migration from rural areas. That, the massive flow of the population to Accra was caused by the development strategy of Nkrumah is supported by Lewis (1967). Lewis wrote: When the first draft of the Ghana's second Development Plan was completed, I pointed out to Nkrumah that he was planning to spend 50% of the money in Accra, which has only 5% of the population. 'Why not?', he asked me. “When you think of England, you think of London; when you think of France you think of Paris; when you think of Russia, you think of Moscow.” ‘No, sir’, I said. “When I think of England, I do not think of London because I live in Manchester, and this is also why I know that capital cities exploit the rest of the country” (Arthur Lewis, p.16, 1967).

This urban biased government policies resulted in increasing disparity in incomes and consumption between the rural and urban areas in the country. Despite reforms undertaken by the Rawlings government in 1983, recent surveys have shown that poverty in Ghana is still more severe in the rural areas than in urban settlements. An analysis of the Ghana Living Standards Survey conducted in 1987–88 which compares the incidence of rural-urban poverty is presented in Table 3.5. In the analysis, the poverty line was chosen to be 32,981 cedis per annum. The Table shows that about 65% of the total population which falls below this poverty line are based in the rural areas, while 27% and 8.3% are based in the urban areas excluding Accra and Accra, respectively.

The Table also show that per capita household expenditure is lowest in the rural areas — 43,644 cedis. This is lower than the national average of 49,472 cedis. Also presented in the Table are the $P_a$ indices, used to measure the proportional shortfall of income for each poor person. For the estimation of the incidence of poverty, two-thirds of the mean expenditure per capita was chosen as the poverty line.

As $a$ varies, $P_a$ takes on a number of features. When $a = 0$, it implies that the focus is on the number of the poor but not on the extent of their poverty. $P_1$ is therefore calculated to capture both the number of the poor as well as the extent of their poverty (for a detailed discussion of the conceptual issues, see Oti Boateng, 1990). Starting with All Ghana, it will be noticed from Table 3.5 that the $P_0$ measure is 0.36; in other words, the incidence of
Table 3.5: Rural-Urban Poverty Indices

<table>
<thead>
<tr>
<th></th>
<th>Population share, in [%]</th>
<th>Mean PCHHE</th>
<th>Contribution to national poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>64.95</td>
<td>43,044</td>
<td>P0 0.44  P1 0.144  79.3  80.4</td>
</tr>
<tr>
<td>Urban excluding Accra</td>
<td>26.76</td>
<td>52,978</td>
<td>P0 0.27  P1 0.084  19.8  19.3</td>
</tr>
<tr>
<td>Accra</td>
<td>8.29</td>
<td>88,528</td>
<td>P0 0.04  P1 0.005  0.9   0.3</td>
</tr>
<tr>
<td>All Ghana</td>
<td>100.00</td>
<td>49,472</td>
<td>P0 0.36  P1 0.116  100.0 100.0</td>
</tr>
</tbody>
</table>

Notes: PCHHE = Per Capita Household Expenditure
Source: Oti Boateng E. et al., 1990.

poverty with this poverty line is 36%. That is, about 36% of Ghanaians in the sample lived in households whose per capita consumption was less than two-thirds of the overall average. Over 43% of rural inhabitants are below a poverty line which cuts off 36% of all Ghanaians, 27% of non-Accra residents, and only 4% of those in Accra.3

This reveals that the incidence of poverty in rural areas is more than eleven times the incidence in Accra. The measure in rural areas is thirty times the \( P_1 \) measure in Accra. A \( P_1 \) value of 0.116 tells us that if perfect targeting were possible, then to "fill up" the poverty gap in Ghana so as to ensure that there was no poverty would require 3,839(0.116 \times 32,981) cedis per annum per person in Ghana, which is 7.8% of mean per capita household expenditure (PCHHE), where 3,839 is the proportional shortfall of income for each person. The analysis estimates that with a population of 13.7 million in 1987/88, the total poverty gap would come to 52.6 billion cedis per annum in 1988. This, according to the authors, illustrates the importance of growth in any Ghanaian poverty alleviation strategy.

The Table also shows that around 80% of the national incidence of poverty is accounted for by the rural incidence of poverty, and the contribution to national poverty increases as \( \alpha \) goes from 0 to 1. On the other hand, the contribution to national poverty of the other two areas declines as \( \alpha \) increases, and dramatically so for Accra. Table 3.5 further demonstrates that not only is the incidence of poverty greater in rural areas, but the depth of poverty is also greater. Quite apparent from the Table is also the correlation between the poverty measures and the per capita household expenditures in the regions. In an earlier analysis, Kyereme and Thorbecke (1987) also found out that in all zones of the country, the proportion of poor households was far higher in the rural areas than in the urban areas, while the mean food expenditure of households was lower in the former than in the latter.

3.1.4 Regional Dimensions of Poverty

The preceding section has tried to examine the rural-urban dichotomy in consumption and poverty, which has contributed immensely to rural-urban migration in the country. Several authors have also attempted to investigate the disparities in the standard of living between regions, which have also contributed to rural-urban and regional migration. Ewusi (1976) used available indices for various socio-economic variables — among other things, access to

3It will be recalled that 2/3 of the mean expenditure per capita was chosen as the poverty line.
proper education, good health services, and good drinking water — to develop a composite index of the level of development of the various regions. His results showed that the Greater Accra Region is far more developed than any other region. The least developed regions were found to be the Upper and Northern Regions, with indices less than 10% of the index for Greater Accra Region (see Table 3.6).

Table 3.6: Measure of Development for the Localities of Ghana, 1970

<table>
<thead>
<tr>
<th>Locality</th>
<th>Measure of Development</th>
<th>PQLI (UNICEF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater Accra</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Central Region</td>
<td>0.398</td>
<td>0.693</td>
</tr>
<tr>
<td>Western Region</td>
<td>0.392</td>
<td>0.778</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>0.355</td>
<td>0.893</td>
</tr>
<tr>
<td>Ashanti Region</td>
<td>0.340</td>
<td>0.862</td>
</tr>
<tr>
<td>Volta Region</td>
<td>0.306</td>
<td>0.778</td>
</tr>
<tr>
<td>Brong Ahafo Region</td>
<td>0.265</td>
<td>0.862</td>
</tr>
<tr>
<td>Northern Region</td>
<td>0.110</td>
<td>0.240</td>
</tr>
<tr>
<td>Upper Region</td>
<td>0.071</td>
<td>0.265</td>
</tr>
</tbody>
</table>

Notes: Accra = 100; PQLI = Physical Quality of Life Index.

A useful method summarising spacial differences in levels of poverty, which was developed in 1979 by Morris has been applied to Ghana in recent times. The Physical Quality of Life Index (PQLI) combines infant mortality, the level of literacy and the expectation of life at birth. Recent estimates of the PQLI for the various regions of Ghana by UNICEF indicates that the incidence of absolute poverty measured by this index is highest in the Northern and Upper Regions. It is interesting to note that both Ewusi and UNICEF used the same 1970 data and got the same ranking for the Northern and Upper as the poorest regions in Ghana. The UNICEF indices are also presented in Table 3.6 for comparison.

This differences in poverty between the two geographical regions has resulted in some migration between the two regions. An analysis of the 1970 and 1974 agricultural census data by Bequele (1983) shows that the number of agricultural holdings in the country as a whole increased by 6.5%. While the number of holders in the North declined by 7.8% that in the South increased by 10.7%. Furthermore, the area of land under cultivation remained unchanged in the South, while it declined by nearly 8% in the North. The conclusion drawn by Oti Boateng et al. from these figures is that a continuation of the historical experience of the earlier years of Ghana's development in the heydays of expansion of the cocoa industry. During this period, the South relied to a great extent on the labour from the Northern part for capital accumulation.

In this chapter, a review of the economic literature on some strategies of economic development, and the impacts of policies adopted by Sub-Saharan African Countries, particularly Ghana on socio-economic indicators was presented. Also outlined was the rural-urban disparities in consumption and poverty in Ghana. In the chapter that follows, an investigation of the factors that determine rural wages and incomes will be undertaken. Of particular interest will be how incomes in the agricultural sector can be improved to reduce rural poverty.
Chapter 4

Determinants of Agricultural Wages and Urban Unemployment

4.1 Significance of Agricultural Wages

The purpose of this chapter is to examine and analyse the factors that influence wages in the agricultural sector and the rate of urban unemployment. Such an analysis is essential in view of the fact that a large proportion of the rural labour force in Sub-Saharan African countries is still engaged in agricultural pursuits. As such any attempt to combat rural poverty must include measures that improve wage rates in the agricultural sector, since that directly affect rural incomes.

It is significant to mention that the best way to investigate rural-urban consumption and poverty disparities is to examine the differences in incomes of the two regions. However, time series data on rural and urban incomes hardly exists for developing countries. As such, it is impossible to use income differentials for the analysis intended in this section. The expected income hypothesis, which deals with rural-urban wage differentials shall be applied in the present study. As stated above, the interest of the present study is on agricultural wage rates, since a substantial proportion of the rural population is often employed in agriculture. The 1970 agricultural census for Ghana revealed that over 31% of the rural labour force depended primarily on wage employment in agriculture for their livelihood. In addition to this, there are deficit farmers (those whose food production fall short of consumption requirements) who always seek wage employment in agriculture in order to supplement their incomes from farming. In this context, trends in agricultural wage rates would undoubtedly influence the standard of living of agricultural workers, as well as deficit farmers.

Although available evidence from some regions in Africa indicate that there is a very high degree of labour self-sufficiency in many households as they principally rely on family labour with minimal hiring-in of permanent and seasonal labour, there are still some indications of high labour hiring in other regions. For example, while Collier (1989) observed that only about 10 per cent of labour in the peasant sector in Kenya was hired in 1974, ILO research presented in Fafchamps et al. (1985) showed that in 1976, as high as 35.1% of labour was hired in Funtua and 23.1% in Gausau, both districts in Nigeria. According to estimates from Ghana, in 1970, about 31% of the rural labour force — particularly in the export
crop producing parts of Southern Ghana where migrant labour constitutes a significant percentage of total hired labour — depended primarily on agricultural wage employment for their livelihood, while a substantial proportion of the labour force depended on wage employment as a secondary source of income (see Bequele, 1983).1

Furthermore, there is a wide array of literature on the direct impacts of agricultural growth on the non-agricultural sector and the overall economy. In some of these studies, the significant impacts of increasing agricultural earnings on the growth of rural non-farm enterprises, have been underlined, indicating that in a rural setting, increasing agricultural earnings is a sine qua non for a rapid growth of the rural non-farm sector. Using time-series data, various studies describe transformations in the rural economy which suggest that rising agricultural wage earnings and increasing consumption demand from farm households have stimulated increases in rural non-farm employment, incomes and a move to more lucrative non-farm activity. (see, for example, Chadha, [1986] for the case of the Indian Punjab; Bell, Hazell and Slade, [1982] for the case of Malaysia; Hazell and Ramasamy, [1988] for the case of North Arcot, India; and the World Bank, [1983] for the case of Thailand). Cross-regional studies from rural Togo and Sierra Leone (Haggblade, Hazell and Brown, 1987), and India (Papola, 1987) also reveal a positive correlation between earnings per worker in agriculture and in non-farm activities. Since the present study also attempts to develop measures to increase non-farm employment and income in the rural areas, factors that greatly influence developments in the rural non-farm economy will be significant interest.

A prerequisite for any meaningful recommendations on measures needed to improve real wages of agricultural workers is a clear identification of the factors that determine, or influence the development of agricultural wage rates. Prior to developing an analytical framework that will help identify the determinants of real agricultural wage rates, the evolution of agricultural and non-agricultural wage rates in Ghana is first analysed.

4.2 Agricultural and Non-agricultural Wages

Figure 4.1 illustrates the evolution of agricultural and non-agricultural wage rates between 1966–88. It can be observed that in real terms, wage rates in both sectors have deteriorated over the years. While the period between 1966–72 showed a relatively stable development in the real wage rate, a drastic decline in wage rate can be observed after 1972. Evident from the figure is the fact that agricultural wage rates have always lacked behind non-agricultural wage rates, with the notable exception of 1986.

An interesting point worth noting is the fact that non-agricultural wage rates have declined more than agricultural wage rates during the last two decades. The result is that, relative to their urban counterparts, agricultural workers have improved their wage conditions in the country, although in absolute terms, real agricultural wage rates have declined over the last two decades. Between 1966–68 the average real monthly wage (in constant 1970 prices) in the non-agricultural sector was 75 cedis per month, while in the agricultural sector it was 37 cedis per month. By 1986–88 these wages had declined to 17 and 16 cedis per month for non-agricultural and agricultural activities, respectively. Wages of agricultural

1Data from other regions also confirm this assertion. For example, from a survey of 5000 households by the National Council of Applied Economic Research in India, it was observed that almost all cultivator households participate actively in the labour market as either buyers or sellers of labour services, with almost 88 per cent of households cultivating a gross-cropped area less than 1.5 acres utilising some hired labour. 79% of these small farm households also had some family members who participated in the labour market with 55% reporting households members earning agricultural wages and working an average of 100 days in the market. Moreover, while almost 96% of the largest farms (30+ acres) hired labour, 85% also utilized family workers.
and non-agricultural workers have thus converged over the past twenty years in a downward movement as agricultural wage rates declined less than non-agricultural wage rates.

The narrowing of the wage gap between the two sectors can be attributed, as noted in the previous section, to the changing employment structure of rural and urban populations, and to an increasing integration of the agricultural and non-agricultural labour markets. It is significant to note that the evolution of real wages seem to be strongly affected by overall economic performance and the rate of inflation. That is, as the agricultural sector grows and the economy as a whole expands, agricultural wage rates rise either as a result of increase in demand for agricultural labour, or a fall in supply of agricultural labour as workers move into non-agricultural pursuits. However, the magnitude of the decline in real wages seem to be related to inflation rate. In years where the inflation rate was high, real agricultural rate declined.

Having examined the wage gap between the agricultural and non-agricultural sectors, an attempt will now be made to identify factors that influence wages in the agricultural sector. The next section therefore develops a hypothesis about how real agricultural wage rates can be quantitatively determined.

4.3 The Theoretical Framework of the Model

In investigating factors that influence the development of real agricultural wage rates, it has to be borne in mind that the wage rate of agricultural labour in the factor market is similar to the price of a good in the product market. Since the price of a good is determined by the forces of supply and demand, the wage rate will also be determined by the forces of supply and demand in a competitive labour market. Hence, any attempt to capture the factors that influence agricultural wage rates should proceed within the framework of an analysis that reflects factors affecting the supply of and demand for agricultural labour. The analysis here is based on a two-sector model, drawing insights from the expected income hypothesis model (Harris and Todaro [1970]) and the work of Garcia (1991), to formulate
the main determinants of the supply of and demand for agricultural labour. First an outline of the model and its two sectors is presented. Second, the factors that influence the supply of and demand for labour in the agricultural sector are determined. Third, an estimating equation for the real agricultural wage rate is formulated, based on the factors that appear to determine supply of and demand for agricultural labour.

4.3.1 The Rural Sector

As a starting focus, a rural household that has to allocate labour for the production of agricultural goods ($A$), non-agricultural goods ($G$), and leisure ($L$) is considered. It is also assumed that the rural sector can produce two goods ($A$) and ($G$), and can sell whatever amount of $A$ it wishes to obtain a manufactured good ($M$), from an urban sector. It is implicitly assumed here that there are two sectors in the analysis — that is a rural — and an urban sector. The production possibility curve of such a sector can be represented by:

$$A = A(G)$$

(4.1)

An exchange equation with the urban sector can be represented by:

$$M = P \cdot (A - \bar{A})$$

(4.2)

where $P$ represents the given rate of exchange between $A$ and $M$, and $\bar{A}$ is the amount of food consumed by the rural sector.

If it is assumed for the moment that the rural sector produces only agricultural goods, we shall have a short run production function such as:

$$X_a = y(N_a; L; K_a) \quad y' > 0, \quad y'' < 0$$

(4.3)

where $X_a$ is output of the agricultural good, $N_a$ is the rural labour supply used to produce this output, $\bar{L}$ is the fixed availability of land, $\bar{K}$ is the fixed capital stock, $y'$ is the derivative of $y$ with respect to $N_a$, its only variable factor. The function says simply that in the short run the level of real output $X_a$ depends on labour input $N_a$ only. The derivatives say that output increases at an increasing rate with each first addition of labour. But after some level of employment, output begins to increase at a decreasing rate — showing diminishing marginal returns — as the capital stock is spread over more and more workers. A point may be eventually reached where no addition to output would come from added labour or even where output would be diminished by adding labour. In this case, the marginal productivity of labour is said to be zero. This point is taken up in detail below.

4.3.2 Basic Assumptions

The neoclassical economic theory of production, where a positive marginal product is assumed for the traditional agricultural sector is considered as a point of departure. This

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2 These latter group of activities include processing of food and fuels, spinning, weaving of textiles, metal working, dressing and implements, pottery and ceremonial objects, as well as in housebuilding, fence repairing, and services such as recreation, protection, transport and distribution.

3 See also Hymer and Resnick [1969] for an interesting model with many features similar to this model.

4 The case of the non-agricultural sector shall be taken on later.
4.3. THE THEORETICAL FRAMEWORK OF THE MODEL

assumption will be justified in the later part of this chapter. It is assumed for the purposes of the analysis that in a rural agrarian economy, agricultural wages and employment will be determined by the forces of supply and demand in a competitive market. Although the assumption is made for analytical convenience, conditions on the rural labour markets in developing countries rather justify this assumption. This is because market forces exert a harsher influence and play a greater role in a poor agrarian economy than in a developed country, as minimum-wage legislation is much less effective, and if at all implemented, unionization of the rural labour force is rare, and the state does not pay any unemployment benefits (see Bardhan, 1979).

As an example, the Labour Force Survey of 1978 in Kenya revealed a modal earnings of agricultural labourers in the range of 100-200 shillings per month, while the urban minimum wage was 390 shillings (Collier, 1989). The Labour Force Survey of 1991 in Ghana reported that while the minimum wage per day was 218 cedis, farm labourers earned between 300-500 cedis per day during the peak season due to labour scarcity. Specifically, children farm labour was paid 300 cedis, while adults earned 500 cedis (Ministry of Agriculture, Tamale, 1992). Interesting is the fact that adults throughout the Northern and Upper Regions — irrespective of location — were paid 500 cedis per day during the peak season. In addition, farmers are not able to influence the prices of their products. The farm labour force is relatively homogenous with most operations performed by illiterate and unskilled labour, with labour demand influenced by the productivity of labour. Wages are under these conditions, flexible enough to clear the labour markets in the rural areas.

However, it is not the most idealised version of perfect competition (i.e., a dimensionless world where distances are nonexistent), where one and only one price prevails in each output and input market (see Junakar, 1989) that is being referred to here. As Sevilla-Siero (1991) rightly notes, as soon as spatial considerations are brought into the analysis (and agriculture in most developing countries is par excellence a geographically dispersed activity) it becomes obvious that locational differences in the farm gate prices that farmers receive for the goods they sell and for the inputs they use are not only a possibility but a necessity as they present competitively determined market premiums or discounts reflecting differences in transportation costs to or from the main market(s), and middlemen’s margins. Thus, depending on their location, different farms will confront different constellations of output and input prices.

Since the concept of zero marginal productivity of labour in agriculture is quite essential for the theoretical basis of this model, and also has strong and important implications on the results, the theoretical underpinings of this relationship is discussed before proceeding with the model. A detailed discussion of this theory is further justified in view of the economic debate surrounding it. The relationship between total product and labour, given the technique and the supply of other production factors is illustrated in the diagram in Figure 4.2.

The total product is shown on the vertical axis while the labour supply is depicted on the horizontal axis. Average product per head is reflected in the slope of the vector from the origin to any point on the curve. The marginal product is reflected in the slope of the curve itself at any given point. The maximum of the average product is represented by point X on the curve, after which it declines as the labour supply increases. The marginal product becomes zero at point Y. If production increases beyond L2, the marginal product becomes negative and average product continues to decline. That is, at point Z with labour supply L3, the marginal product of labour is negative.
Lewis' Hypothesis

Writing on economic development with unlimited supplies of labour, Arthur Lewis (1954) postulated that, given a closed economy, an unlimited supply of labour may be said to exist in those countries where population is so large relatively to capital and natural resources, that there are large sectors of the economy where the marginal productivity of labour is negligible, zero, or even negative. A number of writers had earlier on drawn attention to the existence of such "disguised" unemployment in the agricultural sector, demonstrating in each case that the family holding was so small that if some members of the family obtained other employment the remaining members could cultivate the holding just as well (of course, they would have to work harder: the argument includes the proposition that they would be willing to work harder in these circumstances).

Lewis, of course, did not limit this phenomenon to the countryside. He added that another large sector it applied to was the whole range of casual jobs — the workers on the docks, the young men who rush forward asking to carry one's bag as one appears, the jobbing gardener, etc. According to Lewis, these occupations usually have a multiple of the number they need, each of them earning very small sums from occasional employment, and that frequently their number could be halved without reducing output in this sector. Models which have been built with this assumption of zero or negative marginal productivity of labour in the traditional sector have been occasionally termed the "Lewis-type models" in the economic literature (see Lewis, 1954 and 1958; Ranis and Fei, 1961; Reynolds, 1965 for reviews). Thus, these models assume that labour can be taken away from this sector without affecting production, implying the existence of "disguised unemployment" in the traditional sector. The strict definition of disguised unemployment, however, is that the marginal productivity of labour, over a wide range, is zero; that is, labour can be withdrawn without any loss of output, even if no change in production techniques or in use of other productive resources occurs (Meier, 1989).

Lewis also argues that the price of labour in these economies is a wage at the subsistence level. The supply of labour would therefore be "unlimited" so long as the supply of labour at this price exceeds the demand. In such a situation, new industries could be created, or old industries expanded without limit at the existing wage. Shortage of labour would therefore be no limit to the creation of new sources of employment. Based on the assumption of zero or
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negligible marginal product of labour, Lewis proposes that workers in the traditional sector be paid wages (subsistence wages) below those in the capitalist sector (capitalist wages), to allow labour to be transferred from the former to the latter sector.\footnote{Lewis distinguishes between the subsistence sector and the capitalist sector by saying that the former is all that part of the economy which is not using reproducible capital, while the latter is that part of the economy which uses reproducible capital, and pays capitalists for the use thereof.}

Limitations of the Lewis Model

The existence of zero marginal productivity in agriculture has been disputed by several writers (see Schultz, [1964]; Paglin, [1965]; Hansen, [1965]; and Godfrey, [1969] for reviews). For example, Schultz argues that through generations of experimentation, traditional agriculture gets organised in a way which makes optimum use of whatever labour supply is available, and which leaves each member of the labour force with a positive (though low) marginal product. If labour is withdrawn from agriculture with no change in techniques, output will fall.

Although Lewis refers to the zero marginal productivity of labour as a limiting case, he actually means the marginal product of man and not the marginal product of a manhour (Meier, 1989). He states:

For example, in many countries the market stalls (or the handicraft industries) are crowded with people who are not as fully occupied as they would wish to be. If ten per cent of these people were removed, the amount traded would be the same, since those who remained would do more trade. This is the sense in which the marginal product of men in industry is zero. It is a significant sense, and its significance is not diminished by pointing out that the fact that others have to do more work to keep the total product constant proves that the marginal product of manhours is positive.

Since the shift of labour from the rural area will lead to some reorganization of the techniques of production in that area (this may involve organisation costs), which may be considerable, the concept of zero marginal productivity, becomes difficult to apply. "The contrast between a movement along the productivity curve and a shift of the curve as a result of a change of the supply of other factors of production (e.g., "organization") is relevant in this connection" (Meier, 1989, p.118).

It is significant to note that Lewis admits that his assumption of zero marginal product of labour in the agricultural sector has no universal validity. He states: "We are not arguing, let it be repeated, that this assumption should be made for all areas of the world. It is not true of the United Kingdom, or of North West Europe. It is not true either of some of the developing countries usually lumped together as underdeveloped; for example there is an acute shortage of male labour in some parts of Africa and of Latin America. On the other hand, it is obviously the relevant assumption for the economies of Egypt, of India, or of Jamaica". Ranis and Fei also mention India and Pakistan as typical of the dualistic economy to which their model applies.

Empirical evidence available has tended to cast doubt on the labour surplus argument, particularly in those parts of Africa and Latin America to which Lewis explicitly recognizes that his theory does not apply (see, for example, McLoughlin, 1962). Analysing farm data from India, Paglin (1965) also found not only a positive marginal product of labour, but also lend support to the hypothesis that the rationalization and improvement of agricultural
techniques, generated by development efforts, will exert a strong upward pull on the demand for agricultural labour. Kao et al. (1964) also present results from their analysis to cast doubts on the existence of negative marginal product of labour in South-East Asia. Hansen (1966) also observed that the marginal productivity theory gives a better explanation of movements in wages in Egyptian agriculture, and further concludes that Egypt, has most probably, never been overpopulated in the sense that the marginal product of labour in agriculture is zero. These findings tended to cast doubt on Lewis' assumption for the countries Lewis claimed his assumption was relevant to.

The dramatic decline in agricultural output in several African countries, particularly Ghana and Nigeria in the late 1970s and early 1980s following massive rural-urban migration also seriously contradicts the zero marginal productivity of labour theory, and shows that for this region, one can hardly assume surplus labour in agriculture.6

4.3.3 The Urban Sector

The urban manufacturing sector also has a short run production function:

\[ X_m = f(N_m; K_m) \]

where \( X_m \) is the output of the manufactured good, \( N_m \) is the total labour required to produce this output, \( K_m \) is the fixed capital stock and \( f' \) is the first derivative of \( f \) with respect to \( N_m \), its only variable factor. The same argument holds for the production function, as in the agricultural sector.

Having outlined the production functions for the two sectors, an attempt will now be made in the sections that follow to examine the factors that influence the demand for and supply of labour in the agricultural sector.

4.3.4 Productivity, Terms of Trade, Wage Rate and Demand for Labour

On the demand side, the real wage rate that agricultural producers are willing to pay will usually depend on the productivity of labour and the price of the product offered. The relationship between the real wage rate and the labour productivity is based on the efficiency wage hypothesis of which there are different explanations. Some of the models based on the efficiency wage hypothesis include shirking models, turnover models, adverse selection models, and gift exchange models. Among these various models, the shirking model is most relevant for the purposes of the present study, since it is mostly applied in cases where jobs do not require any skills. In addition, the shirking model requires that the job be boring and the effort of the worker be hardly controllable. In this case, an individual with a wage that is low relative to the mean wage will not put in much effort.

The rationale behind this hypothesis is based on a production function such as

6In his widely debated inaugural lecture on the theory of productivity and growth in manufacturing industry, Kaldor (1966) relied on this surplus labour hypothesis to suggest that as the scope for transferring labour from diminishing returns activities dries up. Alternatively, as output comes to depend on employment in all sectors of the economy, the degree of overall productivity growth induced by manufacturing growth is likely to diminish, with the overall growth rate correspondingly reduced. In this sense, Kaldor believed that countries at an advanced stage of development, with little or no surplus labour in agriculture or non-manufacturing activities, suffer from a "labour shortage" and will experience a deceleration of growth.
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\[ y = f(e(w) \cdot L, K) \] (4.5)

where \( y \) is the output, \( e \) the effort level of each worker, \( L \) is the number of employees, \( w \) is the real wage, and \( K \) is the capital stock. Workers are assumed to be identical and effort is assumed to be an increasing function of the real wage (\( e' > 0 \)). The optimal wage in this case satisfies the condition that the elasticity of effort with respect to the wage is unity. This wage is called the efficiency wage since it minimizes labour costs per efficiency unit of labour. Each firm hires labour up to the point where its marginal product equals the efficiency wage. At this efficiency wage the supply of labour may exceed the demand, but there is no incentive to hire labourers at a lower wage. The implication is that if aggregate demand for labour falls short of aggregate supply at the efficiency wage, then equilibrium will entail involuntary unemployment. Shifts in aggregate demand therefore leave the real wage rigid and generate employment fluctuations.

As argued earlier, if the real price level of a commodity rises, producers react by increasing supply of the commodity. An increase in supply may require additional labour, which, in turn, could result in wage increases for the employees in this sector. Relating the price of a commodity and the productivity of the worker to the wage rate, it can be stated that the real wage rate is a function of the marginal product of labour. This can be written functionally as:

\[ W_a = P \cdot y' \] (4.6)

where \( W_a \) is the real agricultural wage rate, \( P \) is the price of their product, and \( y' \) is the marginal physical product of labour. That is, for competitive profit-maximizing producers, the price they will be willing to pay for labour — the wage rate — will be equal to the value of marginal physical product of labour. In this case, for given prices, competitive profit-maximizing producers will only be willing to pay more for labour, if its productivity increases.

Thus, for a particular level of productivity, the higher the relative price of agricultural output, the more workers agricultural producers are willing to hire, or, the greater the amount of time farmers are prepared to invest in the production of agricultural products. Similarly, for a given relative price of agricultural product, if labour productivity is high enough in agriculture, the more labour services producers are willing to purchase, and the higher the price they are willing to pay for them.7

Analogously, the manufacturing wage rate will be determined by:

\[ W_m = P \cdot f' \] (4.7)

where \( W_m \) is the manufacturing wage rate, \( P \) is the price of the manufactured good, and \( f' \) is the marginal product of labour in the manufacturing sector. Equations (4.6) and (4.7) indicate that if an addition to the labour force is such that \( W_a < P \cdot y' \), or \( W_m < P \cdot f' \), a profit-maximizing enterprise will hire the additional labour. On the other hand, if it is such that \( W_a > P \cdot y' \), or \( W_m > P \cdot f' \), the firm will not.8

7 Once prices of their products increase, farmers respond with output expansion measures such as acreage expansion, irrigation, multiple cropping, etc, which all lead to an increase in demand for labour.
8 The increase in cost, \( \Delta C \), to the firm hiring an additional increment of labour is simply the wage rate \( W_a \) times the change in employment (marginal cost), while the increase in revenue for a given price is given by \( \Delta R \), (marginal revenue) which is \( P \cdot y' \). That is, at equilibrium \( \Delta R = \Delta C \), (marginal revenue = marginal cost). On the other hand, the monopolist will usually maximize profit by hiring additional labour until the
The price variable can be determined as a relative value, instead of considering absolute prices. In the former case, the price of agricultural goods can be related to that of manufactured or non-agricultural goods. This relative price is referred to as the domestic terms of trade (i.e., $P_a/P_m$), and is a function of the relative outputs of agricultural and manufactured goods. This can be functionally expressed as:

$$P_a/P_m = P = \pi \left( \frac{X_m}{X_a} \right) \quad \pi' > 0$$  \hspace{1cm} (4.8)

This implies that as output in the manufacturing sector increases relative to the agricultural sector, the domestic terms of trade is expected to shift in favour of the agricultural sector.\(^9\) Various other market and institutional forces other than output also affect the domestic terms of trade. This topic will, however, be deferred and discussed in detail in a later section.

The relationship between changes in wage rates and changes in labour productivity, with the price levels remaining unchanged can be well illustrated with a Cobb-Douglas production function. Consider the function,

$$y = aK^\beta N^{1-\beta}.$$  \hspace{1cm} (4.9)

The marginal product of labour (MPL) is defined as:

$$\frac{\partial y}{\partial N} = 1 - \beta \frac{aK^\beta N^{1-\beta}}{N}.$$  \hspace{1cm} (4.10)

Substituting $y$ for $aK^\beta N^{1-\beta}$, and recalling from equation (4.6) that $W = P \cdot y'$, where $y'$ is the $MPL$, equation (4.6) can be written as $W = P \cdot (1 - \beta)y'$, in which case $P$ can be expressed as

$$P = \frac{W}{(1 - \beta)y'}$$  \hspace{1cm} (4.11)

in terms of logarithms, equation (4.11) can be expressed as

$$\ln P = \ln W - \ln y' - \ln(1 - \beta)$$  \hspace{1cm} (4.12)

Since total differentiation of logs gives percentage changes, equation (4.12) can be differentiated to obtain

$$\hat{P} = \hat{W} - \hat{y}'$$  \hspace{1cm} (4.13)

where $\hat{P}$, $\hat{W}$, and $\hat{y}'$ represent percentage changes in prices, wages and labour productivity, respectively (see Branson, 1989). The implication of equation (4.13) is that an increase in marginal revenue is reduced to the level of marginal cost, or $W_a = P(1 + 1/e)y'$. That is the competitive firm's function of equation (4.6) adjusted by a factor $1 + (1/e)$. (see Branson, 1989).\(^9\) Harris and Todaro state that a sufficient, but not necessary, condition for such an assumption is that all individuals in the economy have the same homothetic preference map. It would be recalled that the only mathematical property that holds of homothetic functions is that the ratios of derivatives depend only on the ratios of quantities. That is, if a person's income rises and the relative price of goods does not change, then the fraction of his income that he spends on each good does not change. In other words, the relative amounts of two goods consumed depends on the relative price but not on income.
the money wage rate and productivity of the same percentage amount leaves the equilibrium price level unchanged.

Higher wages for capturing productivity increases in the rural labour market shows up particularly in labour-tying contracts. Although for crop production, there are certain seasons where demand for agricultural labour is very low, employers still go into long-term labour-tying arrangements with the so-called permanent labourers, as an incentive to capture the productivity effects of higher annual wages. They also offer him in exchange a dependable supply of labour in the tight season (e.g. weeding and harvesting). Such contracts also help the employer save on recruitment cost in the tight season (i.e. cost of ensuring quick and ready availability of labour during peak operations).

Binswanger and Rosenzweig (1984), argue that share-cropping as commonly practised in Asia, "is an instance of a contract blending transactions in the labour, land credit and insurance markets, which is both economically rational in circumstances of risk or uncertainty and efficient in the sense that output per acre is not lower than on owner-operated farms". In their survey of Palanpur, Bliss and Stern (1982) found that one-quarter of all farm land was cultivated under contracts of share tenancy. On these farms, productivity was as high on tenanted land as on owned land, and the relationship between farm size and productivity per hectare was neutral.¹⁰

Although employees are homogenous, differences in wages usually exists between men and women, since for certain agricultural operations (e.g. ploughing and land preparation), a wage premium for muscle power is offered, while for other activities such as transplanting and threshing, women are quite often preferred, but at lower wages (see Bardharn, 1979).

For example, discussions between the author and selected farmers in the Northern part of Ghana revealed that during the 1991/92 farming season agricultural employers in the Northern and Upper East Regions paid 300 Cedis and 500 Cedis per day to children and adults, respectively, to reflect differences in productivity of the two groups. In the Savelugu district, while tractor operators were paid over 1000 Cedis a day, co-driver received about 600 Cedis a day, again reflecting productivity differences. Hansen (1966) also asserts from his study of productivity in Egyptian agriculture that the marginal productivity theory gives a better explanation of movements in wages since 1914, and of seasonal agricultural wage differentials; differentials between men, women, and children's wages; and geographical wage differentials in the 1950s and 1960s.

The foregoing arguments suggest a positive relationship between labour productivity and wage rates in agriculture. That is, *ceteris paribus* as the productivity of labour in agriculture increases, the wage rate is expected to rise, and vice versa. Quite significant, however, is the fact that the capital stock and the state of technology in agriculture determines the marginal physical product of labour in that sector (Garcia, 1991).¹¹

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¹⁰The share or sharecropping contract is defined as the land rental arrangement by which rent is paid from the share of output produced from the rented land. It is similar to the piece-rate labour employment contract in that the worker is rewarded in proportion to the output he produces. The unified treatment of land and labour contracts has been extensively dealt with in the economic literature as a principal-agent relationship or, briefly, as agency theory. The agency theory is therefore concerned with designing an optimum contract between a principal (e.g., owner of a resource) and an agent (user of the resource).

¹¹Using data for 1960 and 1978, Dollar (1991) demonstrated that South Korean labour productivity grew at a tremendous rate in the heavy industries as compared to the light industries, and this difference he attributed solely to capital deepening in the heavy industries as compared to the light industries.
4.3.5 Weather and the Demand for Labour

As rightly pointed out by Jaeger (1992), weather has an important impact on agricultural production in Africa. Farmers' decisions on the amount of hectares, as well as the type of crops to cultivate\(^{12}\) depends to some extent on the weather conditions. Besides influencing farmers' decisions at the beginning of the farming season, weather also greatly influences crop yields and as such quantities to be harvested. All these factors mentioned above tend to influence the amount of labour demanded by farmers or agricultural employers. Consequently, good weather conditions represented here as \(W\) would be expected to have positive impacts on farmers demand for agricultural labour. However, it needs to be noted that quantifying the impact of weather is problematic, since rainfall data is spotty and difficult to interpret correctly.

4.3.6 The Supply of Agricultural Labour

In this section, an examination of how individuals allocate the time at their disposal within a given period is undertaken. The analysis shall be based on short-term considerations, ignoring any long-term conditions that might affect current behaviour. The basic question to be answered is how a change in the current real wage rate per hour will affect an individual's choice of current working hours.

Assuming that the total time available to a rural worker in a day can be allocated to farm work, earning expected real income \(q^*\), or to other activities, termed leisure \(L\), with the constraints on their ability to achieve maximum satisfaction or utility \(U\), given by the number of hours in the day and the wage rate. The worker's utility function is then given by:

\[
U = U(q^*, L)
\]

and is to be maximized subject to the constraint that

\[
q^* = W_a* \cdot (T - L) \tag{4.15}
\]

where \(T\) is the total hours available to the worker, so that \(T - L = n\) gives the number of working hours.\(^{13}\) The income the worker expects to earn is represented by \(q^*\), while \(W_a*\) is the wage he expects to earn. It is assumed in this simple model that the worker is certain of employment, and as such the market wage is the expected wage. Now, consider a work-leisure decision diagram as drawn in figure (4.3). Each \(U\) curve represents all the combinations of \(q^*\) and \(T\) that give the same level of utility or satisfaction. The points on \(U_0\) represents a lower level of utility than those on \(U_1\). The worker-consumer wants to attain the highest indifference curve possible, but is constrained or limited by the straight line, which is determined by the number of hours available to the person and by the real wage faced. It is also assumed in the analysis that leisure is a normal good.\(^{14}\)

\(^{12}\)This is due to the fact that different rainfall patterns affect individual crops differently.

\(^{13}\)Since there are 24 hours in a day, it can in a simplified way be assumed that the number of working hours per day are 24 hours minus leisure per day. That is, \(n = 24 - L\).

\(^{14}\)A "normal good" is one that people want to buy more of (given its price) when their incomes rise. A person's indifference curves describe his own tastes. Each curve shows the various combinations of goods that the person could consume without being either happier or less happy. Higher indifference curves represent greater happiness.
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Assuming the worker has $T$ hours at his disposal, and decides to have no income, he would have $T$ hours of leisure. If the expected real wage is $W^e_0$, and the worker decides to spend all his time working without leisure, an income of $W^e_0 \cdot T$ can be earned. Leisure can then be traded for income along the budget line that connects the two points. The worker will reach maximum utility at the point where the straight line is just tangent to an indifference curve, such as $g^o$, $L_0$. This is supposed to be the highest indifference curve, and thus the highest level of utility attainable (see Branson, 1989). At this optimum point, the individual equates the marginal benefit of work ($U^*_w$) to the marginal cost due to the leisure forgone ($U_L$).

Changes in the real wage will, however, bring about changes in the slope of the budget line. For example, raising the wage rate to $W^e_1$, results in a swing up of the budget line to $W^e_1 \cdot T$ and a new equilibrium at $q^*_1$, $S_1$. That is, increasing the expected real wage rate reduces the amount of leisure consumed by the individual, or conversely, increases the number of hours worked, $n = T - L$.

It needs to be mentioned at this point that in the above example, the analysis is restricted to the substitution effect ("it's worth working more now") of a wage change, while neglecting the income effect ("you don't need to work hard now"). The income effect means that with increased wages, a worker can better afford leisure and will be induced to consume more of it, implying less time in wage employment. The substitution effect, on the other hand, means that with higher wages the opportunity cost of leisure in terms of the goods and services that an additional hour's work can buy has increased, and he will thus tend to substitute other goods and services for it. It is assumed all along that leisure is a normal good.

In this case, the income and substitution effects operate in opposite directions; an increase in wages, be it in the undeveloped or developed country, may lead rational workers to work less or to work more. Which of the two opposing influences (substitution and income effects) outweighs the other depends on the income level of the worker.

This can be illustrated with Figure 4.4. That is, at low income levels, the substitution
effect outweighs the income effect: the person works more. As wages continue to rise and levels of income increases, there comes a time (e.g., \( W > W^2 \)) when the opposite is true and the supply curve is backward-bending (ref. Layard and Walters, 1987). For clarity, assuming an individual is allowed to have some unearned income \( Y \) as well as his wages. The expected income earned from working is \( q^i = wn \). Total available income or expenditure per day will then be say

\[
y = wn + Y
\]

The supply curve that is obtained from utility maximization can now be represented by

\[
n = n(w, Y); \quad \frac{\delta n}{\delta Y} < 0
\]

If the wage rate rises, the total effect on number of hours worked (\( n \)) can be derived from the Slutsky decomposition, written as

\[
\frac{\delta n}{\delta w} = \left( \frac{\delta n}{\delta w} \right)_u + n \frac{\delta n}{\delta Y}
\]

The first component on the right hand side of the equation carries a positive sign, while the second component carries a negative sign. The implication is that if \( w \) rises by a small unit, the worker's "income" rises by \( n \) and the income effect on his labour supply is a fall, since \( \frac{\delta n}{\delta Y} \) is negative (see also Layard and Walters, 1987).

Since a homogenous rural labour force is assumed, and it is further maintained that in view of the low incomes rural houseolds earn, they would substitute leisure for more work, if wages rise, the aggregate labour supply can be represented mathematically as \( N = N(W_d^*) \), or

\[
W_d^* = g(N^*); \quad g'(N) > 0
\]

where \( N^* \) refers to the total supply of labour. \( g'(N) > 0 \) indicates a positive relationship.
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between wage rate and supply of labour (i.e., as the wage rate rises, the supply of labour increases).

It is significant to mention that for adult females, the work-leisure time dichotomy is an over-simplification. This is because their allocation of time is a three-way choice between paid work in the labour market, leisure and household activity. Although men are increasingly being called upon to take on some household work as a result of the women’s liberation movement, the traditional division of labour in the family continues the assignment of the major responsibility in the household to women. Hence, women generally have lower participation rates than men in the labour markets. However, they are increasingly substituting market activity for household activity (see de Graft-Johnson et al., 1988 for the case of Ghana). Mincer (1988), for example, argues that this development is largely due to increase in real wage of market activity for women (see de Graft-Johnson et al., 1988).

4.3.7 The Wage Rate and Labour Demand

To examine the way labour demand changes as the wage rate changes, consider a simple one-input (labour), one-output profit maximization problem.

\[ \pi^*(p, w) = p_{w}f(x^*) - wx^* \quad (4.20) \]

where \( \pi^* \) is the maximum value of profits for given output price, \( p \) and labour costs, \( w \). The optimum labour demand is given by \( x^* \). To see how profits vary when \( w \) changes, the envelope theorem can be applied, once the function is differentiable. According to this theorem, the derivative of \( \pi(p, w) \) with respect to \( w \) is simply the partial derivative of the objective function, evaluated at the optimal choice:

\[ \frac{\delta \pi^*(p, w)}{\delta w} = -x(p, w) \quad (4.21) \]

this is simply the profit-maximizing demand for the factor. The relation says that if cost of labour (wages) increase, profits would start to decrease (the minus sign). However, a profit-maximizing firm would start to reduce its demand for labour as wages increase. The negative sign therefore indicates a negative relation between the wage rate and the demand for labour.

4.3.8 Migration and Labour Supply

A significant number of studies have shown that the rate of rural-urban migration influences the supply of agricultural labour (see Caldwell, 1968; Dautey, 1979; de Graft-Johnson, 1974; Kasanga and Avis 1988). The studies cited above have further revealed that migration in many developing countries is primarily due to economic reasons. Since the decision to migrate is greatly influenced by economic reasons, it will be expected that those who are most likely to migrate are people in the working age group.

In their recent survey of three districts in Ghana — Wa, Obuasi and Techiman districts — with a sample size of 540, Kasanga and Avis (1988) discovered that almost all those who migrated initially from their villages or towns first did so between the ages of 15 and 30 years (about 96% of the respondents), clearly demonstrating that the “source region” (place of origin) was effectively losing its prime and most effective labour force to other areas in the country, particularly the urban centres.
The increasing rural-urban migration in several developing countries — as noted in the previous chapter — has therefore been attributed to the widening urban-rural income disparities (see de Graft-Johnson, 1974; Kasanga and Avis, 1988 for the cases of Ghana). In the survey conducted by Kasanga and Avis (1988), it was revealed that over 85% of the respondents gave economic reasons for migrating from rural to urban areas. That is, they were motivated to migrate by the prospect of a higher minimum wage in urban areas than the prevailing wage levels in the rural sector.

Of course, other factors, besides the rural-urban wage differential influence the rate of rural-urban migration. Besides economic reasons, analysts often single out family-oriented, education and other secondary reasons such as land shortages, health and witchcraft as variables most likely to increase the rural-urban migration. In a nation-wide survey conducted by the Ghana Statistical Service, it came to light that as much as 64% of the rural-urban migrants moved to join their families. About 22% moved for economic reasons, while 6% migrated for educational purposes, with the rest of the 15% moving for other reasons besides those mentioned (Statistical Service, 1989). These results, however, need to be interpreted with caution, the survey covered the entire household. The household samples therefore included members who were at least 7 years old at the time of the survey. Such a procedure naturally would be biased towards obtaining greater percentages for family reasons, since parents who migrate for economic reasons normally move with their entire families, which in most cases are extended and large.

The Kasanga and Avis study mentioned above, however, takes these shortcomings into consideration and cover only migrants who are economically active. This also enabled them to capture other reasons besides economic, since migrants were requested to give reasons as to why they initially migrated. They come to the conclusion that other secondary reasons do not play any significant role in rural-urban migration. An empirical study by Barnum and Sarbot (1977) on Tanzania also lends support to the hypothesis that for some rural residents the move to a town is an income maximizing behaviour, even though the probability of finding a high-wage job is less than 1.

Since it is assumed in this framework that comparable labour is paid different wages in different sectors of the economy, it would be more appropriate to base the hypothesis on surveys that capture the migratory response of homogenous groups. Such a procedure permits the estimation of "cross-wage effects". That is, how wage rates of one group affect the migratory behaviour of the other. For the purposes of this study, the economic reasons responsible for rural-urban migration is therefore considered. The expected income hypothesis, initially proposed by Harris and Todaro (1970) is applied to capture this migratory response. In their two-sector analysis, Harris and Todaro (1970), postulated that individuals base their decision to migrate on considerations of income maximization. That is, the decision to migrate will be functionally related to:

a) urban-rural income differential, and

b) the probability of obtaining an urban job.

Taking $W_a$ to be agricultural wage rates, and $W_u$ to be urban wage rates, then at equilibrium, the agricultural wage rate should be equal to the expected urban wage rate, $W_u^*$. Thus,

$$W_a = W_u^*$$

(4.22)

The absence of figures on net migration and the unreliability of other statistics make it impossible to carry out an econometric study to subject the hypothesis to a satisfactory test.
Since the expected wage rate cannot be measured, an operational wage function has to be developed from equation (4.22) and to relate the $W_u^e$ term to measurable economic variables. That is, the theory as postulated, involves migration as a function of expected urban-rural wage differential. For the rural sector, the actual wage is taken as the expected wages, but for the urban sector, the expected wage includes a probability variable, which of course cannot be measured. The problem then is to link expected wages back to measured variables by making further assumptions. Harris and Todaro make the $W_u^e$ term operational by noting that potential migrants base their decisions on the prevailing wage and the unemployment rate. Thus,

$$W_u^e = \frac{W_m N_m}{N_u} \quad \text{where} \quad \frac{N_m}{N_u} \leq 1 \quad (4.23)$$

where $N_u$ is the total urban labour force, and as defined earlier, $N_m$ represents the labour force employed in the urban manufacturing sector. This implies that the expected real wage in the urban sector is equal to the real minimum wage, $W_m$, adjusted for the proportion of the total urban labour force actually employed, $N_m/N_u$. In this case, $(1 - N_m)/N_u$ will represent the proportion unemployed. This proportion will measure the probability of finding a job in the urban manufacturing sector. The inclusion of this probability factor allows that at any point in time there may be an excess of urban bound immigrants over urban sector employment opportunities. If a wage rate is established above the laissez-faire equilibrium level, urban jobs are “rationed” among competing applicants by a sort of queueing mechanism implying that potential migrants must weigh the costs of waiting in the queue for urban jobs against the benefits of eventually receiving a higher wage than that prevailing in the agricultural sector.

Only in the case of full employment in the urban sector is the expected wage equal to the minimum wage (i.e., $W_u^e = W_m$, since $N_m/N_u$ will be equal to 1).

The equilibrium equation (4.22) is derived from the hypothesis that, migration to the urban area is a positive function of the urban-rural expected wage differential. That is,

$$N_u = \Psi \left( \frac{W_m N_m}{N_u} - P \cdot y' \right), \quad \Psi' > 0, \quad \Psi(0) = 0 \quad (4.24)$$

where $N_u$ is a time derivative, $P \cdot y'$ refers to the real agricultural wage rate, while $(W_m \cdot N_m)/N_u$ is the expected real urban wage rate and $\Psi$ is a parameter. It needs to be noted that there may be genuine economic differences in the two sectors that can explain wage differentials. For example, differences in skills and in costs of living, higher wages in the modern sector that induce the head of a family to move with dependents to a permanent home near the new place of work, or willingness of large-scale firms in the modern sector to pay higher wages to obtain a regular labour force are factors that can account for urban-rural wage differentials. Beyond these genuine differences, however, there may be certain factors that arbitrarily widen the wage differential between the modern and the traditional sectors and distort the allocation of labour between the two. For instance, as will be elucidated below, an artificial widening can result from various government regulations on labour markets, such as minimum-wage rates, or from the action of trade unions in the modern sector. Before proceeding to show this, however, an earlier version of the expected income hypothesis which was published by Michael Todaro is briefly outlined.

$^{16}\Psi' > 0$ implies that as the wage differential $(W_u^e - W_a)$ increases, a rise in the rate of migration to the urban centre takes place. Following this, migration will only cease when the expected income differential is zero. This is based on the assumption of positive marginal product, and that the migrant gives up only his marginal product.
4.3.9 Present Values of Expected Earnings and Migration

In an earlier paper, Todaro (1969) postulated that the rate of rural-urban migration was a function of the difference between the present values of expected urban earnings and expected rural earnings, with the size of the flow of expected urban earnings significantly affected by the probability of obtaining employment in the urban modern sector. The basic behavioural equation of Todaro's model can be represented as:

$$V_{u-r}(0) = \int_{t=0}^{\infty} [P(t)Y_u(t) - Y_r(t)]e^{-rt}dt - C(0)$$  \hspace{1cm} (4.25)

where $V_{u-r}(0)$ is the discounted present value of the net gain from a rural-urban move. It represents the difference between $V_u(0)$ and $V_r(0)$; where $V_u(0)$ is the discounted present value of the expected urban real income stream over an unskilled worker's planning horizon, and $V_r(0)$ is the discounted present value of the expected rural real income stream over the same planning horizon. $P(t)$ represents the probability of securing a job in the modern urban sector in period $t$; $Y_u, Y_r$ represent average real income in the modern urban and rural sectors, respectively; $C(0)$ is the initial fixed cost of migration and relocation in the urban area; $r$ is the discount factor reflecting the degree of consumption time and preference of the typical rural unskilled worker. The economically rational potential migrant will decide to move, in cases where the value of $V_{u-r}(0)$ is positive. A probability of unity is used in calculating the expected rural income, since Todaro assumes that rural unemployment is non-existent because of the existence of traditional crop-sharing activities and the so-called "extended family" system. From Todaro's model, the value of $V_u(0)$ increases with increases in either $P(t)$ or $Y_u(t)$. That is, the expected urban real earnings vary directly with the probability of finding a job in the urban sector, and the net urban real income. For the present analysis, therefore, the Todaro model yields identical results as the expected income hypothesis model, since $Y_u(t)$ and $P(t)$ both have positive effects on the expected urban real income, as in the Harris-Todaro model.

4.3.10 Urban Unemployment and the Supply of Labour

It has often been argued that in several developing countries, the existence of an institutionally determined urban minimum wage at levels higher than the market clearing wage, often leads to an equilibrium with considerable unemployment (Todaro, [1969]; Harris and Todaro, [1970]). Considering the fact that urban unemployment reduces the expected urban real wage, it would be expected that high urban unemployment will result in a reduction of the rate of rural-urban migration. This, in turn could lead to an increase in the rural labour supply and consequently a downward pressure on agricultural wage rates. The linkage between urban unemployment and real agricultural wage rate is thus established. The foregoing discussion suggests that high urban unemployment rates will have negative impacts on real agricultural wage rates, while low urban unemployment rates will have positive effects on real agricultural wage rates (i.e., $W_a$ and $N_u$ are expected to be negatively related).

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17 In a critical paper, Cole and Sanders argued that rural-urban migration is a dual phenomenon, whereby some migrants who possess the requisite human capital are bound for the urban modern sector and some who are less well endowed are intent on employment in the urban subsistence sector. As such they propose a three-sector analysis, involving rural subsistence, urban modern, and urban subsistence sectors. They also state that their term "urban subsistence sector" is in large measure synonymous with the widely used term "urban informal sector."

18 Such administered wages are usually held above the social opportunity cost of new hires.
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On the other hand, the argument shows that the real urban wage rate \( W_u \) is expected to be positively related to real agricultural wage rate \( W_a \). This follows from the rationale that the real urban wage is directly proportional to the expected real urban wage.

4.3.11 Determinants of Demand and Supply of Labour

Following the assumptions and arguments made in this chapter, the demand for labour in agriculture, \( N^d \), can be expressed as

\[
N^d = N^d(W_a, P_a/P_{na}, C_a, W) \tag{4.26}
\]

where \( P_a/P_{na} \) is the agricultural terms of trade (i.e., price index of agricultural products relative to the price index of non-agricultural goods), \( W_a \) is the agricultural wage rate, \( W \) is the proxy for the effects of weather, and \( C_a \) is the capital stock in agriculture.

The supply of labour in agriculture, \( N^s \), is also given by

\[
N^s = N^s(W_a, R_P, U_{um}, W_u) \tag{4.27}
\]

where \( R_P \) refers to the size of the rural population, \( W_u \) is the urban wage rate, \( W_a \) the agricultural wage rate and \( U_{um} \) represents the urban unemployment rate.

Having assumed competitive conditions in the labour market, the equilibrium condition—the point at which the market clears—is expressed as

\[
f(N^d) = g(N^s) \tag{4.28}
\]

That is, in a competitive setting, the aggregate demand for labour \( N^d \) in the agricultural sector must be equal to the aggregate supply of labour \( N^s \).

To illustrate how the market clears in the case of an exogenous effect—such as a change in the real agricultural terms of trade—consider the agricultural sector with the single labour market depicted in Figure 4.5.

This labour market is initially in equilibrium at point X with real wage \( u_0 \) and employment \( N_0 \)—with demand equal to supply. If an exogenous effect such as a decline in product demand leads to a fall in product prices, the demand for labour will tend to move in the same direction. Thus, profit-maximizing firms will want to reduce wage rates or their labour demand. This generates the decline in labour demand and a shift of the demand curve to \( D^1 \) in Figure 4.5. The initial effect is excess labour supply at too-This is because at point Z, the real wage increases, since the price level falls. The supply of labour therefore remains the same, so that if the wage rate persists at \( w_0 \), only \( N_2 \) amount of labour would be demanded. This results in a reduction in the labour demand of \( N_0 - N_2 \).

If the real wage adjusts, then the model suggests a decline to \( w_1 \) along with a reduction in the quantity of labour to \( N_1 \) ensues. Thus, labour supply falls from \( N_0 \) to \( N_1 \) because of the decline in real wages. Labour demand instead of falling to \( N_2 \), falls to \( N_1 \), which requires a lower real wage than the former. A new equilibrium is thus re-established at point Y. On the other hand, if a change such as increase in product demand leads to an increase in product prices, and a corresponding expansion in output, demand for labour could shift the curve to \( D^2 \). This increase in demand results in a new equilibrium at \( E \), with the number employed increasing to \( N_3 \), and the wage rate rising to \( w_2 \).
There are some other factors that could also influence the demand for and supply of labour in the agricultural sector, but whose representation in the present model is impossible due to the lack of data on such factors. Firstly, as mentioned earlier, investment in the agricultural sector influences the demand for agricultural labour and as such the real agricultural wage rate. In view of the fact that the statistics available only provide figures for aggregate investments and not sectoral investments, a realistic variable for investment for the agricultural sector is impossible to obtain. The omission of such a variable is, however, not problematic, since investment is a response *inter alia* to the demand for the product, which is related to the price of the product, and the real wage rate\(^{19}\). Since the real agricultural terms of trade variable is incorporated in the model to capture the developments of incentives in the agricultural sector, the omission of investment does not affect the qualitative aspects of the results.

Secondly, it is significant to mention that the nature of transaction costs (transportation costs, market structure, banking services, information, legal services, etc.) as will be argued later, influences the demand for and supply of labour in the agricultural sector. For example, improvements of the road and transport systems could lead to lower product prices in distant markets; an increase in demand for the product; a subsequent increase in output; and a corresponding increase in demand for agricultural labour. Similarly, if transport costs are reduced as a result of improved efficiency in the transportation sector, this could have a dual impact on the supply of labour. First, reduced transport costs results in the reduced initial costs of migration, which then encourages rural-urban migration, and consequently lower the rural labour supply. Second, improved efficiency in the rural transport sector would enable rural labourers to participate in other rural labour markets from which they were initially removed as a result of lack of transport.

Beals and Menezes (1970), for example, demonstrated that reducing transport costs between the Southern and the Northern parts of Ghana would have accelerated the north-south migration in the late 1960s and early 1970s. They particularly stress how a fall in transport costs could lead to a greater increase in permanent migration than seasonal...

\(^{19}\)That is \(I = I(p, W/P, \ldots)\) where \(I\) is the rate of investment, \(D_p\) is the demand for the product, and \(W/P\) is the real wage rate
4.3. THEORETICAL FRAMEWORK OF THE MODEL

migration, which involve labourers from the north migrating to the south to work on cocoa farms during the slack seasons in the north.  

However, in a time-series analysis as being carried out in this study, the incorporation of transaction costs would make the estimation cumbersome, if not impossible. Proxies to capture the magnitude of transaction costs for the present analysis is also impossible. The possible impacts of transaction costs and other factors—not captured in the model—likely to influence agricultural labour demand and supply are assumed to be captured in the error term.

4.3.12 The Agricultural Wage Rate

From equation (4.28), the equilibrium condition in the agricultural labour market is given by

\[ N^*(W_a, R_P, U_{um}, W_u) = N^d(W_a, P_a/P_{na}, C_a, W) \]  

hence,

\[ N^*(W_a, R_P, U_{um}, W_u) - N^d(W_a, P_a/P_{na}, C_a, W) = 0 \]  

Solving for \( W_a \) from equation (4.31), relationship between agricultural wage rate and the remaining variables can be derived. This is given by

\[ W_a = \alpha_1 C_a + \alpha_2 W_u + \alpha_3 R_P + \alpha_4 U_{um} + \alpha_5 P_a/P_{na} + W + \varepsilon \]  

where \( C_a \) is the capital stock in agriculture, \( W_u \) is the real urban wage rate, \( R_P \) is the size of the rural population, \( U_{um} \) represents the urban unemployment rate, \( P_a/P_{na} \) represents the domestic terms of trade, \( W \) is a proxy for weather conditions, and \( \varepsilon \) is the error term.

From the assumptions and discussions, the relationship between real agricultural wages and its determinants, on a priori grounds, will be

\[ \frac{\partial W_a}{\partial C_a} > 0; \quad \frac{\partial W_a}{\partial W_u} > 0; \quad \frac{\partial W_a}{\partial P_a/P_{na}} > 0 \]  

whereas

\[ \frac{\partial W_a}{\partial R_P} < 0; \quad \frac{\partial W_a}{\partial U_{um}} < 0 \]  

20Cavallo and Mundlak [1982] also show in their in-depth study of agriculture and economic growth in Argentina, how labour migration can be estimated. They base their model on the inter-sectoral income differential hypothesis. In a very simple version, their model can be represented as

\[ \ln(m + c_0) = \beta_0 + \beta_1 \ln(\delta - c_1) + \beta_2 \beta_3 Z + U \]  

where \( \delta \) is a measure of intersectoral income differential; \( RL \) is the ratio of the labour force in the two sectors; \( RL = L_2/L_1 \), where \( L_j \) is the labour force of sector \( j \), and \( j = 1, 2 \); \( Z \) stands for other variables that might be included in the migration equation, and \( U \) is a random disturbance term. \( c_0 \) and \( c_1 \) are constants. While \( c_0 \) is introduced to accommodate the observations with negative migration (i.e., migration into agriculture), \( c_1 \) represents that value of \( \delta \) at which migration becomes zero.

21This is possible because \( \partial N^*/\partial W_a - \partial N^d/\partial W_a \neq 0 \); That is, the rate of changes in the demand for and supply of labour in response to changes in wages in the rural labour market cannot be equal (see Chiang, 1984).
That is, the expected signs for $\alpha_1$, $\alpha_2$, and $\alpha_5$ are positive, while those of $\alpha_3$ and $\alpha_4$ are negative. Depending on the proxy being used to capture the effects of weather conditions, $W$ could be positive or negative.

The dichotomous classification of the economy into rural and urban adopted in the model conforms very much to the distinction used in Ghanaian data sources. While capturing several key determinants of real agricultural wage rates, it is significant to note that, the wage rate used is a national aggregate that takes into consideration average wages of different agricultural workers (family/hired, male/female, as well as child/adult) involved in diverse agricultural activities. Of course, there is not one wage rate in a year but a whole vector of wage rates for different activities, and for different points of time in the agricultural season so that the aggregation that is made below does not capture these differences. However, for a macro-meso-micro analysis, which is the procedure adopted in this study, the use of macro-level data can hardly be avoided. The strength of the approach lies in its ability to capture the differential impacts of economy-wide policies on target groups.

In explaining the expected income hypothesis applied in the derivation of the real agricultural wage equation, it was explained that the urban unemployment rate affects the agricultural wage rate. On the other hand, it also came to light that the agricultural wage rate pertaining in the rural sector could affect the urban unemployment rate. This, however, depends on the gap between the agricultural and urban wage rates. Since the objective of the present study is to examine the impacts of policy environment on rural-urban linkages, an attempt will be made below to investigate the factors that influence the urban unemployment rate. The extent to which agricultural wage rates tend to influence urban unemployment rates can be captured in such an analysis.

4.4 Urban Unemployment

An examination of the way agricultural wage rates influence urban unemployment invariably calls for an analysis of the various factors that possibly influence the rate of urban unemployment. Since the present study aims at examining the impacts of economic policies on rural-urban linkages, an analysis that explores the reverse causation between agricultural wage rates and urban unemployment will help throw light on the indirect impacts of discrimination against the agricultural sector. First, a review of the explanations that have been suggested for the persistence of unemployment is presented. This is to provide an overview as to the causes of unemployment, generally. Although the empirical analysis here is limited to urban unemployment, it is on record that rural unemployment is not that serious in developing countries. This is partly due to the fact that the rural unemployed migrate to the urban centres. Second, an outline of unemployment in Ghana is presented, followed by the formulation of a theoretical model that shows the determinants of urban unemployment in Ghana.

4.4.1 Review of Current Approaches on Unemployment

Recent economic literature in labour economics has attempted to provide plausible macroeconomic reasons for the explanation of unemployment, which is seemingly involuntary. The solution that was offered by Keynes in the 1930s was that nominal wages were sticky (or at least downward-rigid). Consequently, the labour market fails to clear when aggregate demand is low, and declines in demand lead to increases in unemployment and reductions in output. A Philips curve was added by the Postwar Keynesians to modify this approach,
such that wages and prices adjusted gradually to unemployment (Katz, 1988).

The Keynesian approach which attempted to answer questions like why wages are sticky and, in particular why unemployed workers are unwilling or unable to bid down the wages of seemingly comparable employed workers to obtain jobs, has been increasingly scrutinized in the past two decades. Severely criticized has been the concepts of involuntary unemployment and the business cycle mechanism of slow wage and price adjustments to aggregate demand disturbances. This has led to several attempts by economists to provide alternative equilibrium explanations for cyclical fluctuations in the labour market, while many researchers have tried to provide firmer microfoundations for apparent non-market clearing in the labour market (see Katz, 1988).

In this section, a brief outline of some of the theoretical explanations for the unemployment fluctuations and persistence of unemployment is presented. Firstly, it has been widely established that the extent to which workers are organised into unions determine their ability to resist pressure from non-members to reduce the wages of employees. In other words, the more workers are organised into unions, the better they are in a position to ensure high wages for their members, and as such prevent employers from offering wages that would otherwise clear the market. Surveying 33 countries before the first world war, during the war, and after the war, Barro (1988) observed that the increasing degree of union organisation had been accompanied by increasing unemployment.

Secondly, Solow (1985) and Lindbeck and Snower (1986) distinguish between union members who are employed (insiders) and those who are unemployed (outsiders). These models are based on the two ideas that it is costly for firms to replace their incumbent employees (insiders) with unemployed workers (outsiders) and that insiders are able to influence the wage-setting process without taking into account the interests of the outsiders. Wages are viewed here as the result of a bargain between insiders and the employer. Incumbent employees possess a bargaining power because of the existence of turnover costs — direct costs of hiring, training, and firing, as well as the costs that arise when insiders are prepared to withhold effort and harass new entrants.

The third reason is based on the efficiency-wage theory, which was mentioned briefly earlier in this chapter. Efficiency-wage theories have the common feature that in equilibrium (at least some) firms may find it in their interest to pay wages above the market clearing level. The basic idea here is that worker's productivities (net of training and turnover costs) depend positively on the wage over some range (adverse selection). Consequently, firms may be reluctant to cut wages even in the face of excess supply of labour since wage reductions may lower productivity proportionately more than they reduce the wage bill. In this case, equilibrium can be consistent with persistent involuntary unemployment in some versions of these models (see Stiglitz [1986] and Katz [1988]).

Sectoral-shifts models have also been used by several macroeconomists to explain unemployment in some cases. This approach drops the view of the labour market as one large auction market and adopts a view of many spatially or informationally isolated markets. The underlying idea of such models is that periods of rapid technological change, shifts in product demand, or major changes in relative prices, such as from an oil price shock, require

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22 Important diseconomies of scale in the hiring and training of workers suggest that insiders are likely to have the greatest influence on wages when they act collectively through unions or when there is a legitimate threat of collective action. The implications of insider–outsider models for wage setting and employment are similar to those of standard models of wage determination under unions discussed above.

23 Lindbeck and Snower (1986) distinguish between the efficiency-wage theories and the insider-outsider approach by stating that the unemployment in the case of the former may be understood in terms of a conflict of interest between the firms and the unemployed workers. By contrast, the insider-outsider approach places some labour market power into the hands of the employees.
unusually large movements of labour across firms and possibly also across regions. If labour is slow to adjust to these shifts of labour demand, unemployment is likely to increase. In particular, changes in demand for the products and in input costs lead firms to be continually adjusting the size of their labour forces.

A further explanation for the inability of unemployed to bid down wages can be found in the minimum wage literature. Government minimum wage laws present in both developed and developing countries sometimes makes it difficult for employees to offer wages below a certain minimum. In such situations, even if the prevailing wage is above the supply-price of labour, wages cannot easily be reduced to clear the market.

While all the factors discussed above can influence the level and development of unemployment in developing countries, unemployment benefits is most unlikely to have any significance, since this hardly exists in this group of countries. In particular, unemployment benefits is virtually non-existent in Sub-Saharan African countries. An overview of unemployment in Ghana is presented in the next section.

4.4.2 Unemployment in Ghana

Unemployment has often been cited as one of the problems that plague the Ghanaian economy, particularly in the 1960s (see de Graft-Johnson et al., 1988 for a review). Due to the paucity of data on unemployment figures, a detailed analysis of the evolution of unemployment in Ghana is difficult to accomplish. Available information, however, indicate that the unemployment situation hardly changed between 1960 and 1970. The 1970 population census revealed that unemployment remained stagnant at its 1960 level of 6% for the entire country, although various estimates for the inter-censal years, which was a period of serious economic depression showed that the problem was quite pernicious and varied widely between 1961-69. Brown (1972), for example, estimated that the rate declined to a low 3% in 1962, after which it rose to 13.5% in 1967, and finally fell to 7.9% in 1969. In his analysis, Brown, however, found it difficult to explain the sharp drop in the unemployment rate from 6% in 1960 to 3% in 1961. The 1960 and 1970 census revealed differences in the rates for males and females. While the unemployment rate for men increased from 6.5% (1960) to 7.6% (1970), the rate for women declined from 5.2% to 3.9%.

Data on unemployment rates in urban and rural areas was also provided by the 1970 census, to give a picture of the differences in magnitude of the problem in the two areas. While the unemployment rate for the urban areas was 8.6%, that of the rural areas was 4.9%, suggesting that the unemployment problem was more severe in the urban than in rural areas. The explanation for the lower unemployment rates in the rural areas may be due to the fact that more people in the rural areas are under-employed rather than being openly unemployed. Of course, rural-urban migration is another contributory factor. The narrow definition of unemployment to include only people looking for jobs, and the timing of the census also accounted for the marked difference between the urban and rural rates.

The way the narrow definition of unemployment influences the unemployment rate is shown by Sabot (1977). He distinguishes between the open unemployed — generally identified with reference to some positive action which they themselves have taken during a period, such as going to a government employment office, waiting in a job queue at a factory gate, or writing to a potential employer — and the hidden unemployed. The latter group included people who expressed their intention to work, but had not been involved in active

24 Of course, transfers takes place between the employed and unemployed either through family ties, or friendly relations. The effects of such transfers cannot, however, be compared to state organised unemployment benefits scheme.
job search. Relaxing the job search criterion in his measurement of urban unemployment with survey data for Tanzania in 1971, the aggregate urban unemployment rate increased from 8% to 12%, supporting the widely held view that actual unemployment rates in most developing countries are higher than the figures often presented in statistical data.

It is interesting to note that the issue of disguised unemployment which was discussed earlier on, is not a unique phenomenon of the agricultural sector, but the general economies of developing countries as a whole (see, Berry and Sabot, 1984). Reports of the International Labour Office (ILO) employment missions to Columbia, Kenya, and Sri Lanka also confirm that for every unemployed worker there are three of four underemployed. Disguised unemployment is particularly severe in urban centres. Most people employed in the urban “informal” or “murky” sectors are own-account workers and employees of small-scale, labour-intensive enterprises. Available evidence suggests that such informal sector enterprises are often characterized by income-sharing behaviour associated with rural surplus labour. Berry and Sabot (1984) assert that wages in this sector are sometimes driven even below rural earnings by the overcrowding of workers whose eventual aim is to obtain a high wage job — rural-urban migrants.

Berry and Sabot rightly point out that the incompleteness and inaccuracy of labour force data, and the lack of conceptual clarity in the definitions of labour force categories have led to mistaken perceptions of trends in unemployment rates and overestimates of the magnitude of urban surplus labour. They argue that “in some instances, the gap between ‘modern sector’ wage employment and the urban labour force is treated as a measure of employed surplus labour. But recent research has indicated that small-scale-urban activities may be rather efficient and that the relatively low capital-to-labour ratios in informal sectors may reflect relative factor prices differing from those in the ‘formal sector,’ rather than the absorption of excess supplies of labour.”

An investigation of the factors that influence the rate of urban unemployment in Ghana is now carried out below. An empirical framework is developed for estimation and analysis.

### 4.4.3 Determinants of Urban Unemployment

In deriving equation (4.23), it was assumed that, if $N_u$ is the total urban labour force, and $N_m$ the labour force employed in the urban sector in a period $t$, then $N_m/N_u$ will represent the proportion of the urban labour force employed in the period $t$, and $1 - (N_m/N_u)$ will measure the proportion of urban unemployed, while $N_u - N_m$ will represent the size of the urban unemployed labour force in the same period.

The positive relationship between rural-urban migration and the urban-rural expected wage differential was established in section 4.3.8. It was shown that ceteris paribus, as agricultural wage rates decline relative to wage rates in the urban sector, an increase in the flow of migrants to the urban centres will be expected. In the absence of sufficient employment generating activities to absorb the migrants, pressure will be exerted on the urban labour market, resulting in a possible rise in the open urban unemployment rate. For instance, rapid rural population growth could exert a downward pressure on real agricultural wage rates. Recalling that $W_a$ varies inversely with changes in the supply of labour, migration to the urban centres might be the alternative. This, however, is under the assumption that the potential migrant will not prefer certain employment at a lower wage in the agricultural sector to uncertain employment in the manufacturing sector at a higher wage. It can therefore be deduced that the urban-rural expected wage differential will have direct impacts on

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25 This difference also represents the probability of modern sector employment for a worker in the urban sector, as noted in the previous section.
open urban unemployment.26

A simple two-sector model developed by Corden (1974) is adapted to illustrate the foregoing discussion (see Figure 4.6). The available supply of labour for the two sectors is shown on the horizontal axis. Urban employment is measured from the left hand origin, while the rural employment takes its origin the right. The wage rates and marginal products are measured on the vertical axis, with the marginal product curves of the urban and rural sectors represented by $MPL_u$ and $MPL_r$, respectively. Two crucial assumptions are made here. First, the other factors of production are fixed, and the only mobile factor is labour. Second, a single wage applies to the private, productive public and non-productive public components (see Gelb et al. (1989))27 of the modern sector.

At competitive equilibrium, a common wage would be established at point $Y$ on the

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26For instance, the high urban unemployment rates recorded towards the end of the 1960s in many developing countries, as a result of rapid urbanization, led to predictions of unemployment crises by some authors. The proportion of the populations of Asia, Africa, and Latin America living in cities had risen from less than 5% at the turn of the century to 15% in the 1950 and to 36% in 1975 (see Berry and Sabot, 1984). Because of migration, population growth was generally twice as high in urban as in rural areas.

27Distinction between productive and non-productive public investments is quite arbitrary. We shall refer in the case of Ghana to projects such as the Independence Arch, the Black Star Square and the State House as unproductive investments, since they only provided employment during the construction period and never brought any economic returns thereafter; while projects such as the Volta Dam at Akosombo and Tema Harbour shall be referred to as productive ventures since they did not only generate employment at the time of construction, but have created employment on a permanent basis and have also had beneficial forward linkages in promoting industries such as the Juapong Textiles, which in turn provided further employment opportunities. The Volta Dam has also increased significantly in recent years as a major foreign exchange earner for the country.
horizontal axis, where the wage rate in the urban sector, $W_u^0$ will be equal to the wage rate in the rural sector, $W_r^0$ (i.e., $W_u^0 = W_r^0$). The employment in the urban and rural sectors will then be $XY$ and $X'Y$, respectively. If an exogenous factor (e.g., government policy) raises wages in the urban sector to $W_u^1$, this could result in a contraction of employment in the sector to $XO$. Rural employment will then have to expand to $X'O$ to absorb the rest of the labour force, for the economy to come to full employment. Under such conditions, the wage rate in the agricultural sector will decline to $W_r^1$, resulting in a widening of the urban-rural wage gap to $W_u^1 - W_r^1$.

The competitive equilibrium condition mentioned above is actually realized by spreading the wage bill in the urban sector, $XW_u^0RO$ over the whole urban labour force. In this case, the expected urban wage rate, $W^e_u$ is the average of the minimum wage, $W_u^1$ received by the employed and the zero wage received by the unemployed. That is, as in equation $W^e_u = W_u \cdot (N_m/N_u)$, as in equation refunem. Only in the case of full employment in the urban sector ($N_m = N_u$) is the expected wage equal to the minimum wage (i.e., $W^e_u = W_u$).

The extent of urban unemployment can be traced by drawing a rectangular hyperbola through $R$ (in the space with origin $X$), such that it intersects $MPL\_u$ at $J$ (Corden, 1974). The point $J$ which is the intersection between $t_1 t_1$ and the $MPL\_u$ curve equates the agricultural wage rate $W_2$, with a corresponding agricultural employment of $X'M$. Employment in the modern urban sector remains at $XO$, while urban unemployment is $OM$. If urban wages fall to this point to equate wages in the agricultural sector, there will be no rural-urban migration. On the other hand, as long as an urban-rural wage gap persists, migrants would flow to the urban centres, and urban unemployment will result.

### Minimum Wage Policies

In discussing the impacts of rural-urban income disparities on urban unemployment above, it was mentioned that exogenous changes such as government policies could trigger off a rural-urban migration process. In this section, the possible impacts of minimum wage legislations are examined. The adverse effects of wage legislations which place the minimum wage above the market clearing wage — the supply price of labour — on aggregate employment has been widely documented (see, for example, Sabot, [1977]; Gelb et al., [1989]).

It was shown in section 4.3.7 that the demand for labour is a negative function of the wage rate. Minimum wage rates in many developing countries are often placed above the market clearing wage rate. Referring to Figure 4.6), if the minimum wage is placed above $W^e$, the demand for labour declines, leading to excess supply of labour, and positive unemployment. Assuming $W_u$ is the prevailing minimum wage in the country, then the unemployment rate, $U_{um}$, will vary positively with $W_u$ (see also Sabot, 1977).

Although many governments are aware of the negative impacts of fixing minimum wage rates above the market clearing rate, the rationale behind their behaviour takes its roots from providing political favours to pressure groups such as trade unions lobbying for higher wages for their members (see Olson, [1965]; Becker, [1983]; Colander, [1985] for reviews). For instance, the Ghana government which had come to an agreement with the International Monetary Fund and the World Bank not to increase wage rates above a given percentage, during its medium-term economic recovery programme (1984-86), had to give in to pressure from the workers' trade union demand for high wage increases.\(^{29}\)

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\(^{28}\)This is because the area under a rectangular hyperbola is constant.

\(^{29}\)Governments' response to lobbying from pressure groups in several countries has led many economists to view government policies not as an effort to maximize the social welfare function but as a provider of political favours to pressure groups or an organiser of political support for staying in power. This approach...
Growth of the Urban labour Force

As the urban labour force increases, the number of people looking for employment increases. Now, ceteris paribus, if the urban labour force grows at a rate faster than the number of new jobs in the urban centre, the urban unemployment rate is likely to increase. In other words, a high rate of growth of the urban labour force means that the growth of labour demand must be at least equally rapid to ensure that part of the labour force does not become unemployed. This stems from the fact that, unemployment—whether open or disguised, economy-wide or sector-specific—implies a static imbalance in the labour market: the supply of labour exceeds demand at the prevailing remuneration (Berry and Sabot, 1984). While it is implicitly assumed in the above expression that the whole urban labour force is allocated to the urban labour market, without any out-migration into the rural areas, it is important to note that it is possible that this reverse migration could occur, if employment opportunities in the rural areas are higher than in urban areas, and incomes are quite substantial to allow a decent living. A second point that is worth noting is the fact that a substantial proportion of the urban labour force could decide to be housewives. This would imply that labour demand—job vacancies—might not necessarily have to grow equally as the growth in the urban labour force to avoid positive unemployment.

Modern Sector Growth

The relationship between output, productivity and employment growth rates is also expressed in Kaldor’s second growth law (briefly mentioned earlier in this chapter). According to this law (also known as Verdoorn relation), there is a strong positive relation between the rate of growth of productivity in manufacturing industry \( p_m \) and the growth of manufacturing output \( g_m \). This implies that as productivity increases in the manufacturing sector, output in the sector expands. Taking a cross-section of twelve developed countries over the period 1952-54 to 1963-64, Kaldor found a strong correlation between \( p_m \) and \( g_m \). These results which are stated below, also showed a strong correlation between the rate of growth in manufacturing employment \( e_m \) and \( g_m \).

\[
P_m = 1.303 + 0.484 \, g_m \quad r^2 = 0.826 \quad (4.35)
\]

\[
e_m = 1.028 + 0.516 \, g_m \quad r^2 = 0.844 \quad (4.36)
\]

The two relationships which are identical, produce the single relationship

\[
g_m = p_m + e_m \quad (4.37)
\]

From equation (4.37), which can be reformulated as \( p_m = g_m - e_m \), it is obvious that the growth rate in productivity will be measured by the difference between the rate of increase in output and that in employment. This will imply that, for a given rate of output growth, the higher the increase in productivity the less the rate of employment growth. Considering this relationship per se might give the impression that policies that are geared towards rational explanation. Private interests seek economic rents through their influence over public policy, and governments respond in order to satisfy favoured political supporters. The creation of economic rents by governments represents a relatively easy way of acquiring political resources (Bates, 1983; Gelb et al., 1989).
employment creation must not necessarily be productivity enhancing. A closer look at Kaldor's equations (4.35) and (4.36), however, reveals that output growth is not independent of increases in labour productivity. It is possible that an increase in productivity in a sector could stimulate investment in that sector, leading to an increase in the number of jobs created, and a consequent reduction in the unemployment rate. In other words, the final effect of changes in labour productivity on the urban unemployment rate can be positive or negative. This effect depends on whether a particular technology is labour-saving or labour-intensive, and whether more rural-urban migration follows or not.

Lewis (1967) identifies three cases in which introducing a more productive technology that expands output may affect employment in that industry. First, if the labour cost per unit of output is not reduced. For example, if the innovation makes it possible to produce a new product, or if natural resources previously unexploited are used in production, or the wastage of raw materials is reduced. If such an innovation does not reduce the labour cost per unit, it will increase employment. Second, if the labour cost per unit of output is reduced, but the demand for the product is elastic enough to prevent employment from falling. The argument for an innovation here may then be not that it will increase employment, but that employment would fall even more, if the innovation were not introduced. Third, labour per unit of output falls, and the demand for the product is not sufficiently elastic to prevent employment from falling.

While the first two cases lead to increases in output without reducing employment, the third case presents a different situation. In the third case, consideration has to be given to both employment in the industry which uses a new machine and also the employment generated in making the machine. Net employment declines only if the decline in the machine-using industry exceeds the increase in the machine-making industry. If an increase in imports automatically ensures an equivalent increase in exports, investments will create employment whether machines are made at home or bought from abroad. On the other hand, if the equilibrating mechanism functions imperfectly, then the greater the dependence on foreign machines, the smaller will be the net employment created by investing in new technology (Lewis, 1967). From Okun’s law and Kaldor’s second law, a negative relationship would be expected between the rate of growth in unemployment and the growth of manufacturing output.

From the foregoing discussions, the relationship between urban unemployment and its determinants — economically active urban population, agricultural and government minimum wages, and modern sector real output growth can now be specified as

$$U_{um} = \beta_0 + \beta_1 O_m + \beta_2 W_a + \beta_3 W_m + \beta_4 U_p + \mu$$  (4.38)

where $U_{um}$ is the urban unemployment rate, $O_m$ represents output in the manufacturing sector, $U_p$ is the economically active urban population, $W_a$ and $W_m$ are the real agricultural and minimum wages rates, respectively. $\beta_1$, $\beta_2$, $\beta_3$ and $\beta_4$ are parameters, and $\mu$ is an error term. It will be expected on a priori grounds that $\beta_1$ and $\beta_2$, will be negative, while $\beta_3$ and $\beta_4$ will have positive signs.

4.4.4 Estimation Techniques

The estimation of equations (4.32) and (4.38), respectively representing the real agricultural wage rate and the urban unemployment rate is done by the method of co-integration and the error-correction model (ECM). First, a theoretical justification of the ECM and co-integration is presented. Empirical results from the ECM and co-integration application for
the models developed above are then given.

Co-integration and Error-Correction Model

In estimating the relationships shown in Equations (4.32) and (4.38), a few significant points need to be considered. First, the relationships can be viewed as long-term equilibriums. These long-term equilibriums could, however, be outweighed by short-term — due to expectational—perceptonal— and decision lags — dynamic processes. The incorporation of lagged structures into the model to make such relationships flexible enough has been proposed in the literature (see, for example, Stalder, 1990) as one way of capturing these dynamic processes. Second, it needs to be examined whether the time series in the equations are stationary or non-stationary. Since it is now apparent that regressions of one non-stationary variable on another will usually yield a high $R^2$ and $t$-ratios which are biased towards rejecting the null hypothesis of no relationship even when there is no relationship between the variables concerned (Granger and Newbold, 1974).

The Gauss-Markov theorem would not hold in this case, since a non-stationary series or a random walk does not have a finite variance. Hence ordinary least squares (OLS) would not yield consistence parameter estimators. That is, the conventional t-test will tend to indicate a relationship between the variables when none is present (Pindyck and Rubinfeld, 1991).

Originating from Granger (1981) with recent advancements by Engle and Granger (1987), co-integration techniques appear to offer a means of identifying and hence avoiding the spurious regressions so easily specified and accepted with non-stationary series. It also provides the tools for the application of dynamic error-correction (ECMs) that account explicitly for the dynamics of short-run adjustment toward long-run equilibrium. For a regression in levels of the data, if the variables in the equation are unit-root non-stationary, OLS coefficient estimates will be inefficient, significance levels will be inflated, and there will be a high probability of concluding that there is a significant relationship among the variables when in fact no relationship exists. The method usually used to ensure stationarity is differencing of the series. While the estimation in differences satisfies the conditions of the classical regression analysis, a major drawback of the procedure is that it results in a loss of valuable information and as such could represent a misspecification.

A well known estimation procedure used to analyse the short-term adjustments dynamics in differences, and at the same time ensuring that the long-term information in the data is not neglected is the co-integration and error-correction model (Engle and Granger, 1987). If economic series are co-integrated, the long-run trends of the series adjust in accordance with an equilibrium constraint and the short-run dynamics conform to the class of error-correction models. That is, dependent variables and regressors could move together in such a way that non-stationarity in the dependent variables is cancelled by non-stationarity in the independent variables if the variables are co-integrated.

Variables are co-integrated if there is a linear combination of their data series which is stationary even though the individual series are non-stationary. Consider the simple case of variables with single unit roots, $x_t$ and $y_t$, whose first differences are stationary. Linear combinations of the levels of $x_t$ and $y_t$ are usually also $I(1)$. However, if there exists some constant $A$ such that

$$z_t = (y_t - Ax_t)$$

(4.39)

$30$The Gauss-Markov Theorem states that given the assumptions of the OLS estimators, the estimators are the best (most efficient) linear unbiased estimators of the true parameters in the sense that they have the minimum variance of all linear unbiased estimators.
4.5. EMPIRICAL APPROACH

is \( I(0) \), then \( y_t \) and \( x_t \) are said to be co-integrated. In this case, \( A \) measures the long-run or equilibrium relationship between the two variables and \( z_t \) indicates the extent of any divergence from that relationship. If the relationship between the variables is positive, \( z_t \) being stationary, \( I(0) \), then they cannot drift apart. Although co-integration itself has nothing to say about directions of causation between variables, if \( y_t \) and \( x_t \) are co-integrated, then \( y_{t-1} \) and \( x_{t-1} \) will also be co-integrated (Granger, 1986), and there will be Granger causality in at least one direction between the two variables concerned (Granger, 1988).

If co-integrated, the short-run dynamic processes (secular components) through which the series adjust toward their long-run equilibria (cyclical components) are represented by constrained error-correction models. That is, while stochastic trends cause the variables to apparently wander aimlessly, the time series eventually follow one another if the variables are co-integrated. In this case, least square estimates are "super-consistent". A specification of the error-correction model involves the first differences of \( x_t \) and \( z_t \) as functions of the distributed lags of first differences of both variables as well as the once-lagged equilibrium error, referred to as the error-correction term. According to Engle and Granger, because the variables are co-integrated, the error-correcting term is \( I(0) \), matching the \( I(0) \) first differences. Consequently, the least squares standard errors of the error-correction model, using the OLS residuals of the co-integrating equation in place of the error-correcting term, will be consistent estimates of the true standard errors. It is evident from the preceding discussion that for two or more variables to be co-integrated, two conditions must be satisfied. First, the data series for each of the variables concerned must have similar basic statistical properties. Second, there should exists some linear combination of the integrated series which is stationary. The determination of the orders of integration is essential in both cases.

4.5 Empirical Approach

An important implication of the foregoing is that the time series properties of all variables need to be ascertained prior to estimation. Among seven tests for co-integration listed by Engle and Granger, three have emerged as the most popular choices. These include the co-integrating regression Durbin-Watson, Dicky-Fuller and the Augmented Dicky-Fuller tests. All these tests are used to test for unit roots in linear combinations such as that in equation (4.39) of the series involved. Before conducting any co-integration test, however, it is essential to establish the orders of integration of the variables. Preliminary testing of each series, using what are commonly called Dicky-Fuller tests, is the first step in this identification process. If unit-root non-stationarity is present in variables, the hypothesis that the variables are not co-integrated can then be tested.

A variable is said to be integrated of the order \( d \), usually represented in short as \( I(d) \), if by differencing it \( d \) times, it becomes stationary. In specifying regression analysis, it has to be ensured that the different variables are integrated to the same degree. Otherwise, the equation does not make sense (Engle and Granger, 1987). Suppose the level variables are integrated of the order one, that is, \( I(1) \); then if a special linear combination of the variables result in a \( I(0) \) process, with zero mean, then the variables are said to be co-integrated.

Data Sources

The real agricultural wage rate was obtained by deflating the nominal annual wage rate by the Rural Consumer Price Index, since this is a more realistic measure of the value of rural earnings than the National Consumer Price Index. Average wage rates in this sector
is derived in the *National Accounts* by estimating a weighted average of the wage rate for hired labour and the annual returns to farm labour. Real urban wage was represented by the wage in the manufacturing sector. This wage rate was obtained from the National Accounts and the *Ghana Quaterly Journal of Statistics*.

The source of unemployment data was the *Yearbook of Labour Statistics*. In the analysis, however, unemployment rates were used. These were derived by expressing the absolute unemployment figures as a percentage of the economically active population. Since only the total number of unemployed people are available in the statistical tables, an estimation of rural and urban employment figures was done by using the 1980 proportions of rural and urban unemployment rates were used to estimate the proportions of the unemployed in the two sectors.

Capital stock in agriculture was obtained by dividing the real value added in agriculture by the rural population. This is based on the notion that the higher the capital stock, the higher the labour productivity (see Garcia, 1991). Source of data for the agriculture value added was the *United Nations National Accounts*, while the data on the rural population was taken from the Production Yearbook of the *Food and Agricultural Organisation* (FAO). The agricultural terms of trade was derived by considering the ratio of the index prices of agricultural products to the index of manufactured products. Prices of agricultural and non-agricultural goods for the period 1966–88 were taken from Stryker (1990), while those for 1986–88 were taken from the Quarterly Digest of Statistics of the Statistical Services of Ghana.

The rural population was represented by the total rural population. The size of the economically active rural population could also be used. However, the disadvantage of this data is that it contains only persons above the age of fifteen. This certainly does not reflect the true rural agricultural labour force, since children also constitute a large proportion of the rural agricultural labour force.

Data on nominal minimum wage rates was obtained from the Statistical Services of Ghana, in Accra. The national consumer price index was used to deflate the wages to get real minimum wages. Data on real industrial output was taken from The World Bank’s *World Tables*. Unlike the data for the rural population, the economically active urban population was used in the analysis, since it is only persons within the age group of the economically active population that are likely to gain employment in the urban manufacturing sector. Rainfall data which is used to represent the effects of weather was obtained from the *Ghana Meteorological Services*.

For the econometric analysis, the variables were transformed into natural logarithms, and time indices introduced. As pointed out by Lloyd and Rayner (1993), while the application of the difference operator frequently removes a time-dependent mean, it has little effect on stabilising the variance of empirical time series. Although a time-dependent variance motivates the use of a power transformation in empirical work, the logarithmic transformation is generally adequate in practice. The type of transformation will, however, depend on the severity of the trend in the variance. Since most empirical time series are integrated of order one, i.e., require differencing once to remove time dependence in the mean, a useful result emerges when the difference and logarithmic transformations are combined. For example, if the series $X_t$ is integrated of order one, differencing the logarithm of $X_t$ will be equivalent to the rate of growth of the original series $X_t$, since $\Delta \log X_t = (X_t - X_{t-1})/X_{t-1}$, provided the ratio $(X_t/X_{t-1})$ is moderately small. This combination induces stationarity, and also provides a plausible economic interpretation.
4.5. EMPIRICAL APPROACH

Unit Root Tests

A first step is to investigate whether the variables are trend-stationary processes (TSP) or difference-stationary processes (DSP). As already stated, if the series are non-stationary, in particular, if they follow random walks, a regression of one against another can lead to spurious results. Detrending the variables before running the regression will not help, since the detrended series will still be non-stationary.

The Dickey-Fuller unit-root tests are applied to identify the order of integration of the time series, and to determine if they are DSP or TSP. The procedure involves the estimation of the following regression

$$\Delta X_t = \alpha + \beta t + (\rho - 1)X_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta X_{t-i} + \varepsilon_t$$  \hspace{1cm} (4.40)

where $X_t$ is the variable under consideration, $\Delta X_t = X_t - X_{t-1}$; $\Delta X_{t-i}$ is the first difference of the observation at time $t - i$; and $k$ is the number of lags that ensures that the error term, $\varepsilon_t$, is white noise. A regression can be run to test if $\rho = 1$. This testing of the null hypothesis of $\rho = 1$ is called the unit root tests, indicating that the variable $X$ is non-stationary. The statistic used, $\tau$, is the usual $t$ - statistic calculated under the null hypothesis. Once this test has been performed for each variable in the model, it can then be ascertained whether the model is appropriately specified as TSP or DSP. Such a distinction is critical to subsequent analysis of the relationship between different data series (Nelson and Plosser, 1982). While both exhibit behaviour in small samples that is virtually indistinguishable by casual inspection, they are generated in distinct ways. Essentially, a DSP is rendered stationary by differencing, whereas a TSP is rendered stationary by inclusion of a trend term.

If $\rho = 1$ and $\beta = 0$, then $X_t$ has a unit-root and is thus non-stationary in levels, but stationary in first differences; it is DSP. If $\rho < 1$ and $\beta \neq 0$, the $X_t$ is non-stationary in levels and stationary in deviations around trend; it is a TSP. Should $X_t$ be stationary itself, then $\rho < 1$ and $\beta = 0$.31

The detection of a unit-root implies the possibility of a second unit-root as equation (4.40), has $k$ characteristic roots. Application of the Dicky-Fuller unit-root test reported here (see Table 4.1) indicate that in all cases, the hypothesis of a unit-root cannot be rejected, even at the 10% significance level.

In each case there are 24 observations. Comparing the Figures in the Table to the critical value for sample size of 25 in the Dicky Fuller Table, it can be observed that the null hypothesis of unit root at the 5% level (critical value of $-3.60$) cannot be rejected for the individual series, with the exception of the weather variable. In each of the regressions, the null hypothesis that $\beta = 0$, could not be rejected, indicating that all the variables that are non-stationary and difference-stationary series.

To be certain of the order of integration of the variables, an examination of the autocorrelation and partial autocorrelation functions is carried out. First, the autocorrelation functions are reported, followed by the partial autocorrelation functions. This is essential because, as pointed out by Lloyd and Rayner (1993), unit-root test are fragile, and have a low power where the root is not unity but close to it. That is, the tests are unable to dis-

31Although combinations of $\rho = 1$ and $\beta \neq 0$ is also possible, Nelson and Plosser suggest that this type of deterministic behaviour may be reasonably ruled out in economics, since it is a behaviour rarely observed in empirical economics.
CHAPTER 4. AGRICULTURAL WAGES AND URBAN UNEMPLOYMENT

Table 4.1: Unit-Root Tests for the Levels

<table>
<thead>
<tr>
<th>Series</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural wages</td>
<td>-0.91</td>
</tr>
<tr>
<td>Manufacturing wages</td>
<td>-0.84</td>
</tr>
<tr>
<td>Agricultural terms of trade</td>
<td>-3.02</td>
</tr>
<tr>
<td>Agricultural Capital stock</td>
<td>-1.38</td>
</tr>
<tr>
<td>Rural population</td>
<td>-2.33</td>
</tr>
<tr>
<td>Urban unemployment</td>
<td>-0.98</td>
</tr>
<tr>
<td>Manufacturing Output</td>
<td>-2.62</td>
</tr>
<tr>
<td>Minimum wage</td>
<td>-2.34</td>
</tr>
<tr>
<td>Weather</td>
<td>-4.04</td>
</tr>
</tbody>
</table>

Notes: All variables are in natural logarithms for the 1965–88 period. The asymptotic critical values of \( \tau \) are \(-4.38\), \(-3.60\), and \(-3.24\) at the 1%, 5%, and 10% significance levels, respectively (Fuller, p. 373).

Source: Computed by the Author.

Table 4.2: Sample Autocorrelations of the Natural Logs of Annual Data.

<table>
<thead>
<tr>
<th>Series</th>
<th>Sample Autocorrelations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \rho_1 )</td>
</tr>
<tr>
<td>( W_a )</td>
<td>0.91</td>
</tr>
<tr>
<td>( C_a )</td>
<td>0.79</td>
</tr>
<tr>
<td>( W_u )</td>
<td>0.85</td>
</tr>
<tr>
<td>( P_a/P_{na} )</td>
<td>0.53</td>
</tr>
<tr>
<td>( U_{um} )</td>
<td>0.81</td>
</tr>
<tr>
<td>( RP )</td>
<td>0.84</td>
</tr>
<tr>
<td>( W )</td>
<td>0.23</td>
</tr>
<tr>
<td>( W_m )</td>
<td>0.85</td>
</tr>
<tr>
<td>( O_m )</td>
<td>0.69</td>
</tr>
<tr>
<td>( U_p )</td>
<td>0.89</td>
</tr>
</tbody>
</table>

Notes: \( \rho_i \) is the \( i \)th order autocorrelation coefficient. The large sample standard error under the null hypothesis of no autocorrelation is \( T^{-1/2} \) or roughly 0.41 for the series of the length considered here.

Source: Computed by the Author.

Quite evident from Table 4.2 is the fact that the autocorrelation coefficients of the level variables are so high and decay so slowly — with \( \rho \) values very close to one — that they can hardly be distinguished from random walks. Two notable exceptions of this characterisation
are the weather and terms of trade variables. The $p$ values for the weather begins with 0.23 which is far below the critical value of 0.41, indicating that the variable is stationary even on levels. The terms of trade variable also exhibits a more rapid decay as would be expected of a stationary series. It's values, however, begins with a $p$ value above the critical value, implying that its level variable is still non-stationary.

Since the level variables are non-stationary, any regression with these variables will lead to spurious correlation. It is, therefore, appropriate to revert to differences to solve this problem. It is interesting to note that the autocorrelation structures of all the variables display positive autocorrelation at lag one only which is characteristic of first-order moving average processes. This representation of the data is inconsistent with the TS model. The only TS process that gives rise to autocorrelation only at lag one is the case of serially random deviations about the trend (Nelson and Plosser, 1982).

To specify the maximum number of lags, both the values that would be suggested by the autocorrelations of first differences and by the partial autocorrelations of the deviations from trend have to be considered. The autocorrelation coefficients of the first differences are presented in Table 4.3. It is quite obvious from the Table that the coefficients are low, indicating stationary series. If the partial autocorrelation functions (see Table B.8 in Appendix B) are taken into consideration, it will be observed that all the variables practically decay after the first lag, suggesting a first-order autoregressive process AR(1). Referring to this Table, it can be observed that while the first lag values are all above the critical value for the sample —0.41— the values that follow all fall below the critical value. Accordingly, a first difference model can be applied to the underlying data.

Table 4.3: Sample Autocorrelations of First Differences Data

<table>
<thead>
<tr>
<th>Series</th>
<th>$\rho_1$</th>
<th>$\rho_2$</th>
<th>$\rho_3$</th>
<th>$\rho_4$</th>
<th>$\rho_5$</th>
<th>$\rho_6$</th>
<th>$\rho_7$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$W_a$</td>
<td>0.01</td>
<td>0.24</td>
<td>0.15</td>
<td>0.03</td>
<td>-0.00</td>
<td>-0.17</td>
<td>0.04</td>
</tr>
<tr>
<td>$C_a$</td>
<td>0.23</td>
<td>0.05</td>
<td>0.19</td>
<td>-0.05</td>
<td>-0.15</td>
<td>0.11</td>
<td>-0.22</td>
</tr>
<tr>
<td>$W_u$</td>
<td>-0.13</td>
<td>0.17</td>
<td>0.12</td>
<td>0.00</td>
<td>-0.09</td>
<td>-0.22</td>
<td>0.02</td>
</tr>
<tr>
<td>$P_a/P_{na}$</td>
<td>-0.13</td>
<td>0.11</td>
<td>0.16</td>
<td>-0.17</td>
<td>-0.04</td>
<td>-0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>$U_{um}$</td>
<td>-0.24</td>
<td>0.09</td>
<td>-0.09</td>
<td>0.06</td>
<td>-0.07</td>
<td>-0.01</td>
<td>-0.03</td>
</tr>
<tr>
<td>$RP$</td>
<td>0.00</td>
<td>0.20</td>
<td>0.19</td>
<td>0.03</td>
<td>0.02</td>
<td>0.00</td>
<td>-0.09</td>
</tr>
<tr>
<td>$W$</td>
<td>-0.01</td>
<td>-0.31</td>
<td>-0.13</td>
<td>-0.06</td>
<td>-0.06</td>
<td>-0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>$W_m$</td>
<td>0.00</td>
<td>0.27</td>
<td>-0.06</td>
<td>-0.18</td>
<td>-0.03</td>
<td>0.17</td>
<td>0.12</td>
</tr>
<tr>
<td>$O_m$</td>
<td>0.18</td>
<td>-0.14</td>
<td>-0.15</td>
<td>0.01</td>
<td>-0.33</td>
<td>-0.39</td>
<td>0.17</td>
</tr>
<tr>
<td>$U_p$</td>
<td>0.30</td>
<td>0.26</td>
<td>0.25</td>
<td>0.00</td>
<td>-0.22</td>
<td>-0.06</td>
<td>-0.12</td>
</tr>
</tbody>
</table>

Notes: First differences of the data are used. $\rho_i$ is the $i^{th}$ order autocorrelation coefficient. The large sample standard error under the null hypothesis of no autocorrelation is $T^{-1/2}$, or roughly 0.41 for the series of the length considered here.

Source: Computed by the Author.
Error-Correction Model

Since all the level variables — except the weather variable — as indicated by the Dicky-Fuller tests, as well as an examination of the autocorrelation and the partial autocorrelation functions of the levels and first differences indicate that all the series are generated by AR(1) processes, an error-correction model for the real agricultural wage rate can be specified as

$$
\Delta W_{at} = \alpha_1 \Delta C_{at} + \alpha_2 \Delta P_a/P_{nat} + \alpha_3 \Delta R_{Pt} + \alpha_4 \Delta U_{umt} + \alpha_5 \Delta W_{ut} - \lambda (W_{at-1} - \alpha_0 - \alpha_1 P_{at-1} - \alpha_2 P_a/P_{nat-1} - \alpha_3 R_{Pt-1} - \alpha_4 U_{umt-1} - \alpha_5 W_{ut-1}) + \varepsilon_t \tag{4.41}
$$

where $\Delta W_{at}$ is the rate of real wage growth, $\Delta P_a/P_{nat}$ is the rate of agricultural terms of trade growth, $\Delta W_{ut}$ is the rate of urban wage growth, $\Delta R_{Pt}$ is the rate of rural population growth, $\Delta U_{umt}$ is the rate of urban unemployment growth. The term inside the brackets in equation (4.41) provides the error-correction mechanism. If the real agricultural wage rate rises above the long-run equilibrium level at time $t - 1$, the term in the brackets becomes positive. However, $\lambda$ carries a negative sign, its effect at time $t$ is to reduce the growth rate of the observed wage towards its steady state path. This is the reason why equation (4.41) is referred to as an error-correction model (Denbaly and Vroomen, 1993). It is interesting to note that once the variables are stationary and co-integrated, the equations can be estimated with Ordinary Least Squares irrespective of any simultaneity problems (See Engle and Granger, [1987]).

Similarly, the specified error-correction model for urban unemployment rate is represented as

$$
\Delta U_{um} = \beta_1 \Delta O_m + \beta_2 \Delta W_a + \beta_3 \Delta W_m + \beta_4 \Delta U_p - \gamma (U_{umt-1} - \beta_0 - \beta_1 O_{mt-1} - \beta_2 W_{at-1} - \beta_3 W_{mt-1} - \beta_4 U_{pt-1}) + \mu_t \tag{4.42}
$$

The error-correction term is captured in this equation by $\gamma$. As in the case of equation (4.41), $\gamma$ ensures that the long-term equilibrium relationship in equation (4.42) is satisfied. Here again, the higher the value of $\gamma$, the greater deviations from the equilibrium influence changes in unemployment rates ($\Delta U_{um}$).

If it is established that the individual level variables both in the real agricultural wage rate (that is, the six variables $W_a, C_a, P_a/P_{nat}, R_{Pt}, U_{umt}$, and $W_{ut}$) and the urban unemployment rate (the five variables $U_{umt}, W_a, W_m, O_m$ and $U_p$) equations can be represented by $I(1)$ processes, and that the residuals in both equations are stationary, the short-term dynamics of the error-correction model can be estimated as shown in equations (4.41) and (4.42).

It has already been established above that all the variables under consideration (with the exception of the weather variable) are integrated of order one. That is, the individual variables can be represented as $I(1)$ processes. Hence, the test of whether the variables are co-integrated or not can now be undertaken. The co-integration test can be carried out by running an OLS regression called the co-integrating regression and then testing to see, whether the residuals from this regression are stationary. If the endogenous and exogenous variables are not co-integrated, any linear combination of them will be non-stationary, and
4.5. EMPIRICAL APPROACH

hence the residuals will be non-stationary. Specifically, the hypothesis is that the residuals are not stationary, i.e., the hypothesis of no co-integration.

The empirical results of the co-integration and error-correction models are now provided below. First the results from the real agricultural wage analysis is discussed, followed by that of the urban unemployment rate.

4.5.1 Empirical Results for the Real Agricultural Wage Rate

The Co-integrating Regression

The co-integrating regression for the real agricultural wage rate is as follows (t-values in parentheses):

\[
W_a = 89.82 + 0.66C_a + 0.21P_a/P_{na} - 0.01RP - 2.04U_{um} + 0.34W_u + Z_t
\]

\[
(5.47) \quad (6.09) \quad (3.17) \quad (6.91) \quad (5.96) \quad (3.08)
\]

\[
R^2 = 0.98 \quad DW = 1.25
\]

The Dicky-Fuller test mentioned above can be used to test whether the residuals, \(Z_t\), is stationary or not. If in the regression of \(\Delta Z_t = \sigma Z_{t-1} + \nu_t\), \(\sigma\) is found to be negative and statistically significant, then the null-hypothesis (\(Z_t\) is \(I(1)\), i.e., non-stationary) can be rejected, and the alternative hypothesis, (\(Z_t\) is \(I(0)\), stationary) can be accepted (Engle and Granger, 1987). Running such a regression gives

\[
\Delta Z_t = -1.10 Z_{t-1} + \rho_t
\]

\[
(-5.27)
\]

\[
R^2 = 0.56 \quad DW = 2.06
\]

The t-statistic (—5.27) given here is significant at the 10% level (critical level is —4.97) for the present analysis (see Table 2 in Engle and Yoo, [1987]; and Table 1 in Mackinnon, [1991]). The null-hypothesis (i.e., \(Z_t\) is not stationary) can therefore be rejected in favour of the alternative hypothesis. That is, \(W_{at}\), \(C_{at}\), \(P_a/P_{nat}\), \(RP_t\), \(U_{umt}\), and \(W_{ut}\) are co-integrated.

The Error-Correcting System

After establishing that the variables are co-integrated, the model was then estimated. The empirical results of the estimation of the error-correction model are presented in Table (4.4). Also presented in the Table are relevant statistics which include the coefficient of regression variables (\(\alpha\)), the coefficient of determination adjusted for degrees of freedom (\(R^2\)), the Durbin-Watson statistic and the t-statistics applied at various levels of significance.

It is important to note that this two-step procedure of Engle and Granger is applicable only if a unique cointegrating vector exists. The test, however, does not distinguish between the existence of one or more cointegrating vectors. Johansen and Juselius propose a maximum likelihood procedure to estimate the parameters and test for the number of co-integrating vectors (For details of this test, see Johansen and Juselius, 1990)
To establish that the joint distribution of the variables is an error-correction system, a series of models was estimated. As proposed by Engle and Granger, the simplest error-correction model was first estimated, followed by added lags of the endogenous and exogenous variables. Of all the lagged changes, none of the variables was found to be significant or nearly so. Thus, the final model which is reported in Table 4.4, has the error-correction term estimated from the co-integrating regression and changes in the real urban wage rate, labour productivity, rural population, agricultural terms of trade, urban unemployment rate, and the level variable of weather effects.\textsuperscript{33}

The primary area of concern in the results is the sign as well as the size of the estimated coefficients. Positive and significant coefficients for the variables $W_u$, $P_a$, and $P_a/P_{na}$ will support the positive effect of urban manufacturing wages, capital stock, and agricultural terms of trade on agricultural wages. On the other hand, negative and significant coefficients for $RP$ and $U_{um}$ will lend support to the contention that an increase in the size of the rural population results in a fall in the agricultural wage rate, while an improvement in the chance of obtaining a job in the urban sector (in decline in $U_{um}$) also leads to an improvement in the wage rate.

Generally, the equations performed satisfactorily with all the coefficients having the expected signs and are all significantly different from zero, although at different levels of significance. Only the weather variable was statistically insignificant and carried the wrong sign and was as such dropped from the regression. The model also passed a diagnostic test for serial correlation. The coefficient of determination, ($R^2$), was 0.85.

The positive and highly significant coefficient of the urban wage variable $W_u$, lends support to the hypothesis that wages in the urban modern sector influence those in the traditional agricultural sector. That is, an increase in the real wage rate in the urban sector relative to the rural sector, leads to an increase in the number of urban-bound rural migrants. This, in turn results in a decrease in the supply of labour to the rural farm sector, also resulting in an increase in real agricultural wage rate.

The estimated coefficient for the error-correction term, $\lambda$ indicates that deviations of the real agricultural wage rate from the long-term equilibrium value is partly corrected by about 57\% per annum. This implies that the tendency to move towards the equilibrium is fairly strong.

The coefficient of urban unemployment ($U_{um}$) is negative and highly significant at the 1\% level. The magnitude of the coefficient ($-0.31$) suggests that a 1\% increase in the urban unemployment rate leads to a 0.3\% reduction in the real agricultural wage rate. This demonstrates that the probability of obtaining a job in the urban centre does influence a prospective rural migrant's decision to move to the urban centre. While the proxy for the probability of finding a job in the urban centre is highly significant in the analysis, it needs to be noted that a rural resident may have some positive probability of obtaining an urban job without first migrating to the city and incurring opportunity and real costs in job search (Fields, 1976). Risk aversion, which is neglected in the expected income approach adopted here, may also play a role if migrants emphasize the probability of employment more heavily than the expected wage rate. Such factors, among many others, help in explaining why the large gap between urban and rural wages has not contributed to even greater urban unemployment.

Similarly, a prospective rural migrant might still decide to move to the urban centre, despite his awareness of high urban unemployment. This in a way also supports the assertion

\textsuperscript{33}Since the weather variable is already integrated to the order zero (i.e., $I(0)$) it needs not to be differenced again.
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Table 4.4: Estimated results for Real Agricultural Wage Rate

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficients</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\lambda$</td>
<td>$-0.573^b$</td>
<td>2.13</td>
</tr>
<tr>
<td>Capital stock</td>
<td>$0.264^c$</td>
<td>1.83</td>
</tr>
<tr>
<td>Real urban wage rate</td>
<td>$0.432^a$</td>
<td>3.78</td>
</tr>
<tr>
<td>Rural population</td>
<td>$-1.09^a$</td>
<td>2.83</td>
</tr>
<tr>
<td>Urban unemployment rate</td>
<td>$-0.312^a$</td>
<td>3.37</td>
</tr>
<tr>
<td>Agricultural terms of trade</td>
<td>$0.651^a$</td>
<td>5.72</td>
</tr>
</tbody>
</table>

$R^2 = 0.85$, $DW = 1.96$

*All variables are first differences of natural logs. Significance levels are (90%)$^c$, (95%)$^b$ and (99%)$^a$.

Notes: $\lambda$ which represents the error-correction term, is the residual ($Z_{t-1}$) from the co-integrating regression.

of Gugler (1968), who concluded after a considerable study of labour migration in Africa that rural-urban migration is an economic phenomenon that can be portrayed as a “game of lottery” in which rural migrants come to the city fully aware that their chances of finding a job are low. The vast difference in urban and rural wages, however, makes the successful location of an urban salaried job so attractive that migrants are prepared to take a chance. In a survey of unemployed Nigerian school-leavers, McQueen (1965) pointed out that “even when it is apparent that work is scarce, the appeal remains that in the city the chances for a lucky break are ever present, as they surely are not in the village and small towns.”

The agricultural terms of trade variable is positive and significantly different from zero at the 1% level. The positive sign indicates that an improvement in the terms of trade increases the real agricultural wage rate. That is, if the prices of agricultural products improve relatively to non-agricultural goods, the real agricultural wage rate rises. On the other hand, if the terms of trade for the agricultural sector declines, the real agricultural wage rate is most likely to deteriorate. The terms of trade coefficient of 0.65 indicates that a 1% change in the agricultural terms of trade will lead to a 0.65% change in the real agricultural wage rate.

The capital stock variable ($C_a$), also shows a positive and significant coefficient, suggesting that increases in the capital stock in agriculture, which tends to increase the productivity of labour, result in positive improvement in the real agricultural wage rate, while declining capital stock is accompanied by a reduction in the real wage rate. The coefficient of 0.26 suggests that a 1% change in capital stock will result in a 0.26% change in the real agricultural wage rate. This supports the earlier argument that growth in the capital stock that results in output expansion could lead to an increase in the demand for agricultural labour, and a consequent increase in agricultural wages. This result demonstrates how crucial invest-

---

$34$It needs to be noted that an augmentation of the capital stock that leads to increases in labour productivity could also result in the release of labour from agriculture to non-agricultural pursuits, as demand for non-farm goods rise and production in the sector expands. This release of labour from agriculture in this case, still lead to a rise in the wage rate of those employed in the agricultural sector.
ment in agriculture to improve farm labour productivity is, in increasing the earnings of farm workers. Besides investing directly in agriculture to raise the Labour productivity in the sector, productivity of rural dwellers can also be raised by the provision of good health services, good drinking water, educating the people through extension services and adult education, as well as by motivating them. All these require the improvement of the physical and economic infrastructure.

This positive and significant coefficient of the capital stock variable — which is positively related to labour productivity — suggests that there is no disguised unemployment in Ghanaian agriculture. That is, the marginal product of labour in agriculture is positive. It would be recalled that one of Ranis and Fei's (1961) crucial assumption in their surplus-labour model is that the institutional wage in agriculture does not rise significantly as agricultural productivity rises. This, however, was based on the existence of disguised unemployment in agriculture. They state that "as long as a disguised unemployed labour force in agriculture persists, it is doubtful that an upward pressure on the institutionally determined agricultural wage will be significant." Godfrey (1969) also argues that if workers migrated to the towns as soon as, or, faster than changes in agricultural productivity made them disguised unemployed, then the institutional wage in agriculture is be likely to rise with agricultural productivity. Since the capital stock variable coefficient is significant in the present model, it may be concluded that there is no disguised unemployment in the agricultural sector.

The coefficient for the size of the rural population variable has the expected positive sign, and is statistically significant at the 5% level. This lends support to the idea that as the rural population grows, the supply of agricultural labour rises, tending to exert a downward pressure on agricultural wages. The magnitude of the coefficient suggests that ceteris paribus, a 1% positive change in the size of the rural population results in a decrease of 1% in real agricultural wages (a more than proportionate change). Ironically, despite the increasing population, labour is one of the major problems of farmers in the country, in particular, during the peak seasons. Most farmers interviewed during the 1992-93 farming season, complained that it was very difficult to find labourers for their farms, particularly for weeding and harvesting activities. Evidence from officials of the Ministry of Agriculture in Tamale (Northern Region) and in Bolgatanga (Upper East Region) also point to the problem of labour scarcity and high labour costs during the peak seasons in the last three farming seasons. The migration of the youth to the cities has contributed significantly to the reduction of the agricultural labour force in these regions.

4.5.2 Empirical Results for the Urban Unemployment Rate

The Co-integrating Regression

The co-integrating regression for the urban unemployment rate is (t-values in parentheses):

\[
U_{um} = 3.07 - 0.83O_m - 0.77W_a + 0.28U_p + 0.66W_m + U_t
\]

\[
(4.54) \quad (3.38) \quad (4.53) \quad (3.15) \quad (3.81)
\]

\[
R^2 = 0.73 \quad DW = 1.06 \quad (4.45)
\]

As in the case of the equation for the real agricultural wage rate, co-integration can be tested here by using the residuals \(U_t\) to run a regression to see if they are stationary. Such a regression produced the following results:
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\[ \Delta U_t = -0.25 \, U_{t-1} + \varrho_t \]

\[ (-5.18) \quad (4.46) \]

The t-statistic of $-5.18$ is above the critical value ($-5.01$) at the 5% level, resulting in the rejection of the null-hypothesis of no co-integration. Once it is established that the variables are co-integrated, the model can be estimated with an error-correcting system.

**The Error-Correcting System**

Here again, a series of models was estimated to determine the fact that joint distribution of the variables is an error-correction system. The simplest error-correction model was estimated, followed by added lags of the endogenous and exogenous variables. Of all the lagged changes, none of the variables was found to be significant or nearly so. Thus, the final model which is reported in Table 4.5, has the error correction term estimated from the co-integrating regression and changes in the real agricultural wage rate, manufacturing labour productivity, economically active population, minimum wage rate, and the manufacturing output.

While the coefficients for the variables representing manufacturing productivity, minimum wage and urban economically active population carry the expected positive signs, the error-correction term, the manufacturing output and the real agricultural wage rate carry the expected negative signs.

With the exception of the coefficient of the the minimum wage rate, all the other coefficients of the included variables are significantly different from zero. Also presented in the Table are relevant diagnostic statistics which include the coefficient of regression variables ($\beta$), coefficient of the error-correction term ($\gamma$), the coefficient of determination adjusted for degrees of freedom ($R^2$), the Durbin-Watson statistic and the t statistic applied at the 1%, 5% and 10% levels of significance.

The value of the estimated error-correction term ($\gamma$) implies that deviations of the urban unemployment rate from the long-term equilibrium rate will be corrected by about 23% per annum. Although the coefficient is extremely low, it is supported by the statistical significance of the t-value.

The results show that the minimum wage has a positive, but statistically insignificant effect on the urban unemployment rate. While the positive sign is in line with the widely held view that policies that place minimum wages above that of the market clearing wage lead in the medium run to an increase in the urban unemployment rate, the statistical insignificance (even at the 10% level), as well as the size of the coefficient (0.166), shows that over the period under consideration, minimum wage rates did not have any impacts on the urban unemployment rate. This is not surprising in the case of Ghana where the daily minimum wage was far below the manufacturing wage rate throughout the period under consideration. For example, in 1970, while the monthly manufacturing wage rate was 76.35 cedis at constant 1971 prices, that of the government minimum wage was 25 cedis. Even in the 1980s, when the galloping inflation tremendously reduced the purchasing power of workers, the minimum wage rate still remained below the wages workers in the manufacturing sector earned.

The statistically insignificant coefficient for the minimum wage variable also supports the assertion of de Graft-Johnson et al., (1988). In a qualitative analysis, they argue that because a large proportion of wage employment is in the public sector (the sector employs an
Table 4.5: Estimated results for Urban Unemployment Rate†

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficients</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>γ</td>
<td>-0.230</td>
<td>2.28</td>
</tr>
<tr>
<td>Manufacturing output</td>
<td>-0.512</td>
<td>3.27</td>
</tr>
<tr>
<td>Real Agricultural wage rate</td>
<td>-0.343</td>
<td>2.42</td>
</tr>
<tr>
<td>Real Minimum wage rate</td>
<td>0.166</td>
<td>1.49</td>
</tr>
<tr>
<td>Urban population</td>
<td>0.517</td>
<td>2.87</td>
</tr>
</tbody>
</table>

$R^2 = 0.47$, $DW = 2.04$

†All variables are first differences of natural logs. Significance levels are (95%)* and (99%)**.

Notes: γ which represents the error-correction term, is the residual $(U_{t-1})$ from the co-integrating regression.

average of 83% per annum of the total recorded wage employment), where the Civil Service regulations make it extremely difficult to lay off employees even at the very low ranks, government minimum wage legislations hardly have impacts on the employment situation in the country. For example, the first minimum wage legislation in Ghana was passed in 1960 to increase the minimum wage from 0.55 Cedis per day to 0.65 Cedis per day. But in 1960–61, recorded employment increased by 5.2%.

It has also been argued that what really limits employment opportunities in the private sector is not just increments in the minimum wage but rather the type of technology available to firms (see de Graft-Johnson et al., 1988). The contention is that many new technologies are developed in the West and are suitable for abundant skilled labour and capital. Such technologies are as such unsuitable for and inconsistent with the conditions of capital scarce and abundant unskilled labour in developing countries, where the use of such technologies results in underutilization of abundant labour. In this case, the technology chosen tend to influence unemployment rate than the minimum wage rate.

If the result obtained here does not seem to confirm the presumption that wage legislations that set minimum wages higher than the market-determined wage rate tends to reduce the overall employment rate, the negative impact of wage controls on employment is well illustrated by the experience of Kenya. Between 1949 and 1968, real wages quadrupled (to several multiples of average rural farm incomes) as a result of wage fixing. The government later ceased administratively, raising private sector wage rates and allowed the labour markets to function. Within a decade the wage rate for unskilled labour was a little higher than the mean income of farmers, which broadly eliminated the urban income bias. The effect on employment was striking. In the year before 1968, urban formal employment expanded at a sluggish 1.6% a year; in the decade after 1968 it grew at more than 6% a year, only part of it can be explained by greater public sector employment (World Bank, 1989). In the 1980s, government policy has been to allow official wage contracts to rise by no more than 75% of inflation. As a consequence real wage rates in the private sector have continued to fall (World Bank, 1989).

The coefficient for economically active urban population is positive and significant at the
Table 4.6: Rural-Urban Migration in Ghana since Structural Adjustment.†

<table>
<thead>
<tr>
<th>Previous occupation</th>
<th>Current occupation</th>
<th>Agriculture</th>
<th>Non-agriculture</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>63</td>
<td>2</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Non-agriculture</td>
<td>4</td>
<td>31</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>33</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

†Principal Occupation 1984-88, in %.

Note: sample size = 5,570; Source: Jaeger, W.K., 1992.

1% level, indicating that increases in the economically active population result in increases in the urban unemployment rate. This is in line with a priori expectations that, ceteris paribus if the increase in the size of the economically active population (potential labour force) exceeds the increase in the number of jobs created in the urban centres, there is bound to be a rise in the urban unemployment rate. The interpretation of the coefficient is that a 1% increase in the economically active urban population leads to a 0.52% increase in the urban unemployment rate.

The negative and statistically significant coefficient of the real agricultural wage rate variable on urban unemployment rate is consistent with the argument that a relative increase in the real agricultural wage rate which tends to lower the rural-urban wage differential, reduces rural-urban migration, or even encourages urban-rural migration, thereby creating a situation that exerts a downward pressure on open urban unemployment. Conversely, if the real agricultural wage rate falls, widening the gap between urban and rural earnings, the supply of people offering themselves for employment in the towns will increase. In cases where enough employment is not created to absorb the rural migrants, unemployment is bound to increase. The coefficient indicates that a 1% decline in the real agricultural wage rate results in a 0.34% increase in the urban unemployment rate.

A recent Ghana Living Standards Survey conducted in conjunction with the World Bank seems to confirm the results. Analysing information that was collected on 8,000 individuals to examine the impacts of Structural Adjustments on migration from rural to urban areas, the World Bank observed that among individuals that have changed occupations between 1984–88, those moving from non-agriculture into agricultural jobs outnumber those moving in the opposite direction by a factor of two-to-one (see Table 4.6).

According to the Table 4.6, between 1984 and 1988, 4% of the respondents who were formally engaged in non-agricultural occupation moved into agricultural occupation, while only 2% of the respondents moved in the reverse direction. This data suggests a positive net urban-rural migration since the initiation of the programme (although not all non-agricultural occupations imply urban residence). Given the relative size of the agricultural labour force compared to that of the urban labour force as a whole, the data indicates a 2% net increase in the proportion of the population earning a living from agriculture (Jaeger, 1992).

Significant is the fact that this pattern contrasts with estimates from before 1984 showing migration in the other direction at about 1% per year. The data helps to confirm the presumption that macro policies have far-reaching effects on rural-urban migration, and on
labour allocation between agriculture and the rest of the economy.

With reference to Figure 4.1 shown earlier in this chapter, it can be noticed that the rapid decline in real agricultural wages ceased after 1984, as the ERP progressed. The urban unemployment rate also fell from 16.6% in 1983 to 10% in 1986, and finally to 8.9% in 1988. This development supports the argument advanced in this section, and also shows that better conditions can bring the migrants home again.

The negative and statistically significant sign of the manufacturing output—positively related to GNP growth—coefficient indicates that economic growth tends to reduce the unemployment rate. The magnitude of the coefficient indicates that a 1% increase in economic growth results in a 0.51% fall in the urban unemployment rate. This result is in line with conventional wisdom, which postulates that output expansion which leads to general economic growth results in an increase in demand for labour by producers—increasing the level of employment, and *ceteris paribus*, reducing the unemployment rate.

Before proceeding to discuss the results and obtained above, and their implications for policy measures, a Granger Causality test is carried out on some of the very significant policy variables. This is to ascertain the direction of causation between the variables, since co-integration does not indicate any Granger Causality.

### 4.5.3 Granger Causality Tests and the Determinants of Real Agricultural Wages

In view of the fact that most of the variables included in the estimations can be influenced by macroeconomic policies—agricultural terms of trade, urban manufacturing sector wages, and government minimum wages—a Granger Causality test is carried out here, to examine the extent to which the above-mentioned policy variables really determine the real agricultural wage rate.

The basic question of interest in this test is, for example, whether changes in the real agricultural terms of trade cause changes in agricultural wage rates, or whether agricultural wage rates and agricultural terms of trade are both endogenously determined? Similar questions were framed for the relationships between the real urban manufacturing wage rates and real agricultural wage rates, as well as the government's minimum wage and real agricultural wage rates (see Granger, 1969; Sims, 1972).

The basic idea underlying this test is: If A causes B, then changes in A should precede changes in B. To say that A causes B requires the fulfilment of two conditions. First, A should help predict B, i.e., in a regression of B against past values of B, the addition of past values of A should contribute significantly to the explanatory power of the regression. Second, B should not help to predict A. This is due to the fact that if A helps to predict B and B helps to predict A, then it is most likely that one or more other variables are in fact "causing" both A and B (Pindyck and Rubinfeld, 1991).

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35 A lot of controversy surrounds particularly the fixing of prices of agricultural inputs and outputs in the economies of many low income countries. Farm prices act as incentives to farmers and as major determinants of the real income of consumers. While higher incomes may be necessary, at least in the short run, to induce increased crop or food production, this imposes a heavy cost on low-income consumers. Timmer, Falco and Peterson, therefore term this "the food price dilemma" (see Timmer et al., 1983).
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4.5.4 Testing Procedures

To ascertain whether each of the two conditions holds, the null hypothesis that one variable does not help predict the other has to be tested. That is, to test the null hypothesis that $B$ does not cause $A$, $B$ has to be regressed against the lagged values of $B$ and lagged values of $A$ (the "unrestricted" regression), and then $B$ has to be regressed only against the lagged values of $B$ (the "restricted" regression). A simple $F$ test is then used to determine whether the lagged values of $A$ contribute significantly to the explanatory power of the first regression. In case the lagged values of $A$ are found to contribute significantly, the null hypothesis can then be rejected, and a conclusion drawn that the data are consistent with $A$ causing $B$. The null hypothesis that $B$ does not cause $A$ can then be tested the same way.

To test whether $A$ causes $B$ therefore involves the following procedure: First, the null hypothesis that $A$ does not cause $B$ is tested by running the "unrestricted" regression:

$$ B = \sum_{i=1}^{n} \alpha_i B_{t-i} + \sum_{i=1}^{n} \beta_i A_{t-i} + u_t \quad (4.47) $$

where $n$ represents the number of lags. This is followed by the "restricted" regression:

$$ B = \sum_{i=1}^{n} \alpha_i B_{t-i} + u_t \quad (4.48) $$

The sum of squared residuals from each regression is then used to calculate an $F$ statistic to test whether the group of coefficients $\beta_1, \beta_2, \ldots, \beta_n$ are significantly different from zero (see Pindyck and Rubinfeld, 1991). The null hypothesis that $A$ does not cause $B$ is then rejected if they are significant. The null hypothesis that $B$ does not cause $A$ is tested by running the same regression as above, but switching $A$ and $B$, and testing whether lagged values of $A$ are significantly different from zero. To conclude that $A$ causes $B$, the hypothesis that $A$ does not cause $B$ must be rejected, while the hypothesis that $B$ does not cause $A$ must be accepted.

Learner (1985) suggests using the term "precedence" instead of the complicated word Granger causality since all that is been done is testing whether a certain variable precedes another, and not testing causality as is usually understood. Sims (1972) also regards Granger causality as a test for exogeneity, while Engle, Hendry and Richard (1983) consider it as a test for strong exogeneity. It has, however, been proved that Granger noncausality is neither necessary nor sufficient for exogeneity as understood in the usual simultaneous equations literature (Pindyck and Rubinfeld, 1991). It is, therefore, relevant to note that failure to reject the hypothesis of noncausality between pairs of variables need not necessarily imply that no long run relationships exists between them. Rather, it may be that such relationships involve more than two variables.

4.5.5 Results

Four lags was chosen for the regression analysis (i.e., $n = 4$), since $n$ is to some extent arbitrary. The following OLS regressions were run

$$ W_{at} = a_0 + \alpha_1 W_{at-1} + \cdots + \alpha_4 W_{at-4} + \beta_1 Z_{it-1} + \cdots + \beta_4 Z_{it-4} + \varepsilon_t \quad (4.49) $$
Table 4.7: Tests for Causality with Real Agricultural Wages

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th>( F(4,15) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( H_1 : W_a \not\rightarrow W_u )</td>
<td>0.52</td>
</tr>
<tr>
<td>( H_2 : W_u \not\rightarrow W_a )</td>
<td>7.49</td>
</tr>
<tr>
<td>( H_1 : W_a \not\rightarrow P_a/P_{na} )</td>
<td>0.34</td>
</tr>
<tr>
<td>( H_2 : P_a/P_{na} \not\rightarrow W_a )</td>
<td>7.23</td>
</tr>
<tr>
<td>( H_1 : W_a \not\rightarrow W_m )</td>
<td>2.05</td>
</tr>
<tr>
<td>( H_2 : W_m \not\rightarrow W_a )</td>
<td>2.50</td>
</tr>
</tbody>
</table>

Notes: \( n = 4; N = 24 \), critical \( F \) Statistic at 5% level is 3.09, data period is 1965–88. \( W_u \) = Urban wage rate; \( W_a \) = Agricultural wage rate; \( P_a/P_{na} \) = Agricultural terms of trade; \( W_m \) = Minimum wage rate.

where \( W_{at} = \Delta W_{at} \) represent changes in real agricultural wage rates, and the \( \Delta Z_i's \) represent changes in real urban manufacturing wage rate, changes in real agricultural terms of trade, and changes in the real government minimum wage rate. The results of the tests are presented in Table 4.7.

It would be observed from the results that in the causality test of real agricultural rate \( (W_a) \) and real manufacturing wage rate \( (W_u) \) — the first analysis — the hypothesis \( (H_2) \) that changes in wage rates in the manufacturing sector do not cause changes in wage rates in the agricultural sector is strongly rejected, while the hypothesis \( H_1 \), that changes in real agricultural wage rates do not cause changes in real wage rates in the manufacturing sector cannot be rejected. For the relationship between agricultural wages and agricultural terms of trade, it would again be observed that the hypothesis \( H_2 \), that changes in real agricultural terms of trade do not cause changes in real agricultural wages is strongly rejected, while the hypothesis \( H_1 \), that changes in real agricultural wages do not cause changes in real agricultural terms of trade, cannot be rejected. On the other hand, the relationship between the government minimum wage rate and the real wage rate in the agricultural sector presents a different picture. The third analysis reveals that both the \( H_1 \) and \( H_2 \) hypotheses are strongly rejected. This suggests that both the government minimum wage rate and the agricultural wage rate are endogenously determined by other factors.

### 4.6 Conclusions

The findings from the co-integration and error-correction model presented earlier, together with the results of the Granger Causality tests are evidence of a strong relationship between wage rates in the urban sector and wage rates in the agricultural sector, as well as between agricultural terms of trade and agricultural wage rates. The results, however, reveal that the government minimum wage policies hardly cause changes in real agricultural wage rates. It can also be concluded from the results that so long as the wage actually received by workers in the urban sector exceeds agricultural earnings there will be rural-urban migration and growth in urban unemployment, in the absence of policies to create jobs in the urban centres.

The results of the estimation of real agricultural wage rates show that a number of policy variables influence the wage rate in the agricultural sector. These include the urban unemployment, the agricultural terms of trade and the labour productivity which is determined by the state of technology and capital stock in the agricultural sector. The findings suggest that policies that tend to suppress agricultural prices relative to prices in the non-agricultural sector, not only discourage agricultural production, but also depress
agricultural wages. This again reduces the earnings of rural workers, tending to increase rural poverty. In addition, government policies that lead to increases in urban unemployment also indirectly affect agricultural wage rates and rural poverty. Particularly, minimum wage regulations tend to increase urban unemployment, which reduces the expected real income of the rural-urban migrant. This in turn, increases the supply of rural labour, and a decline in the agricultural wage rate.

The analysis of the determination of the urban unemployment rate also reveals that the agricultural wage rate negatively affects urban unemployment. That is, to keep urban unemployment at low levels, wages in the agricultural sector have to be raised. This again calls for favourable agricultural terms of trade. As will be shown later in this study, trade policies that tend to protect domestic industries shift incentives towards the non-agricultural sector, which in turn lead to unfavourable terms of trade for agriculture, and a decline in agricultural wages. That is, the indirect effects of tariff and non-tariff barriers on rural poverty have to be taken into consideration by policy makers in designing trade policies.

Furthermore, if agricultural terms of trade have to be improved, farmers would have to receive the right prices for their produce. As will be shown later in this study, available evidence shows that agricultural producers have more often than not, been taxed to finance the urban sector. For example, in many developing countries, including Ghana, while prices of food crops have been maintained at low levels, cash crop producers have all along been excessively taxed to finance urban workers. Some possible measures include a wider distribution of development and welfare expenditures to check the gap between urban and rural incomes, and a greater respect for both real and money costs, to make capital yield more employment.

To reduce urban unemployment, the private sector would have to be supported to expand its activities, instead of governments overstaffing public enterprises. Measures that can be implemented to support private sector output expansion are discussed at the end of the next chapter. It is significant to mention that Gelb et al. (1989), have shown in their empirical analysis of labour markets in developing economies how the usual response of governments in many developing countries to urban unemployment — creating unproductive employment — entails expenditure that “crowds out” productive investment. Their analysis supports the hypothesis that the diversion of capital into the unproductive public employment does not affect urban unemployment but productive investment, since creating sheltered employment encourages further ‘rent-seeking’, migration and unemployment. To the extent that rent-seeking is competitive, a welfare cost ensues, since resources that might otherwise have been devoted to production are diverted into the ‘rent-seeking’ activities. Krueger, for example, shows that the welfare cost of import restrictions is equal to that of the tariff equivalent plus the additional cost of rent-seeking (Krueger, 1974).

Evidence from the Statistical Services of Ghana shows that while public sector employment grew at an average of 3.4% per annum between 1960-78, private sector employment declined by 5.9% per annum within the same period (Ghana Economic Survey, 1977-80). By 1980, public sector employment alone averaged nearly 74% of total non-agricultural employment in the country. Between 1984-86, public sector wage employment as a percentage of total recorded wage employment averaged 83% per annum. (Statistical services, Ghana). A survey of public sector employment conducted by the Manpower Utilization Committee set up in 1983 by the government, as part of the recovery programme estimated that about 20% of the work force in the public sector was underemployed. This lends support to the assertion that the government absorbs the labour force into an unproductive sector.36

36In an insightful paper, Becker (1983) discusses the evidence that public enterprises are less efficient than private enterprises producing the same products. He argues that public enterprises often subsidize employees, customers, or suppliers, as well as produce various products. He, however, argues that if public ownership is
In summary, if rural poverty is to be reduced, policy makers would have to address the issue of raising incomes of rural dwellers. The feasibility of labour or income support in the form of subsidies to rural areas might be a problem due to very high disbursement costs. In this case, policy makers have to see to it that the agricultural sector enjoys favourable terms of trade. Similar effects can be brought about by public investments in rural infrastructure to improve living conditions in the rural areas, so as to make life in the villages more attractive and hence raising wages in real terms. In particular, government investments in infrastructure and the expansion of credit facilities to the rural areas can lead to diversification of the rural economy as the development of the rural non-farm economy picks up. Evidence from Nigeria shows that, providing rural areas with feeder roads, clean water and electricity, coupled with higher farm incomes have helped bring back some migrants, at least temporarily, to the land (World Bank, 1989; Comte, 1992). It is in the light of this that the rural non-farm economy has gained increasing importance in economic literature in recent times. The chapter that follows seeks to examine the linkages between the farm and non-farm sectors. That is, how growth in the agricultural sector affects growth in the non-agricultural sector, and vice versa. The role of investments in infrastructure in creating employment and increasing incomes would be extensively examined. The employment creating, and thus poverty reducing role of rural non-farm enterprises are also analysed.

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an efficient way to subsidize these groups, replacement of such public enterprises by seemingly more efficient private enterprises could lower rather than raise aggregate efficiency because less efficient subsidies must be used. He goes on to state that public enterprises may only appear to be less efficient than private enterprises because intentional subsidies are not included in the definition of "output."
Chapter 5

Linkages between Farm and Non-farm Activities

In the last chapter, the significance and determinants of agricultural wage rate was examined. This included an investigation of the factors that influence the demand for and supply of agricultural labour. It was observed that the supply of agricultural labour influences the prevailing real wage rate significantly. It was further argued that increasing non-farm activities and employment avenues in this sector is likely to improve rural incomes, and slow down rural-urban migration. As will be shown in this chapter several studies have shown that for low-income developing countries, agricultural growth stimulates economic growth in general, and the non-farm sector, in particular. The direct effects of agricultural growth arise partly from increases in the use of farm inputs such as fertilizer, seeds, herbicides, pumps, sprayers, equipment and repair services, and in processing, marketing, and transport services to handle the larger output. The increase in household expenditures on consumer goods and services arising from increased farm incomes is an additional direct effect of agricultural growth on economic growth. These multiplier effects between the agricultural and non-agricultural sectors is termed as forward and backward linkages. This chapter attempts to examine these linkage effects in developing countries, and how economic policies can be strengthened to increase incomes and reduce poverty in these countries.

This is done in three stages. First, a brief outline of the growing significance of the non-farm economy in socio-economic development is presented. This is followed by a review and analysis of current literature on farm-nonfarm linkages. An attempt is then made to empirically examine the linkages between the agricultural and non-agricultural sectors in the Ghanaian economy, using available time series data. Finally, a simple theoretical model is developed to demonstrate the role of the rural non-farm economy in a rural labour market.

5.1 The Role of Non-farm Activities in Development

As stated above, a growing array of literature has emerged to show the importance of the non-farm sector in economic development (see, for example, Anderson and Leiserson, [1980]; Haggblade and Hazell, [1989]; von Braun and Pandya-Lorch, [1991]; Reardon, [1992] and Hazell and Haggblade, [1992]). This importance stems particularly from the linkages that exist between the farm and non-farm sectors. Figure 5.1 illustrates these linkages. As the figure depicts, and will be discussed in detail later in this chapter, five different linkages are
significant — two in the factor markets and three in the product markets.

Production Linkages

Capital flows

Farm sector

Labour flows

Non-farm sector

Demand Linkages

Figure 5.1: Farm–Nonfarm Linkages

The factor market linkages involve capital and labour flows between agriculture and non-farm enterprises. Linkages on the product market include backward production linkages from agriculture to rural input suppliers, forward production linkages from agriculture to processors and distributors, and consumer demand linkages generated as a result of increasing farm incomes. These linkages are discussed in detail, later in this chapter. However, before these linkage effects are explored, an overview of the significance of the non-farm sector is provided. This is aimed at throwing more light on the important role of the sector in the socio-economic development of developing countries.

5.1.1 Non-farm Employment and Income

The rural non-farm economy plays a major role in terms of its contribution to employment and people's livelihood in most developing countries. For example, non-farm enterprises account for 14%, 26%, and 28% of full-time employment in rural Africa, Asia and Latin America, respectively (see Table 5.1). Table 5.1 reveals that when rural towns are included, non-farm employment share increase substantially.

Table 5.1: Share of the Rural Labour Force Primarily Employed in Non-farm Activities

<table>
<thead>
<tr>
<th>Classification</th>
<th>Africa</th>
<th>Asia</th>
<th>Latin America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural settlements</td>
<td>14</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Rural towns</td>
<td>59</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>Rural settlements plus rural towns:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>36</td>
<td>47</td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>34</td>
<td>79</td>
</tr>
</tbody>
</table>

Notes: †Percentage of total employment. Non-farm activities include all non-agricultural activity except mining. Rural settlements in Africa and Asia here are referred to as those below 5000. In Latin America, the cut-off lies at 2500. Rural towns do not exceed 250 000.

Source: Haggblade and Hazell, 1989.

Besides contributing to employment generation, income earned from the non-farm sector plays a significant role in the total income of rural households in developing economies. Earnings outside the farm sector constitutes about 25-30% of income in rural Africa and 30-40% in Asia and Latin America (Haggblade and Hazell, 1989). Recent surveys by the International Food Policy Research Institute (IFPRI) also confirm that non-farm earnings
in many rural areas of developing countries constitute a large proportion of total household income. As is apparent in Table 5.2, in six out of the eight locations investigated, more than half of the survey households had an off-farm income share (out of total income) of 30 percent or more. Thus, reinforcing the conclusion that off-farm earnings is quite crucial for the livelihood of many rural dwellers.

Table 5.2: Share of Off-farm Income in Total Income of Household†

<table>
<thead>
<tr>
<th>Survey Location</th>
<th>&lt; 10%</th>
<th>10% - 30%</th>
<th>30% - 60%</th>
<th>&gt; 60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil (Zona da Malta)</td>
<td>53.1</td>
<td>23.7</td>
<td>14.6</td>
<td>8.6</td>
</tr>
<tr>
<td>Guatemala (Western Highlands)</td>
<td>38.3</td>
<td>10.0</td>
<td>7.2</td>
<td>44.5</td>
</tr>
<tr>
<td>The Gambia (Central region)</td>
<td>38.2</td>
<td>38.2</td>
<td>19.9</td>
<td>4.7</td>
</tr>
<tr>
<td>Kenya (Southwestern region)</td>
<td>11.3</td>
<td>30.4</td>
<td>36.7</td>
<td>21.6</td>
</tr>
<tr>
<td>Rwanda (Northwest)</td>
<td>17.5</td>
<td>20.1</td>
<td>29.1</td>
<td>33.3</td>
</tr>
<tr>
<td>Sri Lanka (Kandy District)</td>
<td>(s.s)</td>
<td>(s.s)</td>
<td>5.6</td>
<td>91.4</td>
</tr>
<tr>
<td>Bangladesh (various areas)</td>
<td>2.7</td>
<td>35.2</td>
<td>43.7</td>
<td>18.5</td>
</tr>
<tr>
<td>India (North Arcot district)</td>
<td>21.4</td>
<td>(s.s)</td>
<td>(s.s)</td>
<td>65.7</td>
</tr>
</tbody>
</table>

†In percent of households.
Notes: (s.s) = sample size of less than 10 households. The Indian data is for 1983/84.

It also came to light that almost 20% or more of the households in seven survey locations had off-farm income shares greater than 60%, with the percentage share of non-farm income increasing significantly in areas with densely populated and large proportions of landless households. This situation was found to be quite prominent in the district survey of Sri Lanka, where more than 90% of the households surveyed earned over 60% of their incomes from sources outside agriculture (von Braun and Pandya-Lorch, 1991). This in a way emphasizes the importance of off-farm income in rural areas where land is in short supply and most of the households are landless and near-landless. It also shows that the rural non-farm economy plays an important, although variable, equity-enhancing role across countries.

It has surprisingly been noted that across income groups, there is no difference in terms of the share of income originating from farm and non-farm sources (for reviews, see Ho, 1986; Haggblade, Hazell and Brown, 1987; (Haggblade and Hazell, 1989, von Braun and Pandya and Lorch, 1991). This, as stated by Haggblade and Hazell (1989), is in part due to the very success of the non-farm economy in elevating some of the "would-be-poor" to a higher income group or, because of problems involved in accurately measuring the female non-farm earnings.

Available evidence also suggests that farm families in developing countries are typically risk averse (see, for example, Lipton, [1968]; Schulter and Mount, [1976]; Binswanger, [1980]; Binswanger and Silers, [1983]), and that they seek to avoid risk through various managerial and institutional mechanisms. Lipton (1968), for example, states that poor small farmers are of necessity risk averse, since they cannot afford not to cover their household needs from one season to the next. This, according to Lipton is due to the fact that they will starve if they fail to do so.
Besides diversifying crop production to take account of risk and uncertainty, most rural households also attempt to compensate for harvest shortfalls and lower farm incomes by diversifying into non-farm activities to enable them stabilize their income and consumption over the whole year.

Reardon et al. (1992), in their empirical analysis of the determinants and effects of income diversification among farm households in Burkina Faso, identify non-farm income as one of the four options farm households have at their disposal, to redress crop output shortfalls and stabilize income and consumption. The other options include:

a) participating in the credit or the insurance markets
b) receiving transfers
c) selling their assets.

However, it has been documented that rural financial markets are severely underdeveloped in low income economies (see Binswanger, 1986; Adams and Higurashi, 1988). It has further been pointed out that the possibility of inter-household transfers being sufficient to help other households that experience crop failures is quite limited, since these transfers constitute only a tiny part of income and consumption, and are highly insufficient to compensate harvest shortfalls (see Reardon, 1990 for a review of evidence from Northern Nigeria, Senegal, and Burkina Faso).

Farm households often have to resort to income diversification in areas where consumption credit and crop insurance are ineffective, and the inter-household income transfer is very limited. Non-farm income is therefore a powerful force for farm households to compensate for lower-than-expected crop revenue. In the section that follows, a review of the literature on the magnitudes of the multiplier effects of agriculture on the non-farm sector is provided. This is to show that providing the essential prerequisites for agricultural growth can promote growth in the non-agricultural sector, increasing real incomes in general, thus helping to reduce poverty, particularly in rural areas.

5.2 Impacts of Agricultural Growth on Non-farm Activities

As briefly mentioned above, a number of empirical studies of different areas reveal close relationship between the agricultural and non-agricultural sectors (see, for example, Mellor, [1976]; King and Byerlee, [1978]; Hazell and Roell, [1983]; Haggblade and Hazell, [1989]; Haggblade, Hazell and Brown, [1989]; Hazell and Haggblade, [1992]). On the demand side of the rural farm sector, King and Byerlee (1978), Hazell and Roell (1983), as well as Hassan and Babu (1991) show in their various empirical studies that higher-income groups and larger-sized farms tend to purchase higher amounts of rurally produced non-food items as income increases. In their study using total per capita expenditure as a proxy for income, Hazell and Roell (1983) estimate that in the Mudaare (in Malaysia), the average household allocates 37% of any incremental income to locally produced non-farm goods, while the corresponding figure is 11% in Gusau (in Nigeria). These results are consistent with the hypothesis that increasing farm incomes of rural dwellers result in an increase in the purchase and consumption of locally produced non-farm goods.

Using data for 12 African and four Asian countries for which comparable data were available, Haggblade, Hazell and Brown (1989) demonstrate a positive relationship between
changes in agriculture and changes in the rural non-farm economy (see Figure 5.2). The
Correlation coefficient between rural non-farm employment and agricultural income for the
group of African countries was found to be 0.63. This again lends support to the hypothesis
that higher agricultural income growth leads to consumption diversification into non-foods,
many of which can be supplied by the rural non-farm economy.

Figure 5.2: Rural non-farm employment as a function of agricultural income: (a) rural areas
plus rural towns (b) rural areas only.
Source: Haggblade and Hazell, 1989

Quite apparent from Figure 5.2 is the fact that, for any given level of agricultural income,
Asian countries generate higher levels of non-farm employment than do their African coun-
terparts, thus suggesting that agricultural multipliers may be higher in Asia. This disparity
is also supported by the study of Hazell and Roell (1983). As reported earlier, they show
that average expenditure on rurally produced non-foods averages about 18% in Muda and
North Arcot (both in Asia), double the roughly 9% prevailing in Gusau and Sierra Leone.
While African consumers in Gusau and Sierra Leone spend only 11-18% of incremental income on rurally produced non-foods, their counterparts in Muda and North Arcot give out 26-31% — twice that in Africa.

In their study, Hazell and Roell (1983) particularly attribute the larger marginal budget shares for foods in Africa to fewer towns and poor transport facilities. These constraints limit access to non-foods in rural villages. A survey of the African consumption studies by Haggblade, Hazell and Brown (1989) reveals that households in the Zaria Region of Nigeria spend a significantly greater portion of their income on non-foods, especially services, than do consumers in Sierra Leone and in Gusau. This difference, according to them arise, at least in part, because the three Zaria study villages were deliberately selected for their proximity to the urban centre of Zaria. As a result, consumers in the study villages have easier access to a wider range of consumer goods and services than are most rural African villages.

Haggblade, Hazell and Brown (1987) use consumption parameters from Sierra Leone and Nigeria along with production parameters from farm and non-farm budget studies across the continent to estimate agricultural growth multipliers on the order of 1.5. That is, a 1 dollar increase in value added from agricultural tradables produces an additional 0.50 dollars of rural income in Africa, compared to about 0.83 dollars in the Asian countries for which evidence is available.

Haggblade and Hazell (1989) also demonstrate empirically that improving agricultural technology increases agricultural output, which could then step up demand for regional non-foods. They observe again that the multiplier effects are quite larger in Asia and Latin America than in Africa. For example, their empirical analysis showed that medium-sized irrigated rice farms growing High Yielding Varieties (HYV) in Asia have a multiplier of 1.64. Out of the 0.64 US dollars indirect gain, 0.58 US dollars (i.e., 90%) accrues to producers of non-farm nontradable and only 0.06 US dollars accrues to producers of non-tradable foods. In contrast, only 0.18 US dollars (or 64%) of the total indirect gain of 0.28 US dollars accrues to producers of non-farm non-tradables in rainfed areas of Africa dominated by hoe cultivating smallholders.

They argue that the larger marginal budget share for non-tradable foods that pertain in Africa accounts for this difference in the structure of the multipliers. In concluding, they state that “the multipliers tend to be smaller in Africa, for example, probably as a reflection of poorer rural infrastructure, lower population density, lower income and consequently less consumer diversification into non-foods, fewer prospects for irrigation and therefore fewer backward linkages than other regions”. The poor infrastructure development in Africa also fragments markets for perishable foods, thereby rendering non-tradable foods that are tradable in Asia. They therefore believe that, although the type of technology change influences the relative size of the multiplier, its absolute size is largely controlled by the policy, institutional and resource environment in which agricultural production takes place. In Taiwan, for example, where rural metalworking sector has diversified in response to agricultural modernization, an additional factor has been industrial decentralization made possible by good quality infrastructure. This has affected the diversity, as well as the level and growth of employment.

Apparently, in Taiwan, decentralized industrialized growth — made possible by a developed rural infrastructure — made it possible to transfer labour services from agriculture to non-agricultural activity without at the same time moving labourers from rural to urban areas. With a decentralized pattern of industrialized growth, household members are able to participate in non-agricultural activities by commuting while still taking part in farm work as a sideline or during busy seasons. With fewer people leaving the countryside for cities, rural demand for goods and services is stronger and thus able to support a larger
5.3  Linkages in the Ghanaian Economy

The various studies discussed in the fore-going section all indicate that for developing countries, agriculture growth has profound effects on the non-agricultural sector, and that growth in the non-agricultural sector also stimulates growth in the agricultural sector. Evidence available also show that, there are substantial linkages between these sectors in the Ghanaian economy. These linkages, as already indicated above, include backward (demand for industrial inputs and services by agriculture), forward (adding value to agricultural output by transforming its products), final-demand (the demand for goods and services originating in the expenditure of agricultural earnings) effects, as well as capital and labour flows between the two sectors.

This section will be primarily concerned with the linkages between the two sectors in the Ghanaian economy, and how they can be strengthened. A brief overview of the non-farm economy is first presented. This is followed by a discussion of the determinants of growth in the sector. An attempt is finally made to empirically examine the relationship between the agricultural and non-agricultural sectors in the economy.

5.3.1 Brief Overview of the Non-farm Economy

In a recent Ghana Living Standards Survey conducted by the Ghana Statistical Service, it was revealed that the non-farm sector accounts for nearly 43% of total income of households, and almost 30% of rural income in Ghana (see Table 5.3). The same survey showed that even the very poor rely to some extent on non-farm activities for their livelihood. About 30% of total income for the very poor (households with an annual per capita expenditure of 37,020 cedis and below) come from non-agricultural sources, while the corresponding figure for the highest income group (households with an annual per capita expenditure of 114,801 cedis and above) was over 60% (Statistical Service, 1989).

Table 5.3: Non-farm Share of Rural and Urban Income, Ghana†

<table>
<thead>
<tr>
<th>Source of Income</th>
<th>Locality</th>
<th>Accra</th>
<th>Other Urban</th>
<th>Rural</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td></td>
<td>2.2</td>
<td>30.8</td>
<td>73.1</td>
<td>56.8</td>
</tr>
<tr>
<td>Self-employment</td>
<td></td>
<td>45.9</td>
<td>39.7</td>
<td>16.4</td>
<td>24.6</td>
</tr>
<tr>
<td>Wage labour</td>
<td></td>
<td>33.0</td>
<td>15.7</td>
<td>4.3</td>
<td>9.5</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>18.9</td>
<td>13.8</td>
<td>6.2</td>
<td>9.1</td>
</tr>
<tr>
<td>Total non-farm</td>
<td></td>
<td>97.8</td>
<td>69.1</td>
<td>26.9</td>
<td>43.2</td>
</tr>
<tr>
<td>Total Income</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

†In percent of households.  

As shown in Table (5.3), the proportion of income earned from non-farm activities increases dramatically from rural to urban settlements. While the non-farm sector constitutes almost 98% of income sources in urban Accra, the proportion decreases to about 69% in the other urban centres and finally 27% in rural areas. The significance of non-farm activities
is further appreciated if one considers the proportion of the population employed in this sector. The survey also showed that over 54% of households in the country operate non-farm enterprises. It was further observed that the composition of non-farm activity varies considerably across localities of different sizes. With the number of non-farm enterprises operated by households increasing from 36% in rural areas to 48% in Accra, thus confirming the widely held notion that urbanization has accompanied the rising prominence of non-farm activity (see Hazell and Haggblade, [1991]; Haggblade et al., [1989]).

Another feature that can be observed between the non-farm sector in the rural and urban areas is the fact that in rural areas, the largest percentage of households are engaged in manufacturing and industrial activities, while in the urban centres, non-food commerce dominate among the non-farm activities (see Table 5.4). Transport services are more important in the urban centres than in rural areas, increasing from 3.6% in rural areas through 6.8% in other urban centres to 9.1% in Accra, which is the largest city.

Table 5.4: Distribution of Non-farm Enterprises by Locality and Type of Business†

<table>
<thead>
<tr>
<th>Type of First Business</th>
<th>Locality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accra</td>
</tr>
<tr>
<td>Manufacturing and Industry</td>
<td>21.3</td>
</tr>
<tr>
<td>Services</td>
<td>9.1</td>
</tr>
<tr>
<td>Commerce (Food)</td>
<td>1.3</td>
</tr>
<tr>
<td>Commerce (Non-food)</td>
<td>54.3</td>
</tr>
<tr>
<td>Other services</td>
<td>14.0</td>
</tr>
<tr>
<td>All</td>
<td>100.0</td>
</tr>
<tr>
<td>Sample Size</td>
<td>221</td>
</tr>
</tbody>
</table>

†In percent of households.

Notes: Others include income from rent (actual and imputed), remittances, educational scholarships, etc.

Source: Ghana Living Standards Survey, 1989

Within the manufacturing sector, most rural employment is accounted for by a wide range of activities. These include dressmaking, metalworking, including blacksmithing, welding, fabrication and assembly work for buildings, machines, tools, and equipment; wood, including sawmilling, furniture making, and general carpentry.

5.3.2 Farm and Non-farm Growth Linkages

The purpose of this section is to examine the various kinds of linkages between the farm and non-farm sectors that exist in the Ghanaian economy. First an outline of these linkages is presented. An attempt is then made to empirically estimate the growth multipliers between the two sectors.
5.3. LINKAGES IN THE GHANAIAN ECONOMY

Production Linkages

In Ghana, the output of agriculture provides inputs for industries, such as fruit and vegetable processing, textiles, fish canning, tobacco, soap and oil and cocoa processing, etc. Using an input-output table constructed in 1968, a number of studies have shown that these linkages are weak in Ghana. For instance, Stryker and Dumenu (1986) show that intermediate inputs, using traditional techniques of production, account for less than 10% of the value of cocoa and less than 20% of the value of rice and maize. Most of these inputs are seeds and hand tools produced by the traditional sector.

The dependence of industry on agriculture for inputs hinges on the growth of processing industries, which in turn, depends on the amount of income and perhaps export demand. Similarly, the dependence of agriculture on industry for inputs hinges on the technology used in agriculture. It is therefore not surprising that at Ghana's stage of development, these linkages are not strong. In the short run, very little can be done to improve these linkages, but in the long run, technological improvements in the agricultural sector and the development of the industrial sector should provide greater linkages.

Demand Linkages

The factors that influence the total demand for industrial consumption goods — both rural and urban demand — can be better understood if one considers the differential impacts of agricultural output growth on the rural and urban sectors. Increases in agricultural output, accompanied by favourable agricultural terms of trade, may have positive effects on rural demand for non-food commodities. That is, if the terms of trade improves for agricultural products, those who sell agricultural commodities will benefit, while those who buy agricultural commodities will be negatively affected.

A close look at Table 5.5, reveals that although food is the dominant item of consumption in Ghana, non-food expenditure nevertheless constitutes a substantial proportion of the average household budget in the country. Adding together consumption of market purchased items and that of home-produced items, food accounts for over 66% of the total expenditure of Ghanaian households, while non-food purchases account for almost 34%. It can further be observed from the Table that the budget share of non-food commodities is higher in the urban than in the rural areas. Whereas as much as 42.9% of expenditure goes to non-food items in Accra, the corresponding Figure is 28.5% in the rural areas.

Table 5.5: Distribution of Average Household Expenditure

<table>
<thead>
<tr>
<th>Locality</th>
<th>Type of Expenditure</th>
<th>Accra</th>
<th>Other Urban</th>
<th>Rural</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Purchased</td>
<td>56.6</td>
<td>49.8</td>
<td>35.0</td>
<td>42.4</td>
</tr>
<tr>
<td>Home-Produced Food</td>
<td>0.5</td>
<td>11.4</td>
<td>36.5</td>
<td>24.0</td>
<td></td>
</tr>
<tr>
<td>Non-food</td>
<td></td>
<td>42.9</td>
<td>38.8</td>
<td>28.5</td>
<td>33.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

†In percent of household
Source: Ghana Living Standards Survey, 1989
Since urban workers spend a larger proportion of household expenditure on food than rural workers, urban workers are likely to be adversely affected if the terms of trade shift in favour of agriculture. This is particularly so, if an improvement in agricultural terms of trade results in an increase in the real price of food in the urban areas.\footnote{This situation is possible if the urban consumer does not re-adjust his consumption basket. If he decides to leave his consumption budget share for non-food commodities, he may only have to reduce his demand for food commodities, or change his consumption basket in favour of cheaper food items.} Agricultural terms of trade is an index that includes both cash and food crops, while foodgrain terms of trade includes only food crops. For example, an increase in the producer price of cocoa may not have direct impacts on urban workers, although it may boost the demand for non-food commodities. On the other hand, increasing the prices of maize and rice will be directly felt by net buyers of these commodities.

Capital Flows

It has been widely documented that capital flow out of agriculture into non-farm activities outweigh the reverse flow of capital from non-farm activities into the farm sector. Available evidence suggests that macro policies such as trade policies, crop pricing, and fiscal policies are mostly used to transfer resources out of agriculture into the rest of the economy (see World Bank, [1981]; ILO, [1982]; Sharpley, [1981]).

Capital flows between the agricultural sector and non-farm activities in Ghana is quite high. A very common way of capital transfers from the agricultural to the non-farm sector is through export taxes levied on cash crops by state marketing boards. These taxes have varied between 30-60\% of farmers' cash crop prices. For example, the Ghana Cocobod has used its pricing system to tax away a sizeable proportion of cocoa farmers' income. As a percentage of the FOB price, the per unit tax on cocoa farmers has fluctuated widely. Whereas this tax averaged 45.5\% between 1958-59, it increased sharply to 57.5\% in 1968-69, before declining to 46.6\% in 1978-79, and to 16.5\% between 1983-84 (see Stryker, 1990). Given the nature of the government's expenditure, it is most likely that the resources have been transferred into the urban areas and into non-farm activities, as will be shown later in this study, in the discussion of non-price transfers into and out of agriculture.

Besides government price and non-price transfers out of agriculture, private investors have often channelled investments funds from agriculture into non-farm activities. In a survey of rural non-farm enterprises conducted by the author between March and June 1992, in the Tamale district, 51\% of the respondents reported that they first started their business with funds entirely from the sales of agricultural products (Details of the survey is reported later in this chapter). Nineteen per cent said they obtained part of their investment funds from farm activities, while 31\% claimed not to have used surpluses from agriculture to invest in their enterprises (see Table 5.6).

It can be observed from Table 5.6 that agriculture plays a significant role in raising funds for investment in rural non-farm activities. As will be discussed in chapter six, agriculture serves as a major source of investment funds for most of the non-farm enterprises requiring large start-up capital. Similar surveys in Kenya and Sierra Leone suggest that agricultural surpluses account for between 15 and 40\% of non-farm investment capital (Haggblade, Hazell and Brown, 1989).

As mentioned earlier, surpluses generated in non-farm activities also furnish funds for productivity-enhancing investments in agriculture. Particularly, income earned from non-farm activities are used to acquire certain factors of production. Several farmers engage themselves in non-farm activities during the lean period, and use part of the resources they
5.3. LINKAGES IN THE GHANAIAN ECONOMY

Table 5.6: Sources of Investment Funds

<table>
<thead>
<tr>
<th>Village</th>
<th>Funds from Farm activities to start Business†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Totally</td>
</tr>
<tr>
<td>Diare</td>
<td>61</td>
</tr>
<tr>
<td>Gushie</td>
<td>69</td>
</tr>
<tr>
<td>Nabogu</td>
<td>52</td>
</tr>
<tr>
<td>Pong-Tamale</td>
<td>37</td>
</tr>
<tr>
<td>Savelugu</td>
<td>48</td>
</tr>
<tr>
<td>Kumbungu</td>
<td>65</td>
</tr>
<tr>
<td>Nyankpala</td>
<td>42</td>
</tr>
<tr>
<td>Nanton</td>
<td>36</td>
</tr>
<tr>
<td>Kogni</td>
<td>37</td>
</tr>
<tr>
<td>Tampiong</td>
<td>56</td>
</tr>
</tbody>
</table>

† In percent. Notes: Sample size = 624. Survey results reported in detail later in this chapter.
Source: Survey Data

accumulate to purchase productivity-enhancing inputs such as improved seed and fertilizer, as well as to hire the services of tractors for land cultivation. In some cases, land is even purchased with capital accumulated from non-farm activities.

In a survey of 256 farmers by the author in the Savelugu district in early 1992 to examine factors that impede productivity and output growth, it was noticed that 242 of the respondents were engaged in non-farm activities beside their farm work. As many as 74 (29% of the sample size) of them gave non-farm activity as the major source of income for the purchase of farm inputs such as improved seed and fertilizer. The positive impacts of non-farm earnings have also been observed in other African countries like Kenya, Nigeria and Tanzania (Haggblade et al., 1989).

In the same survey, when the farmers were requested to state their major source of income in times of crop failure, it was observed that 111 of them, constituting about 44% of the sample size claimed they often resorted to non-farm activities to stabilize income and consumption. As Table 5.7 shows, income from non-farm activities is particularly important in areas where farmers have no access to financial institutions — Diare and Nanton. Although Savelugu has no public financial institution, its proximity to Tamale (the regional capital), as well as the good transportation system serves as an advantage for farmers to travel to financial institutions in Tamale for loans.

It is important to note that the results presented in Table 5.7 are only for major sources of income to cater for the household in the event of a crop failure. There were farmers who reported sources other than non-farm income as their major income sources, but also stated that they rely to some extent on non-farm activities in times of crop failures. Thus, the magnitude of the significance of non-farm income in stabilizing rural household income and consumption would be greater if the complete breakdown of the income source of each farmer would be considered instead of his major income source.

Besides the input-output model mentioned above, a number of studies have used models such as economic base and semi-input-output models to estimate the multiplier effects of
agricultural growth. In view of the data requirements and computational costs involved, the examination of agricultural growth multipliers with the above-mentioned procedures is not feasible in the present study. It is significant to note that a recent empirical study by Haggblade et al., (1991) demonstrates that the growth multipliers produced by the models mentioned — “fixed-price models” — are mostly over-stated, because they assume perfectly elastic supply of non-tradables. They develop a price-endogenous model that relaxes the assumptions of current fixed price models. Their results show that fixed price models like the economic base and input-output models tend to overstate the magnitude of agricultural growth multipliers by 10% to 25%, since they assume perfectly elastic supply of non-farm goods and services.

A formal modeling approach is applied in this section to examine the interdependence between the agricultural and non-farm sectors, and how different macroeconomic policies affect the linkages. The section that follows therefore attempts to develop a theoretical framework to empirically capture the linkages between the farm and non-farm sectors in the Ghanaian economy.

5.3.3 Agricultural and Non-agricultural Growth Linkages

As mentioned in the preceding section, there are a number of ways by which the linkages between the farm and non-farm sectors can be investigated. Taking into consideration the computational costs involved and the purposes of the present study, an approach based on Kaldor’s growth laws will be utilized.

As argued by Kappel (1990), although the Kaldor’s growth laws were originally formulated to explain the differences in economic growth between the industrialized countries, it can be viewed as a theory of industrial transformation. This theory of transformation can be applied to both industrialized and developing economies. As stated elsewhere in this study, a large proportion of the empirical work that has been undertaken to estimate these laws (exceptions are McCombie and Ridder [1983] for the case of the United States, and Stavri¬nos [1987] for the case of the UK) have used time-series or pooled data for cross-country analysis. Almost all these estimations, with the notable exceptions of Thirlwall and Vines (1980) and Kappel (1990) have concentrated on industrialized countries. In this section, these laws will be estimated using time-series data on Ghana. A discussion of the Kaldor’s

Table 5.7: Supplementary Income Source in Case of Crop Failure

<table>
<thead>
<tr>
<th>Income Source</th>
<th>Village</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Savelugu [%]</td>
<td>Diare [%]</td>
<td>Nantong [%]</td>
<td></td>
</tr>
<tr>
<td>Borrow from Relative/Friend</td>
<td>56</td>
<td>41</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Borrow from Money Lender</td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Non-farm Earnings</td>
<td>41</td>
<td>30</td>
<td>46</td>
<td>67</td>
</tr>
<tr>
<td>Remittances</td>
<td>11</td>
<td>8</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Financial Institution</td>
<td>16</td>
<td>12</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>100</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

Notes: Sample size = 256. 
Source: Survey Data.
laws is first presented, followed by its application to the Ghanaian economy.

Kaldor’s Growth Laws

According to Kaldor’s first law, there exists a strong relation between the growth of manufacturing output \( g_m \) and the growth of GDP \( g_{GDp} \). Kaldor argues that a fast rate of economic growth is associated with a fast rate of growth of the manufacturing sector of the economy, which in turn, is a characteristic of the transition from “immaturity” to “maturity,” where “immaturity” is defined as a situation in which productivity is lower outside industry (particularly in agriculture), so that labour is available for use in industry in relatively unlimited quantities.

Taking a cross-section of twelve developed countries\(^2\) over the period 1952-54 to 1963-64, Kaldor found a strong correlation between \( g_{GDp} \) and \( g_m \)

\[
g_{GDp} = 1.153 + 0.614 g_m \quad R^2 = 0.959 \quad (5.1)
\]

where \( g_{GDp} \) is the growth rate of GDP and \( g_m \) is the growth rate of manufacturing output in period \( t \). Kaldor argued that the strong correlation between \( g_{GDp} \) and \( g_m \) does not depend on manufacturing output constituting a large part of total output. Setting \( g_{GDp} = g_m \), he showed that rates of growth above 3% are found only in cases where the rate of growth of manufacturing exceeds the overall growth of the economy; that is, where the share of the manufacturing sector is increasing. This, he used to argue that the high correlation between the two variables is not simply the result of manufacturing output constituting a large proportion of total output. He supports this contention with a regression analysis between the growth of non-manufacturing \( g_{nm} \) and the growth of manufacturing output \( g_m \) in which he obtained an almost identical relation between the growth of non-manufacturing output and the growth of manufacturing as in equation (5.1), with a regression coefficient \( R^2 \) of 0.824.

To demonstrate that sectors like agriculture and mining did not play any significant role in the economic growth of developed countries, he run separate regressions of GDP growth on agricultural growth, as well as on mining growth. For the relationship between GDP and agriculture, the following regression was run

\[
g_{GDp} = g_a \quad (5.2)
\]

where \( g_a \) is the growth rate of agriculture. Not surprisingly, Kaldor found no relationship between the rate of growth of GDP and agricultural output growth rate. This is to be expected, since the primary sector (agriculture and mining) constitutes only small proportions of GDP in the countries Kaldor used for his analysis, as compared to the economies of several developing countries which are mainly dominated by agriculture. For example, in 1988 agriculture accounted for 49% of the total output in Ghana. On the other hand, it accounted for only 2% of total output in the United States. Consequently, it may be argued that, ceteris paribus an increase in the growth of agriculture by one percentage point is likely to have a greater impact on the growth of the rest of the Ghanaian economy than in the United States. Since this point is one of the central points in the present analysis, it

\(^2\text{Japan, West Germany, Austria, France, Denmark, Netherlands, Belgium, Norway, Canada, U.K. and United States.}\)
is developed in detail below. Cripps and Tarling (1973), taking the same twelve countries over the longer period 1951 to 1970, and breaking the data up into four sub-periods and pooling, provided support for Kaldor's first law. Research by Thirlwall and Vines (1980) on low- and middle-income countries also showed the same strong cross-section correlation, leading them to the conclusion that the faster growth rate of manufacturing output, relative to growth rate of GDP, the faster the growth of GDP.

The section that follows examines how agricultural growth contributes to overall economic growth, and specifically, how growth in agricultural output stimulates growth in non-agricultural output within the framework of Kaldor's hypothesis. This could simply be done the way Kaldor first did it — and as is sometimes found in empirical studies — by regressing total output growth on agricultural growth. The problem associated with such an estimation is that the spurious correlation that is engendered by agriculture being such a large component of total output cannot be avoided. The analysis here is therefore limited to the relationships between agricultural output growth and non-agricultural output growth, as well as manufacturing output growth and non-manufacturing output growth.

This specific objective stated above is achieved in a three-fold investigation. First, a test is undertaken to determine if any structural break has occurred in the Ghanaian economy within the period under study. Second, an examination of the effects of growth of agricultural output on growth of non-agricultural output, as well as the effect of growth of manufacturing output on growth of non-manufacturing output using single equation models is carried out. An attempt is finally made to capture the impacts of growth of agricultural output on non-agricultural output when the two variables are simultaneously determined.

The Theoretical Framework

Consider the identity:

\[ GDP_t = A_t + N A_t \]  
(5.3)

That is, the Gross Domestic Product (GDP) is made up of the agricultural (A_t) and non-agricultural (NA) sectors. Now recalling that the current Gross Domestic Product (GDP_t) is simply \( (GDP_{t-1}) \) plus the change in GDP \( (GDP_t - GDP_{t-1}) \), each of the variables in equation 5.3 can be represented as

\[ GDP_t = (1 + g_{GDP}^t) GDP_{t-1} \]

\[ A_t = (1 + g_A^t) A_{t-1} \]

Although a thorough discussion of Kaldor's growth laws' debate is not intended here, it is still relevant to mention that Kaldor's paper with its series of 'laws' was meant to account for growth rate differences between advanced capitalist countries. Interesting enough, he concluded by suggesting that the major factor that constrained the growth of the UK manufacturing output had been a lack of labour. No wonder the Economist magazine in reviewing Kaldor's Inaugural Lecture expressed surprise that a Keynesian, and an advocate of export-led growth, should come to such a conclusion. Their explanation was that Kaldor, being in the Treasury at the time had to be careful about mentioning balance-of-payments difficulties and such unmentionables as overvalued currency and export incentives. Subsequent model specifications and results have confirmed the importance of demand factors as determinants of the growth of manufacturing output and that employment growth must be treated as endogenous. Kaldor also later accepted that manufacturing output is fundamentally determined by export growth and that employment will respond to higher output growth. (See Thirlwall, 1983).

Although Kaldor associated GDP to manufacturing, which could be written as \( GDP_t = M_t + NM_t \), implying GDP is made up of manufacturing and non-manufacturing sector, the fact that the agricultural and non-agricultural sectors constitute the Gross Domestic Product is considered here.
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\[ NA_t = (1 + g_{t}^{NA}) NA_{t-1} \]  
(5.4)

Equations (5.4) can be substituted into equation (5.3) and rearranged to obtain the following relation

\[ g_{t}^{GDP} = g_{t}^{a}(A/GDP)_{t-1} + g_{t}^{a}(NA/GDP)_{t-1} \]  
(5.5)

It is apparent from equation (5.5) that the overall growth of the economy in period \( t \) can be expressed as a weighted average of the sectoral growth rates in this period, where the weights are the relative share of the corresponding sectors to GDP during the previous year. This implies that the rate of growth of GDP depends not only on the rate of growth of output in the agricultural sector in the same period, which represents the economic performance of agriculture in period \( t \), but also on the share of agriculture during the previous period, which is an index of the cumulative performance of the agriculture until the beginning of period \( t \) (Stavrinos, 1987). It is also obvious from the latter factor that for any sector to have a significant effect on the growth rate of GDP, the share of the sector to GDP has to be substantial enough.

A similar relationship can be derived for the manufacturing sector. That is,

\[ g_{t}^{GDP} = g_{t}^{m}(M/GDP)_{t-1} + g_{t}^{m}(NM/GDP)_{t-1} \]  
(5.6)

where \( g_{t}^{m} \) is the rate of growth of manufacturing output and \( g_{t}^{nm} \) is the rate of growth of non-manufacturing output. It is evident from equations (5.5) and (5.6) that, estimating equation 5.1 alone introduces a degree of spurious correlation, since \( A \) is a substantial component of GDP in industrialized economies.

A closer look at Equation 5.5 will reveal that for developing countries that are predominantly agricultural economies, the only relationship between the various output growth rates which will be of any economic and statistical significance is the relationship

\[ g_{t}^{a} = \alpha + \beta g_{t}^{a} + \varepsilon_{t} \]  
(5.7)

where \( \varepsilon_{t} \) is a random term. The equation implies that the rate of growth of non-agriculture output and that of agriculture output is related. In the early stages of development, output in the non-agricultural sector will fundamentally be determined by demand from agriculture, as illustrated earlier in this chapter. As industrialization proceeds and the proportion of manufacturing in GDP increases, the growth rate of manufacturing output \( (g_{m}) \) tends to determine the rate of output growth of the other sectors \( (g_{nm}) \). That is, the relationship

\[ g_{t}^{nm} = \alpha + \beta g_{t}^{m} + \varepsilon_{t} \]  
(5.8)

gains economic and statistical significance. This stems mainly from two factors. Firstly, as industrial production and employment expand, labour resources are drawn from other sectors of the economy where there are either diminishing returns, or where no relationship exists between employment growth and output growth. The transfer of labour from these sectors will raise productivity growth outside manufacturing, without causing a diminution in output in the former sector. As a result of increasing returns in manufacturing on the one hand and the induced productivity growth in the non-manufacturing sector, fast growth in manufacturing output results in a faster growth of productivity in the economy as a whole.
Secondly, the degree of returns to scale in the non-manufacturing sector of the economy is affected by the innovation and diffusion of technology from the manufacturing sector to these sectors. Stavrinos (1987) rightly argues that the direction of causation runs from \( g_m \) to \( g_{nm} \) since the growth-stimulating role of the supply-side factors (labour transfer) may be additionally reinforced by changes in the composition of total demand in response to the arrival of new goods, lower relative prices and to increases in income per head. This direction of causation is further strengthened by the fact that the demand for the products of primary sectors and of most services is derived from the demand of manufacturing itself. An estimation of equations (5.7) and (5.8) is undertaken later in this section. To give a clear picture of the changes that have taken place in the structure of the Ghanaian economy in the last three decades, a discussion of the economic structure is provided below.

**Performance of the Manufacturing and Agricultural Sectors**

The agricultural sector has for a long time dominated the Ghanaian economy, although some structural shifts seem to have occurred since independence. In the first decade after independence in 1957, the share of the primary sector in GDP declined from 57 to 40%, with a similar, albeit less severe decrease in its share of the labour force (from 65 to 59%). On the other hand, the manufacturing sector expanded rapidly from a minute post-independence average share of 2% of GDP to an average of 11.3% between 1965–68. It is interesting to note that between 1957 and 1969 manufacturing maintained the highest growth rate of 10% per annum. This rapid growth of manufacturing output was due to the industrialization policies adopted by the Nkrumah government. Several import-substituting industries were set up by the government to encourage the growth of domestic industries. Manufacturing also became an important contributor to exports with a 14% share in 1969, in addition to 11% from processed cocoa and timber exports (Sowa et al., 1992).

The forced industrialization policy of the Nkrumah government, and its neglect of agriculture were mainly responsible for these structural shifts. Although industrial growth was encouraged with heavy protection, there was not a concise policy to develop agriculture to supply raw materials to the growing industries. This resulted in the heavy dependence of most of these industries on imported raw materials.

Manufacturing which rose to 16% of GDP in 1975, started declining as poor economic policies led to balance of payments problems, and foreign exchange constraints hindered the imports of raw materials for the industries. By 1983 manufacturing's contribution to GDP had fallen to a mere 4%. Industrial capacity utilization declined rapidly, and by 1982 reached a lower limit of 25% (World Bank, 1989). The key policy problem here was relatively low investment per worker, which is both a consequence and a cause of slow growth and declining productivity.

Agriculture on the other hand, increased its share of GDP gradually and reached 60% in 1983, after falling to 42% in 1968. Paradoxically, the nation was not producing enough food to feed itself, as such continued to import food, despite this dominance by the agricultural sector. This confirms the fact that the increase in the share of agriculture was mainly due to the statistical consequence of the decline in the industrial sector. The structural development of the Ghanaian economy seems to contradict conventional economic theory. This is because, conventional wisdom states that in the course of development, the share of the primary sector declines, as the shares of the secondary and tertiary sectors expand, and resources are transferred from the primary sector, particularly agriculture, to the latter sectors. However, the virtual collapse of the industrial sector (e.g., construction and mining) in the second half of the 1970s and early 1980s resulted in an increase in the share of the agricultural sector (see Table 5.8).
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Table 5.8: Shares of GDP by Economic Activity, 1978–91

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture</th>
<th>Industry</th>
<th>Manufacturing</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-79</td>
<td>55</td>
<td>12</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>1980-81</td>
<td>56</td>
<td>9</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>1982-83</td>
<td>59</td>
<td>5</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>1984-85</td>
<td>47</td>
<td>13</td>
<td>9</td>
<td>40</td>
</tr>
<tr>
<td>1986-87</td>
<td>50</td>
<td>16</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>1988-89</td>
<td>49</td>
<td>17</td>
<td>10</td>
<td>34</td>
</tr>
<tr>
<td>1990-91</td>
<td>46</td>
<td>17</td>
<td>11</td>
<td>37</td>
</tr>
</tbody>
</table>


Agriculture's performance can also be assessed by considering its contribution to the growth of GDP. Between 1970–74 the sector recorded an annual average contribution of 2.8%. This positive achievement reversed between 1975–79, when the sector's annual average contribution declined by 0.7%. The negative trend continued into the early 1980s, when the annual contribution averaged —1.85% in 1980–83. As reported earlier, a dramatic change in the economy has taken place since the implementation of the Economic Recovery Programme (ERP). The sector's contribution to growth of GDP averaged 1.47% between 1984–90. This shows that agriculture's contribution to overall economic growth has increased appreciable, inspite of a decline in its share of GDP. As is evident in Table 5.8, its share of GDP has fallen from 60% in 1983 to 48% in 1990. This, however, is largely due to a recovery of the industrial and service sectors. Productivity increases have also been recorded in the agricultural sector since the implementation of the ERP, as compared to the low productivity that plagued the sector prior to the recovery programme.

Manufacturing output has also picked up strongly, after several years of continuous decline. The sector recorded an average growth of 9.8% per annum in real terms between 1983–90, and raised its share of GDP from 4% in 1983 to 10% in 1990 (World Bank, 1992). This recovery and growth is partly due to the rehabilitation of existing plant and the availability of imported raw materials made possible by the realignment of the exchange rate regimes, increased in export earnings, and the subsequent easing of the foreign exchange constraints. By 1990, manufacturing capacity had risen to 37%, from 15% in the early 1980s (World Bank, 1989).

The preceding discussion shows that there were points in time where the agricultural sector's contribution to overall growth of the economy declined dramatically. Particularly, the years before the ERP witnessed a gradual decline in the contribution of agriculture to economic growth, as the sector recorded only negative growth, while the years thereafter, marked a period of agricultural recovery and increased contribution to overall economic growth. In analysing the impacts of growth of agricultural or non-agricultural output on the overall growth of the economy, a question that can therefore be raised is whether the decline or recovery in the contribution of agriculture and manufacturing to general economic growth was a gradual one or whether there was a point in time at which a structural shift occurred. On a priori grounds, years characterised by low economic activities such as world economic recessions, or periods of very bad economic policies are possible candidates for structural shifts. For example, Sowa et al. (1992) argue that a structural change has taken place since the ERP took off. This question of structural change linked to the ERP also raises the question of stability of the estimation functions. That is, whether a single function can be used for the entire period under consideration, or whether separate functions have to be used for sub-periods. The determination of structural shifts, however, always has to be tested empirically, which is the subject of the next section.
The Question of Structural Stability

As indicated in the preceding section, in view of the fact that structural shifts might have occurred within the Ghanaian economy within the period under consideration at a particular point in time, an attempt will first be made to determine such a shift point. After obtaining a shift point, separate estimates could then be carried out.

The method of maximum likelihood introduced by Quandt (1958) and widely used to estimate the breakpoint is applied to locate the points of possible structural shifts. In testing for structural stability, the following relationship can be considered:

\[ y_t = \omega + \gamma x_t + \varepsilon_t \quad (5.9) \]

which obeys the two separate regimes:

\[ y_t = \omega_1 + \gamma_1 x_t + \varepsilon_{1t} \quad 1 \leq t \leq k_0 \quad (5.10) \]

and

\[ y_t = \omega_2 + \gamma_2 x_t + \varepsilon_{2t} \quad k_0 < t \leq k \quad (5.11) \]

where \( k \) is the sample size and \( k_0 \) the point of structural shift. A test of structural shift involve testing for stability of the parameters between the two regimes. That is, testing the hypothesis: \( H_0 : \omega_1 = \omega_2, \gamma_1 = \gamma_2 \). If this hypothesis is true we can then accept the single equation estimation.

Quandt's method works by maximizing the usual likelihood function, and by searching over all possible breakpoints. This estimation procedure is based on the assumption that the error terms \( \varepsilon_1 \) and \( \varepsilon_2 \) are independently and normally distributed. It, therefore, requires the evaluation of the log-likelihood function\(^5\)

\[ \log L = -k \log(2\pi)^{1/2} - k_0 \log \hat{\sigma}_1 - (k - k_0) \log \hat{\sigma}_2 - k/2 \quad (5.12) \]

where

\[ \hat{\sigma}_1 = \sum_{y=1}^{k_0} \left[ \frac{\varepsilon_{1y}^2}{k_0} \right]^{1/2} \quad \text{and} \quad \hat{\sigma}_2 = \sum_{z=k_0+1}^{k} \left[ \frac{\varepsilon_{2z}^2}{k - k_0} \right]^{1/2} \]

and \( \varepsilon_1 \) and \( \varepsilon_2 \) are the Ordinary Least Squares (OLS) residuals from equations (5.10) and (5.11) respectively. The evaluation is for all possible values of \( k_0 \) and the maximum likelihood estimate of \( k_0 \) is selected at that value at which equation (5.12) is maximized.

Results of Empirical Estimations

The results of the estimations are presented in Table 5.9. Growth rates are used in the analysis to capture the dynamic effects of growth. That is, for example, the growth rate of

\(^5\)The log likelihood function is chosen because it is easier to work with the (natural) logarithm of \( L \) rather than \( L \) itself. An acceptable procedure since \( L \) is always nonnegative and the logarithm function is monotonic; i.e., it preserves ordering.
agricultural output in time $t$ was represented by $(A_t - A_{t-1})/A_{t-1}$. Data for the estimations was taken from the World Bank's World Tables, various years.

Table 5.9 reveals that a single switch model as the one described above was utilized in the evaluation. The application of this switch model to Ghanaian annual data covering the period between 1966 to 1991 detected 1983 as the overall maxima, where a possible structural shift could have occurred. The two periods, 1966–1983 and 1983–1991 were therefore estimated separately by OLS and a Chow (1960) test was applied to determine whether the structural shift at 1983 is a statistically significant one.

Table 5.9: The Estimated $F^*$ Values from the Chow Tests and Whole Period and sub-period Estimates for the Coefficients of Equations

<table>
<thead>
<tr>
<th>Equation</th>
<th>Estimated Point</th>
<th>Period</th>
<th>$\alpha$</th>
<th>$\gamma$</th>
<th>$R^2$</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation 5.2</td>
<td>1983</td>
<td>1966–1991</td>
<td>-0.927</td>
<td>0.647</td>
<td>0.58</td>
<td>1.83</td>
</tr>
<tr>
<td>($F^* = 4.24$)</td>
<td></td>
<td>1966–1983</td>
<td>-2.785</td>
<td>0.679</td>
<td>0.68</td>
<td>2.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1983–1991</td>
<td>4.609</td>
<td>0.815</td>
<td>0.48</td>
<td>1.51</td>
</tr>
<tr>
<td>Equation 5.7</td>
<td>1983</td>
<td>1966–1991</td>
<td>-1.499</td>
<td>1.054</td>
<td>0.30</td>
<td>2.16</td>
</tr>
<tr>
<td>($F^* = 0.81$)</td>
<td></td>
<td>1966–1983</td>
<td>-4.196</td>
<td>1.093</td>
<td>0.33</td>
<td>2.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1983–1991</td>
<td>3.856</td>
<td>0.932</td>
<td>0.52</td>
<td>1.68</td>
</tr>
<tr>
<td>Equation 5.8</td>
<td>1983</td>
<td>1966–1991</td>
<td>0.986</td>
<td>0.388</td>
<td>0.23</td>
<td>1.91</td>
</tr>
<tr>
<td>($F^* = 0.92$)</td>
<td></td>
<td>1966–1983</td>
<td>-0.200</td>
<td>0.386</td>
<td>0.22</td>
<td>1.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1983–1991</td>
<td>4.091</td>
<td>0.482</td>
<td>0.67</td>
<td>1.63</td>
</tr>
</tbody>
</table>

Notes: The numbers in parenthesis are t-values. $F_{0.05}(2, 23) = 3.40$. Method of estimation is OLS technique (OLS).

Source: Data for analysis taken from World Bank's World Tables and Quarterly Digest of Statistics, Ghana Statistical Service.

The results indicate a statistically significant structural shift during 1983 for equation (5.2), but an insignificant shift for equations (5.7) and (5.8). The Chow tests gave rise to the computed $F^*$ values of 4.24, 0.81 and 0.92 for equations (5.2), (5.7) and (5.8), respectively. Compared to the tabulated value of $F = 3.42$ at the 5% level of significance with (2,23) degrees of freedom, the null hypothesis that the post–1983 observations obeyed the same structural relation as the pre–1983 can be rejected for equation (5.2). This indicates that

---

6 It is probably interesting to note that 1983 was not only the year the ERP was launched, but only the year about 1.5 million illegal Ghanaians residing in Nigeria were sent home overnight. It was also the year of unprecedented bushfires that devastated large farm areas and forced the Rawlings government to launch an appeal for international food aid.
any attempt to estimate this relationship has to be done with separate estimations of the two regimes.

Quite evident from the results is the fact that the structural breakdown of this relation is due to the shift in the values of both the \( \alpha \) and \( \beta \) coefficients. On the other hand, the null hypothesis of no structural shift can be accepted for equations (5.7) and (5.8). For these equations, estimating the two regimes with one equation such as is done with data from 1966–1991 is therefore an acceptable procedure. An estimation to examine the structural stability between growth in manufacturing and GDP growth also produced statistically insignificant results. It is significant to note that the results of equation (5.7) fail to confirm the theoretical expectation that the structural shift in the relation between \( g^{GDP} \) and \( g^a \) is due to a structural shift in the auxiliary relation between \( g^{na} \) and \( g^a \). This is due to the fact that the structural shift in the auxiliary relation is statistically insignificant. The empirical findings show that 1983 could be identified as the turning point for the high performance of Ghanaian agriculture in stimulating overall growth. As discussed in section 5.3.3, the sector’s contribution to GDP growth increased appreciable between 1983–90, after a decline in the 1970s and 1980s.

A glance at the results from equation (5.7) reveals that all the \( \gamma \) coefficients, which represents the impacts of growth rate of agriculture on the rate of growth of non-agriculture are all positive and statistically significant at the 1% level. This indicates that over the period under consideration, growth in agriculture contributed significantly to the growth of the non-agricultural sector.

The \( \gamma \) coefficient for the first sub-period suggests that a 1% increase in agricultural output leads to a 1% increase in output in the non-agricultural sector, while the the size of the coefficient for the second sub-period indicates that a 1% increase in agricultural output results in a 0.9% increase in non-agricultural output. These results do not reveal a marked difference between the two sub-periods. The results of equation (5.8) also show that growth rate in the manufacturing sector contributed positively to growth in the non-manufacturing sector. The \( \gamma \) coefficient for the first sub-period in this equation suggests that a 1% increase in manufacturing output results in about 0.39% increase in non-manufacturing output, while the coefficient for the second sub-period suggests that a 1% increase in manufacturing output results in about 0.48% increase in non-manufacturing output. Although there is no statistical evidence for a marked structural shift, the values of the \( \gamma \) coefficient in the first sub-period, compared to those in the second sub-period, indicate a marked gradual recovery. Quite apparent is the fact that the magnitude of the agricultural multiplier on non-agricultural growth is larger than that of manufacturing on manufacturing.

The positive and statistically significant effect of agricultural output growth on output growth in the non-agricultural sector observed in this study contrasts with the findings of Kappel (1990) for a sample of 65 developing countries. In his cross-country analysis of 65 developing countries using Kaldor’s framework to examine the contribution of the agricultural sector to the development of the non-agricultural sector, Kappel found out that the growth of output in agriculture did not have a statistically significant effect on growth of the non-agricultural output. His results are produced below

\[
q_{na} = 4.029 + 0.715 q_a \frac{Q_{a0}}{Y_0} \quad (5.13)
\]

\[
(2.60) \quad (3.22)
\]

\[
R^2 = 0.03 \quad F = 3.01
\]
where $q_{na}$ is the growth rate of non-agricultural output, $q_a$ is the growth rate of agricultural output, $Q_{n0}$ is the agricultural output in the basis year, and $Y_0$ is the GDP in the basis year. As equation (5.13) shows, the $t$-value of the coefficient of agricultural growth is not significant at the 5% level. It can further be observed that the adjusted coefficient of determination $\hat{R}^2$ is only 0.03 suggesting that there is virtually no relationship between growth of output in the agricultural sector and that in the non-agricultural sector. The possible reason for the divergent results is clearly due to the fact that Kappel's study is a cross-country analysis which consists of a mixture of low-income and middle-income developing economies characterised by large differences in economic structures, economic resources and level of development. Where a wide variation exists between countries in the relative sizes of the agricultural sectors, growth of agricultural output could have differential impacts on the growth of the rest of the economy.

The results obtained for the estimation of equation (5.5), however, fully conform to the cross-country findings of Kappel. The positive and highly significant coefficient for the growth of manufacturing obtained in this study support the cross-country estimates of Kappel (equation 5.14).

$$q_{nm} = 1.62 + 0.158 \ln \frac{Q_{m0}}{Y_0}$$

$(4.49) (8.75)$

$$\hat{R}^2 = 0.54 \quad F = 76.6$$

where $q_{nm}$ is the growth rate of non-manufacturing output, $q_m$ is the growth rate of manufacturing output, $Q_{m0}$ is the manufacturing output in the basis year, and $Y_0$ is the GDP in the basis year. As equation (5.14) shows, growth rate in the manufacturing sector exerts a highly positive impact on growth of output in the non-manufacturing sector. Kappel proceeds to demonstrate that growth in output in the manufacturing sector has a statistically significant effect on the growth rate of employment in the sector, suggesting that as output in the manufacturing sector grows, employment grows in that sector. This could also imply that labour is possibly drawn from the traditional sector into the manufacturing sector. Since his study further demonstrates that output growth in the manufacturing sector is accompanied by growth in productivity in the sector, drawing labour from the traditional sector could result in an increase in productivity in this sector.

The Question of Simultaneity

It is significant to note that the foregoing analysis based on the highly debated Kaldor's growth law, is a simplified case. This is due to the fact that in a single-country macroeconomic model that seeks to capture the relationship between the growth rate of agricultural and non-agricultural incomes, the interdependence of both variables would have to be taken into consideration. Recalling that several other factors, besides growth in agricultural income affect the growth of income in the non-agricultural sector, it becomes obvious that...
single equations such as equations (5.7) and (5.8) cannot effectively capture the interdependence between the two sectors. Similarly, several factors besides manufacturing growth will affect growth in the non-manufacturing sector. In particular, the state of infrastructure and population densities are very likely to influence growth in the non-agricultural sector. Improvement in infrastructure tend to facilitate the transport and communication systems, as well as credit flows in the economy which can help strengthen the linkages between the agricultural and non-agricultural sectors, and between manufacturing and non-manufacturing sectors.

In a time-series analysis, as the one carried out here, it is quite difficult to find realistic variables as proxies to capture the effects of infrastructural changes on sectoral income growth. This makes the inclusion of such a variable in the present analysis extremely difficult. In spite of this, remaining in the simple framework of Kaldor's hypothesis for the purpose of this analysis still requires that an attempt be made to simultaneously determine the growth linkages between agricultural and non-agricultural output, given the high degree of simultaneity that is likely to exist between the variables involved in the parameters of equation (5.4).

In conventional micro-economics, the output or supply of a commodity is positively related to the price of that commodity. The assumption is that as the prices producers receive for their commodities rise, they increase the supply of their products. Under this assumption, as the prices of agricultural goods increase relative to those of other goods (agricultural terms of trade), the real income earnings of agricultural producers is expected to rise.

\[
g_a = f \left( \frac{P_a}{P_{na}} \right); \quad \frac{\partial g_a}{\partial P_a/P_{na}} > 0
\]  

(5.15)

where \( g_a \) refers to the income in the agricultural sector, and \( P_a/P_{na} \) is the price of agricultural goods relative to non-agricultural goods. Under this interpretation, the partial elasticity of agricultural income with respect to \( P_a/P_{na} \) is positive. Nugent and Glezakos (1982), arguing from the point of view of marginal productivity theory, maintain that in economies dominated by agriculture, the expected sign of this coefficient is likely to be positive. However, as Sheehey (1986) suggests, in developing countries where the agricultural sector is relatively large, the size or sign of this coefficient is likely to change in the short term since a large increase in agricultural production would tend to result in declines rather than increases in the prices of farm goods, which then could have a negative impact on agricultural income. To allow for the possibility that the negative effects will soon be felt, a lagged term of this variable is included in the regression equation.

Since the availability of agricultural inputs affects output in the agricultural sector, it will be expected that income from sales of farm products will be affected by the ability of farm households to obtain farm inputs. The sign of the coefficient here will again depend on the extent to which prices react to cyclical output changes. If prices respond negatively...
5.3. LINKAGES IN THE GHANAIAN ECONOMY

to output increases, and demand for the commodity is inelastic, then aggregate income is likely to decline.

While the availability of agricultural prerequisites is considered here as a likely determinant of agricultural output and income, it needs to be noted that the distribution of inputs to the various crop sectors cannot be captured. For example, whether a large proportion of fertilizers and insecticides are channeled into food or cash crops in times of shortages will have differential impacts on aggregate agricultural income. If a country that is a price taker for a commodity on the world market increases its output of the commodity, the export earnings is likely to rise. At the same time shortages of these inputs for the domestic food production could lead to decline in output, and a consequent rise in prices. The aggregate agricultural income could therefore increase under such circumstances.

On the other hand, if agricultural inputs are in abundance for the entire agricultural sector, aggregate output is likely to increase, granting that weather conditions are favourable. The net effect on income will then depend on the differential responds of prices to cyclical output. To capture the impacts of domestic availability of agricultural inputs, annual imports of agricultural prerequisites was included in the equation for agricultural income.

As mentioned earlier on (see section 5.3.2), growth in the non-agricultural sector is likely to have positive effects on the agricultural sector. As the non-farm sector expands, the demand for agricultural raw materials for the manufacturing industries increase. In addition, since food constitutes a greater proportion of the urban household expenditure basket (see Table 5.5), an increase in income in the nonagricultural sector could lead to increased demand for food and other agricultural products. For example, as non-farm incomes increase, consumption of meat, fruits and vegetables is expected to rise. Furthermore, increased growth and productivity in the non-agricultural sector, can draw labour from the agricultural sector, thus increasing productivity in the sector specifically, and in the economy as a whole. The specified equation for agricultural income is then

$$g_{t} = \alpha_0 + \alpha_1 g_{t}^{na} + \alpha_2 \frac{P_a}{P_{nat}} + \alpha_3 \frac{P_d}{P_{nat-1}} + \alpha_4 g_{t}^{im} + \mu_t$$ (5.16)

where $g_{t}^{a}$ and $g_{t}^{na}$ represent growth rates of income in the agricultural and non-agricultural sectors, respectively. The growth rate of agricultural terms of trade is also represented by $\frac{P_a}{P_{nat}}$, while $g_{t}^{im}$ refers to the growth rate of imports of agricultural prerequisites.

The feedback effect of growth of agriculture on the growth rate of non-agriculture can be captured by expanding the model to include an equation for growth in non-agricultural output. As discussed earlier, the forward and backward linkages between these two sectors implies that growth in agricultural output is expected to have positive impacts on growth in non-agricultural output.

As a second determinant of non-agricultural output, the imports of intermediate goods can be considered to have positive effects on output growth. The fact that several developing countries face problems of spare parts and intermediate capital goods to increase industrial output justifies the inclusion of such a variable. Imports of non-agricultural intermediate goods is therefore included as a proxy for imports of industrial raw materials. Here again, to allow for the possibility that the positive effects of agricultural output growth will soon be felt, a lagged term of this variable is included in the equation. The equation for non-agricultural growth is therefore specified as

$$g_{t}^{na} = \beta_0 + \beta_1 g_{t}^{a} + \beta_2 g_{t-1}^{a} + \beta_3 g_{t-1}^{na} + \beta_4 g_{t}^{im} + \epsilon_t$$ (5.17)
where $g_i^{im}$ is the growth rate of imports of industrial raw materials. It is apparent that the model is more complicated with the feedback effect than without the feedback. The actual method of estimation is Two-stage Least Squares (2SLS).

Data on price indices for agricultural and non-agricultural goods was obtained from the Ghana Statistical Services, while that on output of agricultural and non-agricultural sectors, as well as imports of industrial raw materials was taken from the World Bank's World Tables. Data on Imports of agricultural prerequisites was also obtained from FAO Production Yearbook.

5.3.4 Results

Table 5.10 contains results for the non-agricultural output growth estimation, while the results for agricultural output growth are presented in Table 5.11. The primary area of concern in the results is the sign as well as the size of the coefficients. The Durbin - h statistic provided in the Table shows that there is no autocorrelation in equation (5.17). Although 2SLS provide consistent estimates for a dynamic simultaneous equation system when the equations are just identified and the errors are independent, caution have to be exercised when lagged dependent variables serve as regressors in this equation. This is because, if the error terms are autocorrelated, 2SLS cannot produce consistent estimates of the estimation coefficients, and the usual formula of the asymptotic covariance matrix is invalid (Godfrey, 1978). Using a test, derived from the Lagrange Multiplier (LM) principle — LM test — developed by Godfrey (1978), no evidence of autocorrelation was present in equation (5.17).  

Table 5.10: Estimated Results for Non-Agricultural Growth

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Coefficients</th>
<th>t-Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-7.999</td>
<td>2.639</td>
</tr>
<tr>
<td>$g_t^a$</td>
<td>1.653*</td>
<td>5.689</td>
</tr>
<tr>
<td>$g_{t-1}^a$</td>
<td>0.699*</td>
<td>2.532</td>
</tr>
<tr>
<td>$g_{t-1}^{na}$</td>
<td>-0.301c</td>
<td>1.946</td>
</tr>
</tbody>
</table>

$R^2 = 0.62$  
$D_h = 1.26$  
$F - Statistic = 38.8$

Notes: $g_a = $ Real Agricultural Output Growth; $g_{na} = $ Real Non-agricultural Output Growth. The method of estimation is Two-stage Least Squares (2SLS). Significance levels are (90%)c, (95%)k and (99%)a.

Source: Data for analysis taken from World Bank's World Tables.

The results in Table 5.10 indicate a statistically significant effect of agricultural growth on non-agricultural growth at the 1% level. A closer look at the Table reveals that the use of the Two-stage Least Squares procedure produces different results from that produced by Ordinary Least Squares. Although the coefficient of agricultural income remains positive and statistically significant at the 1% level, the magnitude of the coefficient changes. The size of the coefficient increases from 1.05 in the OLS estimation technique to 1.65 in the 2SLS

\p{For details of this test, see Godfrey, (1978) and Breusch, (1978).}
5.3. LINKAGES IN THE GHANAIAN ECONOMY

technique, suggesting that the magnitude of the impacts of agricultural growth on non-agricultural growth increases, when the two growth rates are simultaneously determined.\textsuperscript{11}

The size of the effect of agricultural output on non-agricultural output obtained with the 2SLS estimation indicates that for a 1% increase in agricultural income, non-agricultural income would increase by 1.65% — a more than proportional change. This relationship is not unexpected for a developing country like Ghana where a great majority of the people live in rural areas and are employed in the agricultural sector. As discussed earlier in this chapter, an increase in farm income results in an increase in demand for goods outside agriculture. Apart from increasing the demand for consumer and capital goods, demand for services in the economy also increases in response to rising agricultural income. Imports of prerequisites was found not to have a significant effect on output growth in the non-agricultural sector. It is, however, essential to note that a disaggregation of imports of non-agricultural goods into production and consumer goods is extremely difficult, and as such was not undertaken in this analysis. The observed insignificance of the coefficient, as well as its effects on the $R^2$ (adjusted $R^2$) and $\hat{\sigma}^2$ (residual variance), which resulted in the dropping of the variable from the estimation could be due to this disaggregation problem.

The 2SLS coefficient for real agricultural growth lagged one year suggest that even over time, growth in agricultural output still have positive impacts on growth in the non-agricultural sector. It can, however, be observed that the magnitude of the coefficient and the $t$ — value reduced tremendously, indicating that while output growth in agriculture in the period $t - 1$ still exerts a positive influence on output growth in the non-agricultural sector in period $t$, the extent of the influence diminishes with time.

Another interesting observation from the results is the fact that the lagged values of non-agricultural output growth tend to have negative influence — albeit small — on output growth in that sector. A possible reason is that output growth in period $t - 1$ exerts an upward pressure on prices and wages in period $t$, which tend to reduce demand and output in the sector in this period.\textsuperscript{12}

An examination of the results in Table 5.11 also point to some interesting observations. The first of these observations is that non-agricultural growth does have a positive and significant effect on agricultural growth. The size of the coefficient indicates that a 1% growth in non-agricultural output leads to a 0.4% growth in agricultural output. This again, is not surprising, since the agricultural sector produces mainly primarily food crops for consumption — with income inelastic demand — and cash crops, mainly for exports. Following this, even large increases in output and income in the non-agricultural sector will hardly result in any significant increase in demand for agricultural products, since consumers prefer other household amenities and luxury goods. Here again, the imports of non-agricultural goods, the imports of agricultural prerequisites was not significantly different from zero, even at the 10% level, and was as such dropped from the equation.

It can further be observed that the coefficient for the agricultural terms of trade is positive and statistically significant at the 5% level, implying that the price relation between  

\textsuperscript{11}It is important to mention that the inclusion of other explanatory variables in the 2SLS estimation most probably accounts for the increase in magnitude of the agricultural growth coefficient compared to that obtained from the OLS procedure. A comparison of the results from the two estimation techniques in this case is therefore unnecessary, since the estimations are not done with the same explanatory variables. What is essential for our analysis is the fact that within the simple framework of the Kaldor hypothesis, the results indicate a positive and highly significant effect of agricultural output on non-agricultural output in both cases.

\textsuperscript{12}Since aggregate figures are used, the extent to which changes occur in the various industries within the non-agricultural sector cannot be examined. In this case, if a large increase in output takes place in a few sectors, this could resulted in an increase in the demand for products of other industries. This combined effect would be to drive prices and wages up.
agricultural goods and non-agricultural goods influences real agricultural output. This confirms the hypothesis that an improvement in the terms of trade for the agricultural sector speeds up output growth in the sector. That is, as the prices of agricultural products increase relative to prices of other commodities, farmers are encouraged to step up their output. This finding is in line with the widely held view that higher agricultural commodity prices would be a relatively easy way to raise the incomes of the vast majority of the rural poor by increasing the prices they receive for their products (see, for example, Nugent and Glezakos, 1982). It is, however, significant to mention that research surveys from other parts of Africa indicate that a considerable proportion of poor households in rural areas are net buyers of food, and as such rising food prices could adversely affect the food security situation in such countries.13

Quite interesting is also the size of the coefficient for agricultural terms of trade lagged one year. The results reveal that although the coefficient remains positive as in the case of current agricultural terms of trade, the $t$-value declines from 2.233 to 0.130, suggesting that over time the agricultural terms of trade does not tend to have a significant impact on agricultural output. The size of the coefficient also reduces from 0.275 to 0.013, again indicating that over a period of one year, the magnitude of the positive effect of agricultural terms of trade on output growth declines dramatically.

This supports Sheehey’s (1979) hypothesis that increases in agricultural output brought about by price increases would tend to result in declines in the prices of farm goods in the short-run which, in turn, can reduce output growth in the sector. Particularly in the case of Ghana where income from cocoa earnings constitutes a large proportion of agricultural output, price increases that encourage increase in output can result in a decline in prices and total agricultural output, if other producers respond in the same way to the price increases

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13For example, in a recent empirical analysis, Weber et al., 1988, show that in major grain-producing areas of five countries for which data are available, 50% or less of rural households were net sellers of major staples, even though all of these households were engaged in food crop production. They therefore concluded that the large number of households that are net buyers would be harmed by such policies, at least in the short run, while a significant number that have no net sales or purchases may not be directly affected one way or another.
by increasing their supply — "fallacy of composition". It needs, however, to note that Ghana no longer dominates the international cocoa market as the case was in the 1950s and 1960s, when it used to supply over 40% of world output. Nevertheless, significant output increases in Ghanaian cocoa output, together with output increases in other major producing countries have resulted in price slumps since the mid-1980s. Analysing instability of world prices for primary products, Hazell et al. (1990), conclude that there is a sizeable instability in the export prices for tropical products, especially cocoa and coffee. This, according to them, undoubtedly present challenging problems for countries such as Ghana and Côte d'Ivoire.

A similar development is observed for the non-cocoa sector, where high prices in a particular year encourages producers to increase output in that year, and to additionally mobilize resources the following year to expand output. Such output expansions, have often exerted a downward pressure on prices in the absence of price stabilization schemes. For example, the producer price ratio between maize and non-agricultural goods increased from 1.63 in 1982 to 4.62 in 1983, while the corresponding figure for rice increased from 4.46 to 6.61. The relatively high prices that prevailed in 1983 and the first half of 1984 stimulated farmers to increase output of fodd crops, particularly cereals. Workers employed outside agriculture also engaged themselves in part-time farming. The end effect was to increase agricultural output enormously in 1984. While maize production increased from 173,000 tons in 1983 to 574,000 tons in 1984, output of rice increased from 40,000 tons to 66,000 tons within the same period. The production of other food crops also increased dramatically, as will be shown in the next chapter. The increased output again exerted a downward pressure on these commodities, leading to a decline in relative prices in the later part of 1984, which again continued into 1985 (see Tables B.5 and B.6 in Appendix C).

The strong influence of agriculture on the non-agricultural sector stems from the fact that the former serves as a motor for general economic growth. As is apparent from Figure 5.3, years of high agricultural output correspond with years of high economic growth.

Experiences of several countries, in particular, developing countries (e.g., Argentina, Brazil, Nigeria, etc.) show that industrialization for a home market can make little progress unless agriculture is progressing vigorously at the same time, to provide both the market for industry, and industry's labour supply. If agriculture is stagnant, the overall economy — including industry — cannot grow. The policy failure associated with Ghana's generally dismal economic performance between 1957-82 is to be explained by the undue weight given to industrial development and consequent relative neglect of agriculture. While the period between 1955 and 1960 was characterised by a per capita real income growth of between 2% and 3% per annum, the 1960s witnessed a phase of economic stagnation, during which the economy failed to grow at all. The 1970s saw the economy go into long-running decline, and between 1980 and 1982, real per capita income declined at an annual average of 2%. From the mid-70s to early 80s alone, real per capita income declined by a massive 30%.

The proximate cause of this rapid and unprecedented economic decline was bad and excessive economic management. A highly distorted structure of prices (including the exchange rate) constrained exports and as the debt burden increased, imports of badly needed consumer and intermediate goods were also restricted. Agriculture was heavily discrimated. Cocoa farmers were excessively exploited — in the form of export taxes — in order, inter

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14 The fallacy of composition is used in modern international trade theory to refer to a situation where a number of primary producers devalue their currencies simultaneously and all increase the incentives to supply primary products. When a supply response does occur, there may be a significant increase in world production and a consequent reduction in world prices.

15 It certainly needs to be mentioned that the record yields of 1984 was supported by the good rains of that year, as compared to the unprecedented drought and bush fires of the previous year.
in r-~

cr co en en

Years

Figure 5.3: Output Indices of GDP and Agriculture

alia, to finance large and unproductive public investments (Pickett, 1988). As will be explained in detail in the next chapter, the declining exports led to serious revenue shortfalls for the central government, due to reduced domestic taxes and foreign earnings, and consequently budget deficits. The economy was therefore starved of important inputs and as a result capacity utilization in the manufacturing sector was reduced to only 15-20% (Chand and Til, 1988).

In summary, the findings of this analysis show that there exists strong linkages between the agricultural and non-agricultural sectors. This implies that growth in the non-agricultural sector, and overall economic growth can be encouraged by supporting agricultural growth. These findings, although a single country case, is not consistent with Kaldor's hypothesis that the agricultural sector does not contribute significantly to overall economic growth. As stated earlier, Kaldor's analysis was done for a cross-section of industrialized countries, with relatively insignificant agricultural shares in total GDP. The results, however, lend support to Kaldor's hypothesis that growth in the manufacturing sector is essential for growth in the other sectors and as such the overall growth of the economy. The analysis brings to light the fact that, in developing economies characterised predominantly by agriculture, the agricultural sector can serve as an "engine of growth" for the whole economy. As development proceeds and the share of agriculture dwindles, with the industrial sector gaining increasing significance, the manufacturing sector could take up the role of leading sector.

Investment in agricultural infrastructure and research to increase agricultural productivity, as well as the provision of price incentives for the production, marketing and consumption of agricultural commodities are some of the measures that can boost agricultural output and overall socio-economic development. Recalling from section 3.1.4 that alleviating poverty requires general economic growth, policy measures that promote general economic growth are very essential. This calls for increased support for the productive sector as stated above. As will be shown in the next chapter economic reforms aimed at revitalising the productive sectors can produce positive results in this regard.
The preceding sections in this chapter have reviewed and analysed the linkages between the farm and non-farm sectors, and how essential each of them is in the socio-economic development of underdeveloped countries, in particular low-income countries. It was mentioned at the beginning of the study that its primary objective is, among other things, to develop proposals that can help to increase employment and earnings of the poor in underdeveloped countries. In view of this goal, an investigation of how growth in the non-farm sector can increase employment opportunities and bid up wage rates, particularly in rural areas is quite significant. Of particular interest is how the availability of non-farm employment improves the bargaining power of rural households in the agricultural labour markets.

**Labour Allocation between Agricultural and Non-agricultural Activities**

It was assumed in the theoretical framework of the real agricultural wage model that labour was allocated exclusively to the agricultural sector. This empirically convenient assumption will be relaxed in this section, in an attempt to examine the role of the non-farm sector in generating employment and incomes. In deriving the equilibrium condition in the wage model, it was stated that, at equilibrium the aggregate supply of agricultural labour must be equal to the aggregate demand of agricultural labour, and that the supply of labour to the agricultural sector is a function of the real agricultural wage rate (see equations (4.19) and (4.28). For the purposes of this study, the analysis will first be limited the rural labour market (a closed one), after which this restriction will be relaxed to include urban areas.

**5.3.5 Employment in a Closed Rural Labour Market**

Assuming in a rural area, the available labour has to be allocated between the agricultural sector, denoted by \( L_a \), and the non-agricultural sector, denoted by \( L_g \), where \( L_g \) is the sum of non-agricultural formal sector wage employment and self-employment. The total labour supply in the area can then be represented by \( (L_a + L_g) = L \).

In that case, the supply of labour to the agricultural sector \( L_a \), can be expressed as

\[
L_a = l(W_a/W_g)
\]

(5.18)

where \( W_a \) is the wage rate in the agricultural sector, and \( W_g \) is the wage rate in the non-agricultural sector. In contrast to equation (4.19), this equation implies that the supply of labour to the agricultural sector, \( L_a \), is simultaneously determined by wages in the agricultural and non-agricultural sectors. An implicit assumption in equation (5.18) is, however, the fact that the worker does not migrate to the urban centre as a result of urban-rural expected income differential, and as such allocates his total labour to the rural sector. The supply of labour to the non-farm sector \( L_g \), can be analogously expressed as

\[
L_g = f(W_g/W_a)
\]

(5.19)

showing again that the supply of labour to the non-farm sector depends on the wage rate the employer in that sector pays, relative to an alternative earning possibility outside the sector.

The total demand for labour in the area can then be represented as

\[
\bar{D} = D_a + D_g
\]

(5.20)

where \( D_g \) is the labour demand in the non-farm sector, and \( D_a \) refers to the demand for labour in the farm sector.
In a particular period, granting no population growth takes place, and no migration into the area occurs, the total supply of labour $L$ will remain unchanged. If employment opportunities avail in the non-farm sector, $D_g$ will take up a positive value. Hence $D$ in equation (5.20) would be greater than $D_a$, indicating that, even if $D_a$ remains constant, but $D_g$ continues to grow, the total labour demand in the area will continuously increase. Recalling that the wage rate in a market clearing setting depends on the supply and demand of labour, it can be concluded that an increase in in employment possibilities outside the farm sector can lead to an increase in wage rates in the farm sector.

The preceding discussion shows that generating alternative employment possibilities outside agriculture helps to boost wage rates in the agricultural labour market. That is, if the employer in the farm sector faces competition with demand from the non-farm sector, he would be compelled to offer more attractive wages.\(^{16}\) In areas where employment growth in the farm sector is stagnant or declining — as is the case in many developing countries — an increase in rural employment and incomes for the lowest income groups, who actively participate in the rural labour market, will depend heavily on growth in the demand for rural labour outside agriculture. This issue of alternative earning possibilities is particularly important in labour markets controlled by employers with monopsony power.

Since the monopsonist uses his market power to determine the wage rate and unemployment level of the workers, those with an inelastic labour supply (i.e., those without any alternative source of income, or landless workers) with very low to virtually no bargaining power, would receive low wages. On the other hand, labourers with elastic labour supply (in view of their alternative sources of income) possess a stronger position in facing the monopsonist, and as such are able to earn higher wages. The operation of a labour market controlled by a monopsonist is so central to the foregoing discussion that a detailed discussion is undertaken below.

Monopsony in a Rural Labour Market

Assuming that the labour supply function of the two groups of agricultural workers — i.e., those without any alternative source of income and those with alternative earning possibility to agriculture — in a village labour market is represented by

$$L_i = a_0 + a_1 W_i + a_2 RP + a_3 Z + \varepsilon$$  \hspace{1cm} (5.21)

where $i$ represents the two groups of workers, with $L_1 = L_1(W_a)$ and $L_2 = L_2(W_a/W_g)$. $RP$ is the size of the rural population, and $Z_i$ represents other supply shifters such as the physical health and nutritional status of the worker and length of time each individual actually works. That is, agriculture is the only source of income for group one workers, group two workers have an alternative source of income in the non-farm sector. Other things remaining the same, the coefficient $a_1$, which measures the response of labour supply to changes in the wage rate would be grater for the second group than for the first group. This is due to the fact that group two workers can react with their supply of labour to changes in the wage rate — alternative earning possibility outside the farm sector — whereas group one workers who have no alternative earning possibility can hardly react to changes in the wage rate.

For an empirical illustration, consider, for example, a monopsonist in the labour market

\(^{16}\) Quite interesting is also the fact that the rural non-agricultural sector uses more labour-intensive methods of production, so that the multiplier effect of the sector in creating employment will be great (see Norcliff, [1983]; Nattrass, [1987]).
who faces several potential workers, and as such can fix the wages for his employees arbitrary. In this case, he would be facing a rising supply curve. Now, if he decides to employ more labourers, he has to pay more; and this will involve extra payments to the (x) existing employees as well as to the additional labourers taken on. The marginal cost (MC) will be given by

\[ MC = \frac{d}{dx}(wx) = w + x \frac{dw}{dx} = w\left(1 + \frac{1}{\eta}\right) \]  

(5.22)

where \( w \) refers to the wage rate, and \( \eta \) represents the elasticity of supply and is positive. The monopsonist equates his marginal benefit (MB) to the marginal cost (MC). From equation (5.22), the optimum for the monopsonist can be expressed as

\[ MB = w\left(1 + \frac{1}{\eta}\right) \]  

(5.23)

In numerical terms, assuming the marginal supplier has an elasticity of 0.65 (i.e., inelastic supply), and the marginal benefit from his services is 3.0, this implies that the employer has to fix his wage rate such that his marginal benefits will equal the marginal cost. That is, \( (3 - w)/w = 1/1.5 \) Solving for \( w \) yields 1.2, which indicates that, to equate marginal benefit to marginal cost, the employer will have to pay about 1.2 units (for example 1.2 dollars per hour) to the supplier. On the other hand, if the marginal man or supplier has a supply elasticity of 1.4 (i.e., elastic supply), then the monopsonist will have to fix the wage rate such that \( (3 - w)/w = 1/1.4 \). Solving again for \( w \) yields 1.75. This numerical solution illustrates that workers with elastic labour supply have better chances of been paid higher wages than those with inelastic labour supply. This results lend support to the hypothesis that although all employees of a monopsonist could be paid less than the marginal benefit they confer upon the employer, the marginal supplier with an inelastic supply could be at a greater disadvantage.

A clearer picture is illustrated in Figure 5.4. The Figure depicts the possible wage levels that can pertain in a rural labour market where a monopsonist faces either an elastic or an inelastic labour supply. The \( S_L \) and \( D_L \), curves represent the short-term labour supply and demand curves, respectively, for the monopsonist. \( S_E \) and \( S_{IE} \) are respectively used to show the supply curves of workers with elastic and those with inelastic supply of labour, while \( MCL_E \) and \( MCL_{IE} \) represent marginal cost of labour for elastic and inelastic supply of labour, respectively.

Since the monopsonist can dictate the wage rate in the labour market, he can choose to pay his employees below their marginal productivity. In this case, if he faces employees who have an elastic supply of labour, he chooses to pay them \( W_E \), and demand \( D_E \) amount of labour on the market. On the other hand, if he faces workers with an inelastic supply — virtually no alternative employment possibility — he offers the wage rate \( W_{IE} \) which corresponds to the inelastic supply curve \( S_{IE} \), and demands an amount of labour equivalent to \( D_{IE} \). Although both \( W_E \) and \( W_{IE} \) are below the wage rate \( W_{EQ} \) (i.e., the wage rate that would pertain under competitive conditions), \( W_E \) is still higher than \( W_{IE} \).

The above analysis shows that in both cases, the monopsonist pays labour below its marginal product. In other words, the marginal benefits derived by the monopsonist is greater than the marginal wage offered — with a demand of labour that is lower than demand under competitive equilibrium. It is interesting to note that, because the worker with inelastic supply of labour has no alternative source of employment, he is exploited more than the one with alternative job opportunities. A strong conclusion that can be drawn from
the figure is the fact that the monopsonists would be compelled to increase his wage rate and demand for labour, if he faces competition from other market actors. This is due to the fact that in a competitive setting the producer expands output of his product to the optimum to remain competitive. The latter condition requiring additional inputs.\footnote{The marginal cost of labour curve (MCL) is derived from the the labour supply curve. The latter expresses the wage rate as a function of the amount of labour supplied (i.e., $W = f(N)$). Under the assumption that the function is linear, it can be written as $W = \alpha + \beta N$. The total labour cost can also be represented as $L = W \cdot N$, where $W$ is the wage rate and $N$ the amount of labour hired. Substituting for $W$, $L$ can be represented as $L = \alpha N + \beta N^2$. The marginal cost is then obtained by differentiating the last equation with respect to $N$. That is, $\delta L/\delta N = \alpha + 2\beta N$.}

5.3.6 Transaction Costs and the Rural Labour Market

In this section, the impacts of key policies such as infrastructure improvement, technology provision, and credit market development — which affect the nature of transaction costs — on the rural demand for and supply of labour are analysed. As stated earlier in this study, the impacts of transaction costs have gained increasing significance in the economic
5.3. LINKAGES IN THE GHANAIAN ECONOMY

literature. For instance, de Janvry and Sadoulet (1992) in a recent paper emphasize the role of transaction costs by suggesting that in the identification of the role of public policy, it is important to distinguish those public goods which directly affect the individual households' elasticity of supply response (irrigation, electrification, extension, research, health, education) from those which affect the structure of transaction costs (such as transportation costs, market structure, banking services, information, legal services, etc.) and hence the transmission of price signals and ultimately the decision to sell, buy, or withdraw from transactions through the market.

Impacts of Infrastructural Development on Rural Employment

The significance of infrastructure development is appreciated, if one considers the challenges faced by the road transport sector in many developing countries. Roads in many countries, particularly in the rural areas of Africa have deteriorated to the stage where costs of transport add significantly to the costs of inputs and outputs, thereby constraining economic growth. Lower transport costs associated with improvements in road transport would, in this situation, stimulate additional agricultural production and non-farm activities. A substantial shift of resources from one sector to the other can also from an improvement of infrastructure.

Failure of markets are quite common in situations where the utility derived from the market exchange is less than the cost of transaction required to carry out the exchange, resulting in the market not being used for the transaction. Some evidence of labour market failures in Africa indicate that to a certain extent, poor infrastructure has being responsible for market failures.18 As will be argued later in this section, the lack of good roads and transport systems tend to hinder the efficient flow of information, even within villages in the same districts. In such cases the mobility of factors between small and large farms are usually adversely affected within the economy, to the extent that labour-deficit areas co-exist with labour-surplus areas in the same districts, thus preventing the equalization of factor proportions (i.e., equalizing the marginal products of factors on farms of different sizes) across holdings of different sizes (see Collier, 1989).

De Janvry et al. (1990), have shown that the width of the price bands between the sales price and purchase price of commodities such as food and labour sold by peasant households depends on transportation costs to and from the market, mark-ups by merchants,19 the opportunity cost of time involved in selling (search costs) and buying (recruitment costs), and a variety of transaction costs that are largely household specific.

The pioneering work of Hymer and Resnick (1969) is used as a starting point to demonstrate the possible effects of infrastructural improvement on rural employment. Assuming two crops are produced in a rural area — a labour-intensive (vegetables, fruits, and tree crops), and a land-intensive (e.g., animal farming and food crops such as maize, millet, and sorghum). Let's also assume that the marketing and transport of the labour-intensive commodity requires very good roads, while that of the land-intensive crop does not necessarily require good roads. If initially in this area, land-intensive cultivation is predominant because of poor infrastructure, which consequently results in a low demand for labour, an

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18Roitman (1990), however, argues that "to say that the market is not functioning as it should (and that this is singly the result of an inefficient state) is to deny the possibility that perhaps the market is working exactly as it should in the African context."

19Depending on which market form that prevails in a rural market, mark-ups will vary. In a market where the producers face a monopsonists, the later could dictate the prices at which he buys from the peasants, and as such the possibility of realising high mark-ups would be great. On the other hand, if the merchant is operating in a competitive market, then the range of his mark-ups will be limited. Analogously, a monopolist is more likely to realise higher mark-ups than his counterpart operating in a competitive milieu.
improvement in the road and transport systems that enhances the marketing and transport of the labour-intensive crops could result in an increase in the production of this crop— and a subsequent increase in the demand for labour on the market.

This situation is quite common in remote rural areas, where vegetable cultivation and fruit production, as well as the rearing of farm animals can be undertaken. While vegetables and fresh fruits have to be transported quickly and carefully (sometimes requiring the use of storage facilities) to avoid getting damaged, live animals (cattle, sheep and goats) usually can be transported comparatively easier on bad roads, and for long distances. The poor state of roads and transport systems are also mostly responsible for the lack of market information in the rural areas. This communication gap sometimes results in the frequent physical wastage associated with the transport of perishable fruits and vegetables to distant markets already saturated with such products.

Under such conditions, improving the road and transport systems could result in reduced transport and information costs, and a consequent reduction in the prices of the affected products. Thus, if the demand for labour-intensive products such vegetables and fruits increases, the demand for labour in the producing area could rise. In most parts of Sub-Saharan Africa, farm-gate prices are often far below wholesale prices, mainly because of poor infrastructure. In Ghana, for instance, the differences between producer, wholesale, and retail prices are quite substantial (see Table 5.12). The Table reveals that the margins between the farm-gate and the retail prices are greater for rice than for maize. Whereas the differences between the producer and retail price of maize was 47% in 1980, the corresponding figure for rice in the same period was 64%. This margin increased to 93% and 106% for maize and rice, respectively in 1985. These price differences have been caused to a large extent by poor infrastructure in the rural areas (Alderman, 1991).

<table>
<thead>
<tr>
<th>Year</th>
<th>Maize Producer Price</th>
<th>Maize Wholesale Price</th>
<th>Maize Retail Price</th>
<th>Rice Producer Price</th>
<th>Rice Wholesale Price</th>
<th>Rice Retail Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>86</td>
<td>110</td>
<td>126</td>
<td>135</td>
<td>203</td>
<td>233</td>
</tr>
<tr>
<td>1970</td>
<td>87</td>
<td>117</td>
<td>135</td>
<td>185</td>
<td>269</td>
<td>310</td>
</tr>
<tr>
<td>1975</td>
<td>185</td>
<td>250</td>
<td>287</td>
<td>497</td>
<td>680</td>
<td>782</td>
</tr>
<tr>
<td>1980</td>
<td>3261</td>
<td>4141</td>
<td>4763</td>
<td>5777</td>
<td>8257</td>
<td>9495</td>
</tr>
<tr>
<td>1981</td>
<td>5845</td>
<td>7751</td>
<td>8914</td>
<td>6545</td>
<td>11914</td>
<td>13701</td>
</tr>
<tr>
<td>1982</td>
<td>5659</td>
<td>7991</td>
<td>9190</td>
<td>15530</td>
<td>22095</td>
<td>25409</td>
</tr>
<tr>
<td>1983</td>
<td>31537</td>
<td>36734</td>
<td>42245</td>
<td>45165</td>
<td>59797</td>
<td>68767</td>
</tr>
<tr>
<td>1984</td>
<td>16118</td>
<td>23378</td>
<td>26885</td>
<td>61571</td>
<td>82011</td>
<td>94313</td>
</tr>
<tr>
<td>1985</td>
<td>11819</td>
<td>19817</td>
<td>22790</td>
<td>28453</td>
<td>50971</td>
<td>58617</td>
</tr>
</tbody>
</table>

† Cedis per Metric Ton.
Source: Stryker, J.D., 1990

These additional production and marketed surpluses expected from improved infrastructural facilities can be quite substantial, if adequate supplies of complementary production inputs like seeds, fertilizers, credit, and perhaps irrigation are available. Once this happens,
there is the likelihood that the demand for agricultural labour would increase, if agriculture has already been commercialized.

On the other hand, even in cases of subsistence agriculture, improved access to markets resulting from road improvements could stimulate farmers to produce surplus for the markets, which, in turn, might call for an increase in the time allocated to the production of vegetables and fruits, since the cultivation of these crops is relatively labour-intensive. For example, the installment of a tomato processing plant in Pwalugu, a village in the Upper Region of Ghana, boosted tomato output in the region. This was particularly encouraged with the improvement of roads that made it possible for producers to convey their products to the processing centre, and to other market centres in the area.

Impacts of Transaction Costs in a Closed Rural Labour Market

The above analysis can be expanded to include a variable that explicitly captures the impacts of transaction costs on employment creation in a rural area. Such an analysis is significant in view of the increasing importance of transaction costs in the supply of and demand for farm and non-farm goods (see de Janvry and Sadoulet, 1992). This section therefore attempts to examine theoretically the positive effects of lowering transaction costs in production and marketing processes. To start with, assuming a production system is represented as

$$Y_k = Y_k(X_i, Z_j)$$  \hspace{1cm} (5.24)

where $Y_k$ is a vector of outputs in physical unit, $X_i$ is a vector of variable inputs, and $Z_j$ is a vector fixed inputs. This production function is assumed to be "well behaved"\(^{20}\). Farmers are assumed to maximize profits ($\pi$) defined as revenue less (variable) costs. Solving, the system, the profit function for the various outputs can be expressed as

$$\pi_n = p_k f(X_i, Z_j) - C_i X_i$$  \hspace{1cm} (5.25)

where $\pi_n$ are the money profits for each output, $p_k$ are the prices of output, $C_i$ are the prices of variable inputs. The farm maximizes $\pi_n$ with respect to $X_i$, given $p_k$, $C_i$, and $Z_j$. That is, the farmers are assumed to be competitive price takers, and economically rational. Now, given maximized normalized profit $\pi^* = (\pi/p)$ for each set of exogenous or pre-determined prices, the standard profit function associated with equation (5.25) for a single-output farm is expressed as

$$\pi^* = \pi^*(C/p; Z)$$  \hspace{1cm} $\pi^*_C < 0; \quad \pi^*_Z > 0$  \hspace{1cm} (5.26)

and

$$\frac{\partial \pi^*}{\partial C} = X^* = X^*(C/p; Z); \quad X^*_C < 0; \quad X^*_Z > 0$$  \hspace{1cm} (5.27)

where $\pi^*$ are the maximized real profits, $X^*$ are the optimal variable inputs. Besides the assumption that output is strictly concave in $X$, it is further assumed that output is strictly increasing in $X$ and $Z$, and decreasing in $C$. That is,

\(^{20}\)i.e., among other things, concave and differentiable
where $Y^*$ are the optimal output levels and $C$ are the input prices normalized by the output prices.

Equation (5.27) of the foregoing analysis shows that at the optimum level of production, $X^*_z > 0$. That is, the demand for a variable input in a production process is a positive function of the demand for a fixed input.

For the introduction of transaction costs, consider that the producer markets the products himself. That is, he sends it to the markets, and as such incurs transaction costs. Now if labour is taken to be a variable input and land a fixed input, and it is assumed that the demand for labour $D_l$ is a positive function of the acreage under cultivation $A_c$ — as derived in equation (5.27). That is, $D_l = z(A_c)$, with $z' > 0$. Now, if it is further assumed that the acreage size is a negative function of the costs incurred in transporting the crop to and from the market, and the household specific transaction costs incurred in the production and marketing of the crop, $T_c$. That is, if producers face very high costs in transporting their products to market centres, production will be restricted, which in most cases is accompanied by acreage restriction.

$T_c$ is broadly used in this analysis to represent transaction costs, and is assumed to be the sum of all the costs that determine the difference between the farm — gate price and the sales price in the market. It, therefore, does not refer to only household specific transaction costs, as is sometimes found in the economic literature. For instance, the household specific transaction costs incurred by a borrower from a rural financial market will include only expenses of visiting the lender several times to negotiate a loan, paying bribes, covering the costs for paperwork, and incurring the opportunity cost of time spent negotiating the loan.

As will be noted later in the chapter that follows, these costs mentioned above serve as constraints to the efficient functioning of credit markets — which is essential for the hiring of labour at the planting and weeding periods — in developing countries, particularly in the rural areas. Such financial constraints sometimes help to restrict labour hiring to a level at which the marginal product of hired labour is well above the wage rate (Collier, 1989). That is, facing financial constraints, agricultural employers might reduce the demand for hired labour, while offering low wages as a result of excess labour supply.

As indicated in the previous section, poor infrastructure often serves as a hindrance to the efficient flow of information, and thus add substantially to the search and recruitment costs of labour in a rural area. Collier (1989) notes that limited diffusion of information and limited housing are part of the reasons why rural labour markets are geographically segmented in Kenya, to the extent that a labour shortage in the Coast Province co-exist with a labour surplus in Western Kenya. Even within Western Kenya there are some estates that have considerable difficulty in in hiring labour, although excess labour avail in other estates.

These transaction costs are likely to be reduced, if the level of infrastructure improves considerably. The relationship between transaction costs and the acreage under cultivation can thus be expressed as $A_c = q(T_c)$, with $q' < 0$. Now if the relationship between the demand for labour and the transaction costs is expressed as:

$$D_i = z[q(T_c)]$$

$21$ The results of this analysis is unaffected by this assumption, since the presence of a middleman also results in transaction costs.
then the chain rule can be applied to derive the response of labour demand $D_l$ to changes in transaction costs $T_c$. According to the chain rule, if $D_l = z(A_c)$, and $A_c = q(T_c)$, then the relationship between $A_c$ and $T_c$ can be expressed as $A_c = z[q(cT_c)]$. In rate of changes, this can be represented as

$$\frac{\Delta D_l}{\Delta T_c} = \frac{\Delta D_l}{\Delta A_c} \cdot \frac{\Delta A_c}{\Delta T_c}$$

(5.30)

Algebraically, if demand for labour ($D_l$) is positively related to acreage under cultivation ($A_c$), and the latter is negatively related to the level of transaction costs ($T_c$), then a negative relationship emerges between $D_l$ and $T_c$.22

However, when $\Delta T_c$ is infinitesimal, $\Delta D_l$ will be infinitesimal and the difference quotient $\Delta D_l/\Delta T_c$ will turn into the derivative. That is,

$$\lim_{\Delta T_c \to 0} \frac{\Delta D_l}{\Delta T_c} = \frac{\partial D_l}{\partial T_c} = f'(T_c)$$

(5.31)

A negative relationship can be deduced between the demand for labour and the transaction costs from equation (5.29). Hence from equation (5.31), $f'(T_c) < 0$. Thus, if the transaction costs of producing and marketing of a crop falls, leading to a reduction in market prices of the product, and a subsequent rise in demand for the product, farmers would be stimulated to increase the acreage under cultivation. This, in turn, can lead to an increase in demand for labour services.

For instance, declines in transaction costs arising from infrastructural improvements such as roads and transport availability could enable artisans such as blacksmiths, welders, carpenters, weavers, and even food sellers cover distant markets, thus leading to output increases and a possible benefit from economies of scale. Secondly, local demand increases could result from falling commodity prices as the infrastructural networks such as electrification, establishment of banks, etc. improve to lower unit production costs. A cross-section analysis of selected developing countries by Antle (1983) shows that infrastructure investments do contribute significantly to agricultural productivity in developing countries. The hypothesis that transportation and communication infrastructure is an important constraint on aggregate agricultural productivity in LDCs is also strongly supported by the study.

**Employment in an Open Rural Labour Market**

The preceding analysis, as indicated earlier, was made in the context of a closed rural economy. This implied the crucial assumption that no rural-urban migration takes place, and that the entire rural labour force is supplied to the rural labour market. With this assumption, the additional impacts that improvements in rural infrastructure is likely to have on the supply of and demand for rural labour in urban labour markets is completely omitted. As stated in the earlier part of this study, Todaro's behavioural model on rural-urban migration — applied in the determinants of agricultural wage rate and urban unemployment — indicated that the costs of moving from the rural to the urban sector is taken into consideration by the prospective rural migrant. Beals and Menezes (1970) also empirically illustrate in their analysis of migrant labour and agricultural output in Ghana the significance of transport cost on seasonal migration. They concluded that reductions in transport cost act in

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22That is, if $\frac{\Delta D_l}{\Delta A_c} > 0$; and $\frac{\Delta A_c}{\Delta T_c} < 0$; then $\frac{\Delta D_l}{\Delta T_c} < 0$
conjunction with increased labour demand to increase seasonal migration from the Northern part of the country to the Southern part.23

From the preceding statements, if the assumption of a closed rural economy is relaxed, and the changes in the nature of transaction costs — which naturally includes transport cost — is allowed to have its full impacts on the rural labour market, it would be noticed that rural employment and incomes will be improved significantly with falling transaction costs. This stems from the fact that as out-migration from a rural area proceeds, without any in-migration, the supply of rural labour declines, which, in turn, exerts an upward pressure on the wage rates — granting that rural population growth does not offset this effect. An additional impact is the fact that if migration takes place only during the slack season, the employment opportunities in the non-farm sector would be contested for by fewer people. Finally, incomes earned by migrant labourers could raise rural household expenditures, boosting demand for non-farm commodities.

The increase in available income of landowners and farmers brought about as a result of improved transport services, or lower marketing costs, could also lead to increases in consumption of locally manufactured goods and local services, which could then have a substantial multiplier effect on local non-farm production, employment and income. Once this multiplier effect is set in motion, the demand for labour in the non-farm sector could increase, tending to increase the wage rates in this sector.

Policy Implications

The implications of the foregoing discussion is that even labour-intensive agricultural development alone — though an important element in employment and poverty reduction strategies as shown — may not ease sufficiently the severe problems for the vulnerable low-income groups. Thus, the income prospects for the poor and near landless will continue to become increasingly a function of employment opportunities in the non-farm labour markets (see Anderson and Leiserson, 1980). As Binswanger and von Braun (1990) rightly note, improved infrastructure and rural financial market development are key instruments for overcoming related constraints. However, it is mostly policy failure, rather than market failure, which is more frequently at the core of an impaired favourable interaction of agriculture with the rest of the rural economy.

The significance of the non-farm sector in creating employment, increasing incomes and reducing poverty has been emphasized in the preceding sections. To investigate factors that influence growth in this sector, a survey was carried out in the Northern part of Ghana. The results of the survey are analysed in the next section to show the operating characteristics of enterprises in this sector, and the factors hindering growth, as well as policy measures that can promote growth in the sector.

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23 As Berg (1965) rightly documents, climatic zones in West Africa are so ordered that the slack season in the savanna zones is the busy season along the southern coast. That is, the period of inactivity in the savanna regions corresponds to the time of peak agricultural demands in the cocoa and coffee regions of the forest zone. Short-term movement from savanna to forest is thus a natural adaptation, particularly the kind of work required on the cocoa and coffee plantations — harvesting and the clearing of new plantations can be done by seasonal or casual labour.
5.4 Non-farm Enterprises in Northern Ghana

5.4.1 Introduction

In this section, findings from a survey of the rural non-farm sector in selected villages in the Northern Region is presented. A brief overview of the study area is first presented, followed by a description of the methodology used in the survey. An analysis of the operating characteristics of the enterprises in the survey is undertaken. This is aimed at investigating how the enterprises in this area function, and identifying the constraints facing the sector. In its report, the ILO stated that the major operating characteristics of informal enterprises are: a) family ownership of enterprises; b) small scale of operation; c) labour-intensive and adapted technologies; d) skills acquired outside the formal school system; e) reliance on indigenous resources; f) ease of entry; and g) unregulated and competitive markets. These characteristics are examined using the survey data.

In recent literature on small-scale enterprises, clustering has been documented as a remarkable characteristic of the sector that helps entrepreneurs to raise their output and efficiency. The extent to which clustering of enterprises in the survey area helps in raising efficiency is also examined with the survey data. This is expected to reveal how the complementarity between the activities of small firms located in close to each other facilitates combined greater efficiency and output as compared to operating independently of each other. The major constraints facing the sector is then discussed, followed by an outline of the implications of the findings for policy purposes.

5.4.2 The Survey Area

One of the major reasons why this study area was chosen is partly because of the arguments advanced in chapter three (see section 5.4.2). It was adequately shown in this section that the Northern part of Ghana is lacking behind the Southern part in terms of economic and welfare indicators. In other words, the poverty in the Northern part is far more severe than the Southern part, with the Northern Region only marginally ahead of the Upper Region. The high out-migration of people from these two regions (partly caused by the high incidence of poverty) to the Southern part of the country was also highlighted. Particularly road infrastructure is poorly developed. At the time the survey was conducted, only the major road connecting the Southern part of the country to the Northern, and which runs through the Northern region was paved. The roads that connected Tamale (the regional capital) and the district capitals were all unpaved. Running public water systems and electricity was poorly developed. Apart from Tamale, there was no single bank in any of the districts, or villages. Even Savelugu with a population of over 17,000 people (1984 population census) had no pipe-borne water.

While the geographical position of the region contributes significantly to its economic underdevelopment, the Colonial Development Strategy nevertheless played a major role in the regions present economic predicament. This is quite evident in a statement by Governor Hodgson, “the Northern Territories possess no natural resources to develop; I would not at present spend upon the Northern Territories • • • a single penny more than is absolutely necessary for their suitable administration and the encouragement of the transit trade” (cited in Kasanga and Avis, 1988). Natural resources were limited to export crops and minerals.

24 Another reason is because the author is quite familiar with the study area. He was born and bred in the area and had all his elementary education there.

25 These two regions were referred to as the Northern Territories during the colonial rule.
A large proportion of the population engage in agricultural production on a full-time or part-time basis, with little development of cash crops. The survey area is typical of those areas of West Africa which are highly rural, subsistence-oriented and not engaged in cash crop production to any substantial degree. The climatic conditions in this area, however, permits only a single cropping season, as compared to the Southern part where two cropping seasons are possible. Measures to increase incomes from agricultural processing and non-farm enterprises is therefore essential in designing poverty-alleviation policies in the region.

5.4.3 Survey Method and Procedure

The survey was organised in two parts. The first one was undertaken in March-June 1992 by the author and four field assistants. A second survey was carried out by the field assistants in October 1992 in the same region. This was to ensure that certain non-farm activities that take place immediately after the farming season are included in the analysis. The farming season runs from May to September in the region.

As mentioned at the beginning of this study, rural is considered in this study as any locality that exists primarily to service an agricultural hinterland. That is, the term rural depends more on the function than the size of the locality. In this case, rural areas may include towns of substantial size. The implication is that although rural localities in Ghana are often referred to as settlements with populations of under 5,000, the analysis covers areas more than this upper limit. Non-farm activities also include all economic activities other than crop and livestock production. It, therefore, includes manufacturing, construction, services and commerce.

The method used was the two-stage stratified sampling design. In the first stage, a sample from the population of villages in the three districts of Tamale, Savelugu and Tolon-Kumbungu was drawn to represent the strata. Records from the national census report (1984) was used to compile a total list of villages in each district. With the exception of an area inhabited by blacksmiths, the rest of the sample consisted of villages outside Tamale. This area was included in the sample to study the effectiveness of clustering on efficiency. The second stage involved interviewing all identifiable enterprises in a selected village using a detailed questionnaire. In all 696 enterprises were interviewed in a total of 35 villages. Names of these villages are provided in Table C.5 in the Appendix C.

5.4.4 Characteristics of the Enterprises

In all, twenty-six industry or business types were identified in the survey. The industries were aggregated into eight industry groups. These include: agricultural processing, metalworks, repairs, retail distribution, textiles, food processing, non-metal crafts and other services. Table 5.13 presents data on these industry types and groups, as well as emplyment levels of the various enterprises. The first column in Table 5.13 lists the group of industries. Column 2 lists the types of industries surveyed. Column 3 lists the number of enterprises of each industry type. Column 4 reports the percentage of industries within the whole industry type that was managed by one person at the time of the survey. Column 5 reports the percentage of enterprises managed and owned by the family. In column 6, the average number of people

26 The large-scale cultivation of rice started in the early 1970s in response to the Operation Feed Yourself programme by the then Acheampong's government resulted in an increase in marketable crops in the region. The recent introduction of purchasing of sheanuts by government buying agencies for processing and exports, provides additional income for the rural dwellers in the area.
Table 5.13: Employment in Non-farm Enterprises, Savelugu District, 1992

<table>
<thead>
<tr>
<th>Industry Group</th>
<th>Industry type</th>
<th>Number of enterprises</th>
<th>One person enterprise [%]</th>
<th>Family Ownership [%]</th>
<th>Average number employed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agricultural</strong></td>
<td>Shea butter</td>
<td>26</td>
<td>42</td>
<td>100</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>processing</strong></td>
<td>Pito brewing</td>
<td>15</td>
<td>7</td>
<td>93</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>Peanut oil &amp; cake</td>
<td>22</td>
<td>0</td>
<td>100</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Butchers</td>
<td>27</td>
<td>44</td>
<td>100</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Non-metal</strong></td>
<td>Pottery</td>
<td>11</td>
<td>18</td>
<td>100</td>
<td>2.9</td>
</tr>
<tr>
<td><strong>crafts</strong></td>
<td>Capentry</td>
<td>15</td>
<td>7</td>
<td>100</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Leatherwork</td>
<td>13</td>
<td>8</td>
<td>100</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Zana mats</td>
<td>32</td>
<td>19</td>
<td>100</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Metalwork</strong></td>
<td>Welding</td>
<td>15</td>
<td>0</td>
<td>100</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Blacksmith</td>
<td>25</td>
<td>28</td>
<td>100</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Textiles</strong></td>
<td>Dressmaking</td>
<td>32</td>
<td>31</td>
<td>100</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>Weaving</td>
<td>14</td>
<td>57</td>
<td>100</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Cloth dyeing</td>
<td>25</td>
<td>56</td>
<td>100</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Food</strong></td>
<td>Grain milling</td>
<td>84</td>
<td>0</td>
<td>88</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>processing</strong></td>
<td>Baking</td>
<td>8</td>
<td>0</td>
<td>88</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Retail</strong></td>
<td>Pharmacies</td>
<td>7</td>
<td>57</td>
<td>57</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>distribution</strong></td>
<td>Petrol stations</td>
<td>6</td>
<td>0</td>
<td>83</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Petroleum product selling</td>
<td>26</td>
<td>58</td>
<td>100</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>General stores</td>
<td>52</td>
<td>13</td>
<td>98</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Food items</td>
<td>68</td>
<td>79</td>
<td>100</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Radio</td>
<td>3</td>
<td>100</td>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>repairs</strong></td>
<td>Motorcycle</td>
<td>12</td>
<td>0</td>
<td>100</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Bicycle</td>
<td>29</td>
<td>17</td>
<td>100</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Bars</td>
<td>62</td>
<td>11</td>
<td>100</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>services</strong></td>
<td>Barbers</td>
<td>27</td>
<td>100</td>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
<td>21</td>
<td>5</td>
<td>100</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Firewood</td>
<td>19</td>
<td>11</td>
<td>100</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>696</td>
<td>26</td>
<td>97</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Source: Survey data.
Column 4 in the Table reveals that an average of about 26% of all the enterprises surveyed were single-person operations. This shows that about 74% of the enterprises employed at least one person in their production processes. Only the barbering and radio repair industries were solely run by one person. While the sizes and scale of operation of the latter enterprises were too small to engage additional labour, barbering has always been a job of one person. Hired labour, on the other hand, was relatively more important in enterprises such as peanut-oil and cake, welding, grain milling, baking, petrol stations and motor cycle repairs.

Column 6 sheds light on the labour-intensiveness of the individual industries. The average number of employees (including the operator) across all enterprises was 2.3. The industries exhibiting low percentages of single-operator shares generally show relatively high average workforce. The highest average workforce was recorded by the baking industry. This is not surprising since baking is a labour-intensive activity, requiring a number of processes that have to be undertaken during the production process. Pito brewing, petrol product selling, and motorcycle repairs also show average workforce of more than 3 employees. In contrast, industries such as weaving, garment dyeing, radio repairs, barbering, peanut-oil and cake, pharmacies, general stores and dressmakers display averages of less than 2 employees. Apprentice labour was also used very often in enterprises such as dressmakers, metalworks, and repairs (motorcycle and bicycle). All motorcycle enterprises had apprentices, with apprenticeship lasting between one to two years, while the duration of apprenticeship in the other groups were often less than a year.

A very interesting observation in column 5 is the fact that, on average, over 97% of the enterprises surveyed were operated by their owners. This in itself suggests very strong local family ownership. Besides the high proportion of family ownership, family ties were also important in the selection of paid employees. Of the total number of paid employees, 40% were related to the owner, while in over 30% of the enterprises the owners family members provided significant amount of unpaid labour. As will be discussed below, the family was also the major source of capital to start a business. Of the total initial capital investment, over 81% was raised by the owner, a further 17% was invested by relatives, about 1.5% from private money lenders, while a mere 0.5% was loaned from private and government financial institutions. As mentioned earlier on in chapter 5, farming plays an important role in the acquisition of start-up capital by the family for a business.

About 51% of the respondents stated that their start-up capital was entirely from farming, while a further 19% said part of their initial capital were funds from farming activities. Farming is a particularly important source of capital for enterprises that required large capital outlays. For example, in the grain milling industry, 71% of enterprise owners said they established their businesses with funds from farming. In the relatively low start-up capital enterprises like carpentry and dressmakers (tailors and seamstresses), relatives were the major source of investment capital (about 43%).

One issue frequently raised in discussions of rural non-farm employment is the role of women (see, for example, Haggblade et al. 1989). An examination of the employment figures was therefore carried out to investigate the extent of women participation. The figures reveal that women constituted about 47% of the total labour force employed in the enterprises that were surveyed. Women were particularly engaged in the agricultural processing industries. With the notable exception of butchery, all the agricultural processing activities, together with pottery, operation of chop bars and sales of food items were carried out exclusively by women.

They are also heavily present in general stores garment dyeing, but conspicuously absent in metal works and repairs, which are completely the domain of men. If the services of women in the non-farm household activities, as well as unpaid help in non-farm work are
taken into consideration, it would be noticed that they play a crucial role in the non-farm sector. This lends support to the widely held view that women dominate many of the rural non-farm activities that will grow most rapidly, and as such will be key actors in the economic transition of Africa’s rural economy.

5.4.5 Scale of Operation

Besides employment levels, another indicator of the scale operation is the cost of purchasing necessary equipment to get the enterprise under way, as well as the running costs of the enterprise. An analysis of a sub-sample of 552 enterprises (in all groups) was made to examine these factors. Table 5.14 reports the average start-up capital and monthly cost of inputs. For the sample of industries presented in the Table, the average firm required about 101,160 cedis (or 247 US dollars at the prevailing exchange rate) to get the enterprise under way. This figure is, however, skewed upwards by the some industries that require relatively high start-capital. In all cases, subsequent re-investment of profits in the business, helped to raise the value of assets of the enterprises by about three times the original figure.

It can be observed from Table 5.14 that among the 22 types of enterprises listed, petrol stations required the largest amount to get the business going. For the six enterprises, an average of 520,521 cedis (or 1,254 US dollars at prevailing exchange rate) was required. In contrast, an average of just 3,203 cedis was required for the 9 pottery enterprises listed in the Table. Quite evident from the Table is the fact that all the traditional craft manufacturing enterprises — pottery, weaving, and leatherwork — require relatively low start-up capital.

Start-up capital was particularly high in enterprises like petrol stations, grinding mills and general stores because of the structures that needed to be erected and the equipments that had to be installed before a business could be started. All these three types of enterprises conducted their businesses under specially constructed metal-roofed sheds with separate walled buildings. On the other hand, a substantial number of enterprises — about 43% of the sample, particularly the agricultural processing and non-metal crafts industries — carried out their businesses within the premises they lived or in the opened air.

The use of improved technology in the production processes was not very common within the sample of enterprises that was studied. As will be discussed later, most of the operators cited capital as the limiting constraint in purchasing machinery to increase their efficiency. Column 6 of Table 5.14 also reveals that average cost of monthly inputs varied widely across the various enterprises. For the sample in the Table, the average cost of monthly inputs was 111,037 cedis. While petrol stations required about 467,520 cedis for their monthly inputs, barbers needed an average of about 4813 cedis. The mean value of monthly sales was 165,243 cedis. Here again, the highest average monthly sales was recorded by petrol stations (about 617,300 cedis), while the lowest was recorded by the pottery enterprises (10,800 cedis). As a general rule, the activities using larger capital inputs have higher monthly sales.

It is also clear from column 5 of Table 5.14 that start-up capital per employee is quite small for many firms. The average for the whole sample was 40,196 cedis. The capital to labour ratio was particularly high for activities such as grain milling, petrol stations, general stores, and welding. On the other hand, repairs, agricultural processing, and non-metal crafts demonstrated low capital to labour ratios. For example, for the pottery industry, an average of 1100 Ceids was required for each labour input. This finding, together with the results from Column 6 of Table 5.13 supports the presumption that rural non-farm activities require smaller inputs of capital, but larger inputs of labour. The non-availability of data on urban sector activities does not allow a comparison of labour-intensiveness between the two sectors in this study.
Table 5.14: Average Capital Inputs for Selected Enterprises, 1992

<table>
<thead>
<tr>
<th>Industry Group</th>
<th>Industry type</th>
<th>Number of Enterprises</th>
<th>Average start-up Capital in cedis</th>
<th>Average Monthly Cost of Inputs in cedis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per Establishment</td>
<td>Per Employee</td>
</tr>
<tr>
<td>Agricultural processing</td>
<td>Pito brewing</td>
<td>15</td>
<td>55045</td>
<td>18947</td>
</tr>
<tr>
<td></td>
<td>Peanut oil &amp; cake</td>
<td>16</td>
<td>15837</td>
<td>9556</td>
</tr>
<tr>
<td></td>
<td>Butchers</td>
<td>13</td>
<td>23174</td>
<td>10707</td>
</tr>
<tr>
<td>Non-metal crafts</td>
<td>Pottery</td>
<td>9</td>
<td>3203</td>
<td>1100</td>
</tr>
<tr>
<td></td>
<td>Capentry</td>
<td>15</td>
<td>24070</td>
<td>8780</td>
</tr>
<tr>
<td></td>
<td>Leatherwork</td>
<td>8</td>
<td>14506</td>
<td>7250</td>
</tr>
<tr>
<td>Metalwork</td>
<td>Welding</td>
<td>15</td>
<td>192544</td>
<td>71429</td>
</tr>
<tr>
<td></td>
<td>Blacksmith</td>
<td>25</td>
<td>51902</td>
<td>21133</td>
</tr>
<tr>
<td>Dressmakers</td>
<td>Sewing</td>
<td>32</td>
<td>22450</td>
<td>115541</td>
</tr>
<tr>
<td></td>
<td>Weaving</td>
<td>14</td>
<td>9208</td>
<td>5367</td>
</tr>
<tr>
<td></td>
<td>Garment dyeing</td>
<td>25</td>
<td>36782</td>
<td>20238</td>
</tr>
<tr>
<td>Food processing</td>
<td>Grain milling</td>
<td>84</td>
<td>397730</td>
<td>164706</td>
</tr>
<tr>
<td></td>
<td>Baking</td>
<td>8</td>
<td>243050</td>
<td>64516</td>
</tr>
<tr>
<td>Retail distribution</td>
<td>Pharmacies</td>
<td>7</td>
<td>87600</td>
<td>47727</td>
</tr>
<tr>
<td></td>
<td>Petrol stations</td>
<td>6</td>
<td>520521</td>
<td>195000</td>
</tr>
<tr>
<td></td>
<td>Petroleum product selling</td>
<td>26</td>
<td>35630</td>
<td>15007</td>
</tr>
<tr>
<td></td>
<td>General stores</td>
<td>52</td>
<td>185620</td>
<td>104717</td>
</tr>
<tr>
<td></td>
<td>Food items</td>
<td>68</td>
<td>54590</td>
<td>41556</td>
</tr>
<tr>
<td>Repairs</td>
<td>Motorcycle</td>
<td>12</td>
<td>120987</td>
<td>37895</td>
</tr>
<tr>
<td></td>
<td>Bicycle</td>
<td>29</td>
<td>15670</td>
<td>6214</td>
</tr>
<tr>
<td>Other services</td>
<td>Bars</td>
<td>62</td>
<td>38765</td>
<td>11071</td>
</tr>
<tr>
<td></td>
<td>Barbers</td>
<td>11</td>
<td>7892</td>
<td>5846</td>
</tr>
</tbody>
</table>

Source: Survey data.

5.4.6 Acquisition of Skills by Operators

The suggestion made by the ILO that most skills acquired by practitioners in the informal sector are usually acquired within an informal system of education, and not in schools and training colleges was investigated for the sample. Over-all rates of schooling and literacy are relatively high in Ghana, compared to neighbouring countries. In 1990, 51% of the total
national female population was classified as being literate, while the corresponding figure for the male population was 60%. Data on the educational background of the operators showed that with the notable exception of pharmacies, the literacy rates were quite low. Column 5 of Table 5.15 shows that illiteracy rate was highest among welders, where less than 2% of the operators had received some formal schooling (primary or middle school). Among owners of the agricultural processing enterprises (not represented in the Table) no one received some formal schooling. Majority of the practitioners (about 93%) who claimed to have achieved some formal education, were educated only to the primary school level.

Table 5.15: Educational Statues of Operator, Cross-classified by Activities [in%]

<table>
<thead>
<tr>
<th>Industry Group</th>
<th>Industry type</th>
<th>Educated</th>
<th>Illiterates</th>
<th>On the job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-metal crafts</td>
<td>Capentry</td>
<td>17.9</td>
<td>82.1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Leatherwork</td>
<td>14.5</td>
<td>85.5</td>
<td>100</td>
</tr>
<tr>
<td>Metalwork</td>
<td>Welding</td>
<td>1.8</td>
<td>98.2</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Blacksmith</td>
<td>2.4</td>
<td>97.6</td>
<td>100</td>
</tr>
<tr>
<td>Textiles</td>
<td>dressmakers</td>
<td>27.9</td>
<td>72.1</td>
<td>98.3</td>
</tr>
<tr>
<td></td>
<td>Weaving</td>
<td>16.2</td>
<td>83.8</td>
<td>100</td>
</tr>
<tr>
<td>Food processing</td>
<td>Grain milling</td>
<td>8.3</td>
<td>91.7</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Baking</td>
<td>15.6</td>
<td>84.4</td>
<td>100</td>
</tr>
<tr>
<td>Retail distribution</td>
<td>Pharmacies</td>
<td>100</td>
<td>0.00</td>
<td>74.6</td>
</tr>
<tr>
<td></td>
<td>Petrol stations</td>
<td>4.1</td>
<td>95.9</td>
<td>83.8</td>
</tr>
<tr>
<td></td>
<td>Petroleum product selling</td>
<td>6.4</td>
<td>93.6</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>General stores</td>
<td>22.9</td>
<td>77.1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Food items</td>
<td>3.6</td>
<td>96.7</td>
<td>100</td>
</tr>
<tr>
<td>Equipment repairs</td>
<td>Motorcycle</td>
<td>23.2</td>
<td>76.8</td>
<td>81.2</td>
</tr>
<tr>
<td></td>
<td>Bicycle</td>
<td>4.7</td>
<td>95.3</td>
<td>87.9</td>
</tr>
</tbody>
</table>

Source: Survey data.

There was no instance where the formal schooling received by enterprise owners included any form of technical training relevant for the operation of the business. In Column 6, information is provided to show the extent to which on the job training is important for the rural non-farm sector. With the exception of repairs (motorcycle and bicycle), pharmacies, petrol stations and dressmakers, where some amount of training was received in the informal sector in a larger urban centre, skills were generally acquired on the job in the rural setting. It is, however, significant to mention that the blacksmiths who were interviewed in Tamale said they had attended a 3-day seminar organised by the Intermediate Technology Transfer Unit in Tamale (ITTU) in June 1990.27

27 This shows that the ITTU established in 1988 — one of the units of the Ghana Regional Appropriate Technology Industrial Service (GRATIS) — to transfer appropriate technology to artisans is yet to make any
The analysis shows that although general skills of reading, writing and numeracy are acquired within the formal school system, basic technical skills are usually acquired outside the school system. This fact is supported by a statement made by a female engineering apprentice to a workshop organised by the ITTU in Tema in 1990. “I have no technical education or background, so if I can learn to operate machines I don’t see why other women can’t.” (GRATIS, 1990).

As rightly stated by Norcliff (1983), most entrepreneurs need to be numerate to keep basic accounts, order and check inventory, and plan their cash flow. Literacy is also necessary in reading newspapers, government reports and other sources of business information. However, due to the extremely low literacy rates in some industries, written records were virtually absent. All the pharmacy enterprises and some few stores maintained written accounts to make profit and management calculations. Formal education appeared to contribute significantly to the success of entrepreneurs, particularly in the pharmacies and general stores, since they could then keep basic records of transactions.

It has often been stated that the rural non-farm sector relies to a great extent on indigenous resources in its production process (ILO, 1972). As has been extensively discussed above, capital and labour are mainly obtained from local sources. The inclusion of physical inputs, however, shows that a significant proportion of resources are imported from the urban areas or even foreign markets. Industries engaged in the processing of agricultural products, as well as pottery and mat weavers made exclusive use of local resources. A substantial amount of recycling was present in the blacksmith, welding, and leatherwork industries. On the other hand, dressmaking and retail distribution enterprises such as pharmacies, petrol stations, petroleum products and general stores obtained their input supplies, or marketable goods from urban areas. The analysis shows that the ILO’s assertion that the rural non-farm sector relies heavily on indigenous resources is not entirely accurate, if the definition of resources is restricted to physical inputs of an enterprise (see Norcliff, 1983).

An interesting finding was the high degree of clustering in the blacksmithing industry. In the Savelugu and Tamale surveys, blacksmiths were clustered together in the same place. In Savelugu, all the eight blacksmiths operating in the village, and who were interviewed, had their shops close to each other. A similar finding was made in Tamale, where twelve respondents were operating within the same vicinity. In the other villages, the were isolated and working independently. According to the blacksmiths in Tamale, the complementarity between their activities allow them to discuss problems together, find solutions to them, and to pull resources together to acquire some output- and efficiency-raising equipments. For example, heat-producing equipments were shared together, instead of each isolated enterprise having to purchase its own equipment. This is certainly more efficient than enterprises operating independently of each other. The finding is also consistent with the hypothesis that the degree to which small firms are capable of dynamic and innovative endogenous growth is primarily dependent on clustering (Dawson, 1992).

5.4.7 Major Constraints Facing Output Expansion

Enterprise owners were asked to describe the problems they encountered in starting, as well as in the operation of their businesses. In all, about 69% of the respondents stated that acquiring enough capital was the major problem in starting the business, and in running it meaningful impact on the rural non-farm economy in this area. This is confirmed in the Regional Manager’s annual report of 1990. He stated that during the phase up till the end of 1990, the main beneficiaries of the project was small-scale engineering enterprises in the urban centres, who were encouraged and assisted to produce tools and equipments needed to upgrade agricultural and rural industries (see GRATIS Annual Review, 1990).
successfully. As mentioned earlier, capital was mainly raised by the family and relatives to establish an enterprise. Government financial institutions were completely absent in all the villages that were surveyed. The few respondents that obtained some loans from government agencies had to travel to urban centres to acquire them. The lack of collateral security is the major factor hindering enterprise owners from obtaining credit from financial institutions.

Of course, owners of industries where the required start-up capital was quite low (e.g., pottery, weaving and barbering) did not mention capital as a major problem. Such enterprises complained of equipment and technologies. The issue of equipment and machinery was very common among the enterprises, where over 90% of owners complained of excessive wear of machine parts or of broken down machines which were quite difficult to repair or replace. Some weavers stated that the methods they used were quite obsolete and cumbersome. Ninety-four per cent of the respondents in the textiles, non-metal crafts, repairs, and metalwork believed that improved technical skills and managerial expertise could help increase the efficiency and profitability of their businesses.

Most owners of the enterprises in the retail distribution and other services stated that an improvement in their management skills could contribute significantly to increased efficiency in their industries. This is consistent with the hypothesis that running a successful enterprise often requires considerable skills. In particular, being able to read and write is very useful as already discussed in the preceding section. As much as 46% of the entrepreneurs mentioned that the supply of raw materials or goods for retail was a constraint to the expansion of their businesses. Because of the relatively poor infrastructural network in the region, the timely supply of raw materials and marketable goods for retail are often delayed.

As stated in section 3.1.4, roads are very bad, and transport services extremely poor, making transport costs high, and driving production costs and retail prices of marketable goods high. Telephone services are completely absent, and the postal systems are very inefficient. As a result, operators often have to travel long distances because of trivial business issues, thus foregoing daily production or sales. The absence of electricity also hinders the storage of certain food items, often bringing huge losses to some sellers of certain agricultural products. For example, milk and tomato sellers complained that they often have to dispose of their products after short periods of storage. Some pharmacies also complained that the absence of electricity supply prevents them from selling certain drugs, which can only be stored under low temperatures. At almost all the petrol stations, mechanical power was used for the sales of petrol. The managers categorically stated that vehicles often have to wait for long periods to get served, as compared to urban areas with electricity, where it takes a few minutes to serve customers. Thus, here again, extension of electricity services to these areas could improve efficiency greatly.

A common problem that was mentioned by most enterprise owners, particularly, carpenters, tailors, and butchers was the low and stagnant demand for their products. During a household survey of farmers carried out by the author in the Savelugu district, it came to light that a large proportion of households lacked furniture like beds, mattresses, tables, chairs, sufficient cooking utensils, and possessed only a few stools. Demand for such items could rise with increasing household incomes. Asked about the periods in which the recorded sales are highest, about 73% of the respondents gave the months between October to December, while 21% claimed July to September, while rest (about 6%) said between January and May. The fact that purchases are highest in the period following the farming season (May-September) is not surprising, since a large proportion of the people in the survey area are engaged in agricultural activities. Many rural folks also take up wage employment during the farming season to increase their incomes. This, in a way reveals the linkages between agricultural earnings and non-farm activities.
Although some degree of competition between the rural enterprises themselves was observed, the strong competition between local goods and imported goods was more pronounced. Enterprise owners in the dressmaking, non-metal crafts, soap making industries, and leatherwork mentioned that the competition with urban-produced goods, and in particular, with foreign goods, had increased since the implementation of the ERP. Some examples of these developments are enumerated below:

(a) Production of local leather footwear is undermined by the production of plastic footwear in the cities and imports from foreign markets.

(b) The pottery industry suffers from increasing competition from metal and plastic containers, either imported or made in Accra, while local breweries producing pito also face intense competition from modern breweries established in Accra and Kumasi.

(c) The clothing industry (traditional garment weaving and dyeing, tailors and seamstresses) is also under severe competition from large imports of second-hand and designer-made dressmakers.

(d) Imported mats compete strongly with the traditional zana mats, while local basket makers and leather hand bag producers face increasing competition with imported bags and plastic containers.

This competition faced by rural enterprises from the outside has contributed significantly to the decline of certain industries, as was explained by some enterprise owners. The pottery, basket making and mat making industries have declined dramatically within the last few years as a result of the intense competition with outside goods. It was observed that this sub-group of industries diminished in importance with proximity to Tamale — the regional capital. The local enterprises that have been able to compete with imported goods and products of larger domestic manufacturers have done that because of the relatively low cost of their goods and services. As rightly argued by Dawson (1992), this is due, on the one hand, to the expertise which they have developed in the use of locally available materials, reducing the need for expensive imports, and on the other, to the avoidance of existing labour regulations. The ability of local small-scale enterprises to switch production rapidly between different products and to identify new niches in which they have a comparative advantage is a factor that has enhanced their competitiveness. For example, leather bag producers who faced intense competition from imported products, changed their designs to suit consumer taste, while local tailors and seamstresses introduced modern designs that led to increase in demand for their goods and services.

Another clear case is provided by Dawson (1992) in his study of small-scale vehicle repair workshops in Kumasi (Ghana). After the implementation of the ERP in 1983, and the subsequent liberalization of the markets, imported standard hexagonal bolts, commonly used in all sorts of machinery, flooded onto the local market, undercutting small machine shops which had previously been manufacturing them. This compelled many of these workshops to diversify into the manufacture of less common and generally more bulky bolts (e.g., U-bolts and centre bolts) driving imports off the market.

The survey showed that only the pharmacies and some of the petrol stations (two-thirds) said they had to obtain licences before they could start their businesses. This, together with the relatively low cost of equipments and level of skills required to operate most enterprises, indicates that barriers to entry into most non-farm activities are quite low.
5.4.8 Policy Implications

Schmidt (1982) concluded in a review of the literature on the small enterprise sector that the issue is not whether small enterprises have growth and employment potential, but under what conditions. Several studies have attempted to identify these conditions and to make proposals as to how they can be achieved. The analysis presented in the preceding section of rural non-farm enterprises in the Northern Region of Ghana lends support to the hypothesis that the sector is capable of contributing significantly to the output, employment, and earnings of the rural labour force, if the necessary prerequisites are provided. As stated earlier in the present study, the encouragement of entrepreneurs in this sector to improve efficiency, output, and employment is important for a number of reasons. First, labour absorption in the agricultural sector has been growing slowly as compared with growth of the workforce as a whole, so that alternative sources of employment is absolutely essential. Second, a large part of those engaged in agricultural activities earn a significant proportion of secondary income from the sector in the slack seasons. Third, improving employment opportunities in the non-farm sector would help create alternative job opportunities for agricultural workers, thus exerting an upward pressure on the wages of agricultural employees.

On the demand side of products of the rural non-farm sector, a major problem raised by some enterprise owners, and which was mentioned in the preceding section, is the low demand for the products. This low demand which, in turn, militates against industrial expansion is caused by the low level of purchasing power of households in the surveyed area. A striking finding, although not unexpected is the fact that most artisanal enterprise owners (carpenters, dressmakers, blacksmiths, welding, etc.) and repairs had apprentices, who constituted about 32% of all employment in these sectors in the survey areas. One implication of such a high proportion of apprentices is that the supply of workers with skills appropriate for intermediate-sector production is rising rapidly. As rightly argued by Steel (1979), it is essential to adopt measures to expand demand for the products of this sector to avoid overcrowding and declining productivity, and to take advantage of its potential for absorbing labour while contributing to the growth of national income.

It has been argued by several authors that the principal measures through which governments can help stimulate demand for artisanal and intermediate sector products are to redistribute income in favour of low and middle-income consumers (who are most likely to buy these products), and to avoid subsidising large-scale firms that produce substitutes (see, for example, Steel 1979, and Livingstone, 1977). In its report on Employment, Income and Equity, based on a mission to Kenya, the ILO (1972) also expressed concern for the low level of income obtained by many producers as the return on their work. The report stressed the importance of putting right the imbalances, on equity in place of gross inequality, in earnings, education, and land holdings, among regions, districts and individuals. It went further to suggest that a transfer of incomes from the top income groups to the working poor would result in new types of labour-intensive investments in both rural and urban areas. This should not only generate demand for the products of the non-farm sector but would also encourage innovations in labour-intensive techniques in the sector.

Consumption of goods likely to increase with increasing purchasing power of the low income groups in the rural areas include dressmaking and footwear; bricks and cement blocks; doors, windows and furniture; metal goods such as charcoal-burners; basins and containers; mats and other household furnishings. Owners of enterprises such as carpentry, metal-works, dressmakers, weavers, masons, and shoe-makers could benefit from such an increase in demand for their products. Increased incomes of the craftsmen could lead to increase in demand for products like bicycles, vehicles of all kinds, radios, and other consumer goods. This again could lead to an increase in the demand for the services of repairers of bicycles,
radios, and vehicles. A strategy that redistributes income to step up the demand for rural enterprises — e.g., increase in agricultural earnings — is certainly more likely to increase the general welfare of the nation than the factory production of sophisticated consumer goods for an urban elite, even if ordinary cost-benefits analysis suggest that the latter is more profitable (Livingstone, 1977).

In terms of employment, the survey shows that the typical rural non-farm enterprise is relatively labour-intensive, employing several workers with low capital outlays. The agricultural processing industries, non-metal crafts, textiles, metal-works such as blacksmithing industries showed high average employment levels, although the average capital requirements in these sectors were relatively low. The technologies applied in these enterprises were quite indigenous, without any technical or vocational training. These industries could be helped with improved technology to increase their efficiency. For example, the introduction of the broad loom — a machine used in spinning — by the Tamale ITTU has made it possible for the direct involvement of women in textiles production. Women were previously only engaged in selling the cloth traditionally produced by men on narrow looms. The popularity this technology has gained among women is confirmed in a report by the Tamale ITTU textiles trainer, "The old ladies in my area are now asking me to teach them how to weave on the broad loom. They have heard about younger women training at the ITTU and are beginning to realise they too can improve their living standards by making use of leisure time to earn some income." (GRATIS, 1990). As shown in Table 3.1, section 3.1, the non-farm enterprises have a major role to play in employment creation in Sub-Saharan African countries in the coming decades.

Enterprises such as petrol stations, grain milling, baking, general stores and motorcycle repairs required high investment capital, but also employed a substantial proportion of people who were working in this sector. Competition in this group of industries was quite low because of the high venture capital required to raise such businesses. The use of imported machinery or tools is common in the dressmaking, grain milling, carpentry, and welding industries. Technologies being used in these industries are widely regarded as appropriate. It is apparent that the efficiency of all industries in these two groups could be increased through improved firm organisation and accounting practices. As reported earlier, some enterprise owners in this groups complained that one of their major problems was capital to expand and modernize their operations.

While it is appropriate to suggest that financial assistance in the form of credit services could help such firms to expand and increase general employment opportunities, the possible negative impacts of such measures must be highlighted. Besides the tendency of over-investment in machinery, which may change the basic character of the small-scale sector, there is also the danger of many firms failing to pay back such credits. As will be discussed in the next chapter, the provision of group loans can help reduce default by members. The mobilization of rural savings by co-operative institutions, as has been successfully carried out in Cameroon and other parts of Africa, can also help in providing funds for enterprises plagued by financial difficulties (see ILO, 1993).

Practitioners of the traditional crafts such as pottery, weaving, leatherwork, blacksmithing, garment dyeing and agricultural processing can be assisted with improved production and marketing technologies. In a world of fast changing consumer taste, with liberalized markets, locally produced goods are most likely to experience competition from imported products. It is only when the rural industries are able to combine the advantage of relatively low costs of their goods and services with products that meet consumer taste that they can drive competitors off the market. As demonstrated in section 5.3.5, policy measures that would help lower transaction costs in the sector could go a long way to boost demand for products in the sector, as employment and incomes increase alongside productivity increases.
and price delines. The extension of the Akosombo Hydro-electric power to the Northern part of Ghana and the Volta Region by the Rawlings administration is therefore commendable.

5.4.9 Concluding Remarks

The findings of the survey conform to the assertions of ILO's report as far as the operating characteristics of the rural non-farm sector is concerned. That is, the scale of operation of rural non-farm enterprises is quite small, with family ownership being predominant. The sector is quite labour-intensive, and technologies used are mostly adapted. Barriers to entry are relatively low, since the cost of equipment and the level of skills required to operate it are quite low. The sector as a whole faces strong competition from goods of large urban manufacturing firms and imported items. Some enterprises under severe competition from imported goods are able to survive because of their ability to switch production to meet consumer taste and demand.

The survey shows that the non-farm sector is an area capable of expanding to provide employment avenues for the increasing population, and to supplement incomes of most agricultural households. The appropriate measures required to help this sector increase its efficiency and output seems to include the establishment of conditions conducive for the natural growth of rural non-farm enterprises with increasing market size and incomes, and to avoid biasing resources too heavily in favour of large-scale industries. Helping agricultural producers to raise productivity to increase their output and incomes is certainly an indirect way of boosting the non-farm sector, in view of the forward and backward linkages that exist between the two sectors. Other indirect support measures such as infrastructural improvements (roads, electrification, banking services, etc.) and management assistance to re-orientate production and marketing in the face of competition, as well as credit to producers' co-operatives or existing groups in the community could also be more effective than attempts by the government to deal directly with the non-farm sector.

This section examined the linkages that exist between the farm and non-farm sectors. It also showed that grow in the agricultural sector promotes growth in the non-agricultural sector, and that growth in the manufacturing sector also stimulates growth in the non-manufacturing sector, the the economy as a whole. The results of the survey of non-farm enterprises also showed that sound economic and institutional changes can increase growth, employment and incomes in this section, particularly in the rural areas. This again can help alleviate poverty and slow down rural-urban migration. Since it was shown in this chapter that agricultural growth is significant for growth in the non-agricultural sector and overall economic growth as a whole, an analysis of the incentive structure in the agricultural sector is a sine qua non for any policy recommendation that can promote agricultural growth in the country. This analysis is undertaken in the next section.
Chapter 6

Production Incentives in Ghanaian Agriculture

The analysis presented in the previous chapter emphasized the importance of the forward and backward linkages between agriculture and the non-farm sector. It was observed that economic policies that directly, or indirectly influence growth in agriculture have powerful effects on the non-farm component of rural development and overall economic growth. It was also argued in chapter three that economic policies in many developing countries often discriminate against the agricultural sector — urban-biased policies. This chapter therefore takes a look at how implemented economic policies have affected growth in the agricultural sector. Emphasis is placed on the direct and indirect effects of resource transfers to, and from agriculture, and how such policies affect agricultural output and incomes, as well as the overall economic development.

The rest of the section is organised this way. An analytical framework of how macroeconomic policies influence the relative demand and supply of agricultural products is presented. This is followed by a review of available literature on agricultural supply response, and an empirical investigation of how Ghanaian cocoa farmers respond to changes in economic incentives. Third, an analytical discussion of the general equilibrium effects of trade policy on the structure of domestic prices among exportables, importables, and non-tradables is given, followed by a statistical estimation of the incidence equations linking the domestic price of exportables relative to importables, the latter directly influenced by trade policy. Finally, a theoretical analysis of the different impacts of macroeconomic policies on resource allocations between the tradable and non-tradable sectors, as well as the effects of such measures on rural incomes — based on available secondary data — is carried out.

6.1 Linkages between Macroeconomic Policies and Agricultural Output

The linkages between macroeconomic policies and performance in the agricultural sector stem from direct and indirect effects. Specific trade policies, like restrictions or quotas on agricultural, as well as non-agricultural exports or imports can have far-reaching implications for agriculture. Export taxes, in particular, on agricultural products as practised by State Marketing Boards in several developing countries, have disincentive effects on invest-
ment in the sector. Export quotas, like taxes, have the effect of reducing the prices received by farmers and lower the quantity that is actually exported. Import quotas or quantitative restrictions have the opposite effects of raising the domestic price of the item involved (Balassa, 1971). While this may be favourable for agriculture in the short run — if applied to agricultural products — as it does not expose domestic production to competition from cheap imports, it might be counter-productive in long-run, since it weakens incentives to raise productivity and efficiency in domestic agriculture. With the exception of cases where international prices are distorted by excessive subsidies, it is therefore ideal to free all agricultural imports and exports from restrictions.

Economic policies intended to favour and promote the non-agricultural sector could also have discriminatory or detrimental effects on agriculture. To illustrate this point, consider, for example, a developing country that raises import duties on imported goods to protect the industries against foreign competition. The import tax will raise the domestic price of the imported good above its international price, thereby distorting domestic consumption. This case is better illustrated, if one analyses the problem from the consumer's utility maximizing behaviour point of view.

Assuming two goods, $X_1$ and $X_2$, representing domestically produced goods and imported goods, respectively are consumed. Expressing each individual's utility as a function of these two goods gives

$$U_z = U_z(X_{yz}) \quad y = 1, 2 \quad (6.1)$$

where $z$ is an index for each individual and $X_{yz}$ represents the quantity of each of the two products consumed by each individual. The consumer's problem will involve maximizing equation (6.1) subject to a budget constraint, $M_z = P_1X_1 + P_2X_2$, where $M_z$ is the given money terms for each individual. Now if the price of $X_2$ increases as a result of an increase in import duty, this in general does not change only $X_2$, but also $X_1$. If it is further assumed that the consumer is indifferent between the two goods, for a given utility, the consumer will try to minimize expenditure. For the rational consumer, if $P_2$ increases, and the consumer wants to maintain a constant utility, he would have to substitute $X_1$ for $X_2$.

From the foregoing analysis, it is obvious that, an increase in the relative price of an imported commodity results in a fall in demand for that commodity, and a corresponding increase in demand for the domestically produced substitute. The decrease in demand for foreign goods invariably leads to a fall in demand for foreign currency, ceteris paribus and a subsequent appreciation of the domestic currency — that is, an increase in the value of the domestic currency relative to foreign currencies. The consequences of such a currency appreciation on the agricultural sector can be illustrated with Figure 6.1.

In Figure 6.1, the domestic demand curve ($D$) and the domestic supply curve ($S$) in a price-quantity space are illustrated. At equilibrium the quantity demanded is equal to the quantity supplied ($q^d = q^s$), with the prevailing price ($P_0^L$). If initially, the domestic quantities consumed and produced are $q^d_1$ and $q^s_1$, respectively, then $q^d_1 - q^s_1$ will be imported at the given price $P_1^L$ in local currency. That is, $P_1^L = P_w \cdot E X_1$, where $EX_1$ represents

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1 This "infant industry" argument which is discussed in detail below, has been used extensively by developing countries to protect domestic industries. Baldwin (1992) points out that economists have traditionally assumed that small countries' resulting increase in output brought about as a result of subsidies or tariffs, and other distortions does not change the international terms of trade and consequently does not decrease the welfare of other nations. With such a framework, and with income distribution considerations, it was not difficult to obtain agreement in the GATT to permit developing countries (who were small suppliers of manufactured goods at the time the GATT was formed in 1947) to adopt interventionists trade policies on infant-industry grounds.
6.1. MACROECONOMIC POLICIES AND AGRICULTURAL OUTPUT

Figure 6.1: Effects of Import Duties on Non-agricultural goods on the agricultural import sector (Food Crops)

the exchange rate. After an appreciation of the local currency — caused by an import substitution policy or expansionary monetary and fiscal policies — the domestic price of the agricultural good will fall to \( p_L^f = P_w \cdot EX \), implying relatively cheaper agricultural imports.²

Due to this change in relative prices, the utility maximizing consumer who is indifferent (i.e., constant utility) between imported food and local food will substitute domestically produced food for imported food. Hence, exchange rate changes cause substitution effects which imply non-zero cross price elasticities of demand. Of course, the quantities of food items imported would depend on the degree of substitutability of domestic and foreign goods (i.e., the elasticity of substitution).³ Returning to Figure 6.1, consumption of imported food could increase to \( q_s^f \), with the quantity imported rising to \( q_s^f - q_s^f \). As a result of these shifts, domestic production declines to \( q_s^f \). Consequently, the importing country becomes dependent on agricultural imports as a result of its import substitution policy.⁴

The effect of an increase in import duties to protect the non-agricultural sector, and the subsequent appreciation of the domestic currency on the export sector — particularly exports of agricultural goods — is also illustrated in Figure 6.2. If \( AE \) is taken to represent the export supply curve, with the quantity \( q_1^{AE} \) initially exported to the given price \( P_1^L \). The appreciation of the domestic currency precipitates a fall in the price that, for example, the cocoa farmer receives in the local currency from \( P_1^f \) to \( P_2^f \). If farmers plan in local currency, the export supply will be reduced to \( q_2^{AE} \), resulting in a decline in export earnings of the agricultural sector from \( P_1^L \cdot q_1^{AE} \) to \( P_2^L \cdot q_2^{AE} \). The import substitution policy therefore results in an implicit taxation of the agricultural sector (Herrmann, 1990).

²This holds under the assumption that it is the non-agricultural good that is protected, while the agricultural sector remains unprotected. As stated at the beginning of this chapter, several studies have shown that trade policies of many developing countries do not protect the agricultural sector.
³Available empirical evidence indicates that an appreciation of local currencies in West Africa encourages imports of food items such as rice and wheat. On the other hand, a devaluation leads to a fall in imports of these items, since the domestic prices of the commodities rise. This suggests that the role of exchange rate policies for food imports and food security in developing countries has been underestimated. See, for example, Abdulai and Egger, 1992.
⁴In the analysis presented here, it is the trade policy which precipitates the change in relative prices and the subsequent change in consumer demand for domestic and foreign goods, which, in turn, results in a change in exchange rate.
If exchange rates are allowed to float, the situation will automatically readjust, as the increase in demand for imported agricultural products increases the demand for foreign exchange, with a consequent depreciation of the domestic currency. It is, however, on record that majority of developing countries maintain fixed exchange rates which do not permit the automatic adjustment of exchange rates. As a result, distortions that contribute to the appreciation of the domestic currencies in most developing countries remain until measures like structural adjustment programmes are implemented to correct the distortions. It is an indisputable fact that the implementation of the system of floating exchange rates in low-income developing countries is an extremely difficult task. This is due, among other things, to institutional constraints such as the absence of well and efficient functioning financial markets. Under such circumstances, measures such as the “crawling peg” mechanism can be adopted to permit flexible adjustment of the exchange rate, instead of maintaining unrealistic fixed exchange rates.

At a glance, Table 6.1 which contains indices of the real exchange rates of selected African countries, throws light on the causes of the high food import bills of most countries in this region towards the end of the 1970s and early 1980s.

Apparent from Table 6.1 is the fact that the extent of over-valuation in all the countries increased between 1973 and 1983. For the Sub-Saharan African countries as a group, real exchange rates appreciated by 31% between 1969-71 and 1981-83. Ghana had the most serious currency over-valuation between 1981-83, when the index declined to 8.

The effects of macroeconomic policies on markets and households were extensively discussed in the preceding section. An attempt will now be made in the sections that follow, the empirical issues involved in capturing these impacts will first be examined, followed by a statistical estimation that captures the impacts of the discussed macro-policies. Since the policy response of agriculture has been primarily addressed in the supply response literature, the analysis will begin with a survey of the literature on supply response of agricultural commodities.
Table 6.1: Index of Real Exchange Rates* in Selected West African Countries, (1969-71 = 100)

<table>
<thead>
<tr>
<th>Country</th>
<th>1973-75</th>
<th>1981-83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Côte d'Ivoire</td>
<td>81</td>
<td>80</td>
</tr>
<tr>
<td>Cameroun</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>Niger</td>
<td>80</td>
<td>74</td>
</tr>
<tr>
<td>Mali</td>
<td>68</td>
<td>66</td>
</tr>
<tr>
<td>Ghana</td>
<td>89</td>
<td>8</td>
</tr>
<tr>
<td>Nigeria</td>
<td>76</td>
<td>41</td>
</tr>
<tr>
<td>Kenya</td>
<td>88</td>
<td>86</td>
</tr>
<tr>
<td>All Sub-Saharan Africa</td>
<td>84</td>
<td>69</td>
</tr>
</tbody>
</table>

Notes: * The real exchange rate here is measured as the official exchange rate deflated by the domestic consumer price deflator to the U.S. consumption deflator. A fall in the index indicates exchange rate appreciation.


6.2 Agricultural supply response

6.2.1 Review of other studies

Garcia and Gabriel (1988) note in the study that, in the early stages of the import substitution models, it was thought that agriculture was not responsive to prices, and as such the strong impacts of price incentives in agriculture was entirely neglected. In contrast to the analysis presented in the preceding section about the impacts of exchange rate changes on agricultural supply, this point of view of the early import substitution models implicitly implies that agricultural exports would be exogenous and independent of variables like real exchange rate or the tariff level. Hence, a devaluation to correct balance-of-payments disequilibria would eventually lead to an acceleration of inflation. The latter itself was viewed as a structural phenomena, arising from insufficient food supplies caused as a result of a low supply response of the agricultural sector, and an increasing demand for food generated by rising per capita income.

However, recent studies on supply response of agricultural output have corrected this idea. Some of these recent studies have tried to determine the impact of policy changes on efficiency and welfare through the flexibility in resource reallocation, mainly captured through the direct and cross-price elasticities of supply response. Other studies have also advanced in the measurement of the elasticity of supply response, by attempting to capture the effects of prices not only directly on output and variable factor use, but also indirectly on fixed factors, which also respond to price changes in the longer run (see, for example, Binswanger, 1987; Schiff, 1987; and Binswanger et al., 1989).

The fixed factors are often grouped into three major categories. First, those variables not easily influenced by policies (weather, distance to market, population density, etc.). Second, those variables that respond to private decisions — adoption of high yielding varieties, farm size, irrigation, etc. Third are those which are public goods or respond to policy interventions such as extension services, electrification, agricultural research, road density, market structure, large scale irrigation, banking services, education and health (de Janvry and Sadoulet, 1992). Available evidence shows that all these three categories of fixed factors

---

5For a survey of the results of the major studies, see Askari and Cummings (1977) and Rao, (1989).
influence the output of agricultural commodities to a large extent (ref. Binswanger et al., 1987).

De Janvry and Sadoulet (1992) point out that this identification of the role of public goods is insufficient for an adequate analysis of supply response. According to them, it is important to distinguish those public goods which directly affect the individual households' elasticity of supply response (irrigation, electrification, extension, research, health and education) from those which affect the structure of transaction costs (transportation costs, market structure, banking service, information, legal services, etc.) and hence the transmission of price signals and ultimately the decision to sell, buy, or withdraw from transactions through the market. They therefore suggest that a useful direction in analysing the determinants of supply response in the context of agrarian institutions would be at least to specify a structure of transaction costs and distinguish between categories of households according to whether they respond to sale price, purchase price, or are unresponsive to the direct effects of price policy.

Studies conducted in certain areas show negative price elasticities of supply of agricultural commodities when farmers are unable to secure needed consumer or capital goods on the local market. For example, consumer goods imports financed by a French loan in Mozambique helped to increase the production of cashews, which farmers were not bothering to harvest as long as there was nothing they could buy with the money. Using aggregate data, Berthelemy and Morrisson (1987) also found high positive agricultural supply response with respect to the supply of manufactures in Côte d'Ivoire, Burkina Faso and Malawi.

Azam and Besley (1991) in their analysis of peasant supply response under rationing stated that where food is non-tradable and income from cash crop can only be used to purchase manufactured consumer goods which are binding in supply, the elasticity of supply of cash crops is perverse. In this case, higher cash crops prices increase income which cannot be used to increase the consumption of manufactured goods. The only alternative for the household is to increase the consumption of food by producing more food and less cash crops.

There is also evidence to show that there exists a negative cross price elasticity between the price of consumer goods and the quantity of cash crops produced. Mollett (1984) rightly points out that consumer goods shortages have often inhibited agricultural production, and that many countries have neglected their essential role as an incentive to production. He goes further to say that the farmer is not motivated by the money he receives for his crops but by the goods and services he can buy with it. Hence, increasing the availability of manufactured consumer goods, or reducing their price are significant policy instruments to raise the production of cash crops.

The preceding discussions show that investigating the response of farmers to changes in relative prices and non-price factors presents a complex task that cannot easily be solved with single equation systems. In his survey of the supply response literature, Rao (1988), identifies the different levels that supply response may be considered, depending on the type of resource use question the policy-maker is immediately concerned with. These include:

a) Aggregate agricultural output. If the primary goal is the rate of agricultural output growth, or some other economy-wide aim, the relevant notion is the response of an index of agricultural output to some index of the relative price of agriculture such as its barter terms of trade with non-agriculture.

b) Commodity composition of output. The central point of concern may be to alter the commodity composition of agricultural output by changing intra-agricultural commodity price relations: food products versus raw materials, cereals versus non-cereal
foods, export products versus import substitutes, employment-intensive versus capital- or land-intensive products, etc.

c) Marketed surplus. The objective of policy may also be to ensure a continuous flow of food and raw materials to urban areas sufficient to meet industrialization targets. In this case, the relevant concept of supply is the marketed surplus and the relevant price is an index of the price relatives between agricultural and non-agricultural products.

Supply response will be different at each of these levels, for both technological and economic reasons. The task that confronts the researcher is to identify each of them separately and account for the differences. Rao (1988) has also explained why aggregate- and micro-data may be sufficient to measure supply responsiveness. Since the analysis in the present study examines the impacts of economic policies on agricultural output, emphasizes will be placed on supply response estimations with aggregate data. Of course, a number of studies have applied the profit function approach to analyse supply elasticities with farm-level data (see, for example, Junanker, [1989] and Sevilla-Siero, [1991] for surveys).

At the aggregate level, the Nerlove model has been extensively applied to study supply response of agricultural products using historical data on output, output prices, acreage under cultivation, inputs etc — depending on the availability of data. Based on the type of supply response under investigation, different variants of the model has been used. A brief discussion of the model is presented below, followed by a modification to empirically investigate the reaction of cocoa farmers to certain economic incentives.

### 6.2.2 The Nerlove Model

The Nerlove model hypothesizes farmer reactions in terms of price expectations and/or partial area (or production) adjustments. This model has been used by economists, in certain cases with great modifications in examining supply response. The model consist basically of three equations as represented below

\[
A^D_t = a_0 + a_1 P^e_t + a_2 Z_t + \varepsilon_t
\]

\[
P^e_t = P^e_{t-1} + \beta(P_{t-1} - P^e_{t-1})
\]

\[
A_t = A_{t-1} + \gamma(A^D_t - A_{t-1})
\]

where \(A_t\) is the actual area under cultivation at time \(t\), and \(A^D_t\) is area desired to be under cultivation at time \(t\). \(P_t\) is the actual price at time \(t\), while \(P^e_t\) is the expected price at time \(t\). \(Z_t\) represents exogenous factors affecting supply at time \(t\). \(\beta\) and \(\gamma\) are termed the expectation and adjustment coefficients, respectively.

As mentioned above, several authors have used a modified form of this model to estimate supply response of agricultural products and response of various crops in several countries including Ghana (see for example, Askari and Cummings, [1977]; Rao, [1989] and Garcia, [1988] for reviews). Irrespective of the measure of output used as the dependent variable in equation (6.2), it is plausible that the desired output level is a function of expected price.\(^6\)

\(^6\)The adaptive expectations formula in the second equation says that economic agents revise their ex-
However, as indicated above, it must be borne in mind that the complexity of supply response is such that a simple basic econometric model such as the one presented above, cannot be used to analyse the impacts of one sector on the other. The impacts of non-price factors that influence the supply of a commodity are particularly difficult to capture in an empirical analysis.\footnote{\textsuperscript{7}}

For example, if agricultural supply is not found to respond to improvement in economic incentives, it could be presumed that some non-price production constraints need to be overcome. Such non-price constraints could include limited access to the required inputs, technological backwardness, or inadequate transport and marketing facilities.\footnote{\textsuperscript{8}}

There is likely to be some interaction between the price mechanism and non-price factors as they affect agricultural output. In the short-run, price responsiveness of agricultural supply will surely depend on the state of technology and institutions, the adequacy of rural infrastructure, the existing stock of agricultural capital, and the availability of variable inputs. In the long-run, the influences of these non-price factors on farm output are also likely to be affected by relative price changes. Changes in relative output prices trigger changes in factor prices, as well as movement of factors within agriculture and between agriculture and the rest of the economy. Capital accumulation depends on expected returns to capital, which in turn, depends on relative prices. Furthermore, the adoption of new technologies is also a function, among other things, of relative prices and the rate of capital accumulation (see Mundlak, 1984).

Although weather has an important impact on agricultural production in Africa, quantifying its effects presents an arduous task. In Ghana, like most African countries, rainfall data is spotty and difficult to interpret correctly. It is quite obvious that different rainfall patterns with varying evapotranspiration rates will affect individual crops differently. As pointed out by several authors (see Mundlak, 1984; Bautista, 1987; Garca Garca, 1988; Junankar, 1989; Rao, 1989; Sevilla-Siero, 1991), the quantitative evaluation of all these dynamic effects discussed above, is an inherently difficult econometric task, raising both conceptual and statistical problems.

There are, however, cases where distortionary policies cause relative prices of certain agricultural products to be artificially low, making production of those commodities unre-munerative. Under these conditions, the removal of such price distortions through policy reform could be an appropriate means of improving output performance, demonstrating a positive price response.

In the section that follows, a variant of the Nerlove model will be used to estimate the incentive response of Ghanaian cocoa farmers. The empirical examination has been...
restricted to the cocoa sector for conceptual reasons stated below. A qualitative analysis of the non-cocoa sector is presented later.

6.2.3 Towards a Dynamic Cocoa Supply Response

A major reason why the empirical analysis is limited to the cocoa sector is due to the non-availability of reliable output data for the agricultural sector, and the complex problem of non-separability of production and consumption of agricultural output. Cocoa is a cash crop which is mainly produced by farmers for the market, and as such is fully traded. Reliable data of annual output also exist because the Cocobod purchases the beans from the farmers directly for exports and for supply to domestic processing companies.9

Furthermore, for many crops in developing countries, and for that matter in Ghana, farmers face a lot of uncertainties about prices for their products. They, in principle, react to expected prices, which are generally not observable. With cocoa, the prices are always announced well in advance of the harvesting season, so that the farmers are able to decide as to the allocation of their resources to the various crop enterprises. Moreover, Alderman (1991) is essentially correct in arguing that any review of the Ghanaian economy must discuss cocoa policy in detail.10

The following basic form of the Nerlove specification which has been used by a number of authors in diverse ways to examine the determinants of cocoa output in Ghana is applied in this study with a different estimation technique as will be discussed below (see, for example, Bateman, [1965]; Behrman, [1968]; Akiyama and Duncan, [1982]; Akiyama, [1985]; and Stryker, [1990]).11 That specification is

\[ A_t^c = a_0 + a_1 P_t^c + a_2 A_{t-1}^c + a_3 Z_t + a_4 W_t + U_t \] (6.3)

where \( A_t^c \) is the cocoa output, \( P_t^c \) is the producer price for cocoa in current period, \( Z_t \) is a vector of other supply shifters, such as the real producer price of competitive crops, or an index of manufactured goods supply, \( W_t \) is a proxy for the effects of weather, and \( U_t \) is the error term.

The price of food crops is represented in this analysis by the producer price of maize, which tends to be closely correlated with the prices of the other major food staples (see Stryker, 1990; and Alderman and Shively, 1991). In their empirical analysis of prices and markets in Ghana, Alderman and Shively show that prices are transmitted across commodities very well. They, in particular, argue with their results that price movements for maize influences price movements for other food crops such as sorghum and millet. Maize is also largely cultivated in the cocoa growing areas of Ghana, so that it would be expected that if the prices of maize increase significantly relative to that of cocoa, the utility maximizing farmer would tend to shift resources from the production of the latter to that of the former. On the other hand, if the prices of cocoa increase relative to that of maize, resources will

9Of course, there is some amount of smuggling of cocoa to neighbouring countries. This was particularly practiced before the structural adjustment programme. With the gradual devaluation and improvement of producer prices, the illegal cocoa smuggling has virtually stopped. The data on cocoa output is normally adjusted for smuggling to neighbouring countries.

10According to the recent World Bank — Ghana Living Standards Survey, over 18% of farming households grow cocoa.

11The study by Bateman covered the period between 1933/34-1969/70, while that of Behrman was 1947-63. Akiyama used the vintage matrix approach in his recent study for the World Bank to estimate cocoa supply elasticities.
be shifted from the production of maize to that of cocoa. The arguments here hold because maize is a tradable crop in Ghana. It is in fact an importable.

Studies elsewhere have demonstrated that the availability of manufactured goods seem to influence the supply of cash crops. Berthelemy and Morrisson (1987) specifically introduce a variable that captures the impacts of manufactured goods supply in their empirical study on the supply of cash crops in Sub-Saharan Africa. Their findings indicate that, for many countries, including Ghana, the availability of manufactured goods affects the output of cash crops. The significance of manufactured goods supply on the output of cash crops stems from the fact that, farmers are encouraged to expand output, since they can increase their consumption with the receipts from the sales their produce. The increase in cocoa output and exports also helps to increase the imports of intermediate goods or consumer goods for industrial production. In effect, besides increasing the variety of goods on the market, the development of the consumer goods industries can also lead to a rise in the relative price of cash crop to price of manufactured goods, which in turn, will induce farmers to increase output.

Farmers are as such motivated to produce more in an economy of abundant supply of consumer goods. If consumer goods are rationed and farmers cannot obtain them with the income they receive for their products, they would prefer to produce for subsistence. Manufactured goods may generally include clothing and footwear, food or beverages (such as coffee, tea, chocoliae drinks), beer, building materials or articles required for transport, and others such as soap, matches and cigarettes etc., or even agricultural inputs — which farmers cannot produce.

6.2.4 Co-intergration and Error-Correcting System

An aspect that is potentially important, but has not been fully examined is the dynamic nature of the supply of cocoa. Binswanger (1989), for example, states theoretical reasons why classical statistical methods appear inadequate to estimate reliably long-run supply response, since the year-to-year price fluctuations in the data normally reflect short-lived commodity booms rather than long-run responses to permanent changes in price levels. Jaeger (1992), goes further to point out that “long-run aggregate supply response will include the effect of reallocation of productive resources, labour and capital, among sectors in the overall economy. It may also include changes in government expenditures and public capital investments for infrastructure, research, human capital and institutional support which may be forthcoming in the context of higher incentives” (p. 15).

Although most of the studies make mention of deviations of export crop supply from long-run equilibrium levels, they do not include the way the supply of export crops are influenced by such disequilibria. Equations like (6.3) implicitly assume that adjustments toward equilibrium are instantaneous, leaving no room for quantity supplied to diverge from long-run equilibrium levels. As argued by Denbaly and Vroomen (1993), the empirical results of static models can sometimes indicate that the process being analysed may be dynamic. Expressed in a different way, the supply response to a change in economic conditions may be dispersed over more than one period, giving rise to differences in short- and long-run own- and cross-price elasticities. For instance, the specification used by Berthelemy and Morrisson (1987) for selected African countries to estimate cash crops supply response, produced some high degrees of positive autocorrelation. According to Hendry and Mizon (1978), such results are a sign of possible dynamic misspecification. Furthermore, as discussed in chapter four (see Section 4.4.4), regressions of one unit-root non-stationary variable on another will usually yield a high $R^2$ and $t$-ratios which are biased towards rejecting the null hypothesis of
6.2. AGRICULTURAL SUPPLY RESPONSE

no relationship even when there is no relationship between the variables concerned (Granger and Newbold, 1974).

The consequences of such results have already be discussed in the above mentioned chapter and section. The objective here is therefore to subject all the variables that have been used in the various regressions to econometric tests to find out if these variables can be estimated in levels or, if they first have to be converted into stationary series before being estimated.

First, a Dicky-Fuller unit-root tests is undertaken to investigate if the variables are unit-root non-stationary. This will then be followed by an analysis of the autocorrelation- and partial autocorrelation functions to determine the order of integration (that is, to investigate whether the series are \( I(0) \) or not). As discussed in chapter four, the question of whether the series is a trend-stationary process (TSP) or difference-stationary process (DSP) is then ascertained. An error-correction model is then applied to capture the short-run dynamics of supply response, using the model specified in equation (6.3) as a basis. A description of the data sources is presented first presented below.

Data

Cocoa output data was obtained from the Ghana Quarterly Digest of Statistics. The real cocoa producer price which was also obtained from the same source was deflated with the rural consumer price index, since the consumer basket in the rural area is different from that in the urban area, leading to different consumer price indices for rural, urban and national.

For the purposes of this study, the price of food crops is represented here by that of maize, which tends to be closely correlated with the prices of the other major food staples (see Stryker, 1990). Data on maize producer prices was obtained from Stryker (1990), and Ministry of Agriculture, Ghana. This was also deflated with the rural consumer price index.

The manufacturing output index is used as a proxy for supply of manufactures. It must be borne in mind, however, that the total supply of manufactures include imports of manufactured goods. The imports, however, include intermediate goods which are used for domestic production of manufactured goods. We therefore found it appropriate to use the domestic output index to represent supply of manufactures. These figures were taken from the Ghana Quarterly Digest of Statistics.

The real exchange rate variable was computed by adjusting the nominal exchange rate for inflation in Ghana, using the national consumer price index (CPI) and a weighted index of the manufacturing unit value of the seven major industrial countries to account for the relative change in purchasing power over goods and services. The data on nominal exchange rate was also obtained from the Ghana Quarterly Digest of Statistics, while that on the manufacturing unit value of the seven major industrial countries was obtained from the OECD Economic Indicators. Rainfall data was obtained from the Ghana Meteorological Services.

Unit Root Tests

As stated in the preceding section, before proceeding to examine the response of cocoa farmers to economic incentives, a thorough analysis of the variables involved will be undertaken in order to determine the best procedure. A first step is again to investigate whether the variables are trend-stationary processes (TSP) or difference-stationary processes (DSP). As already argued in chapter four (see section 4.5), if the series are non-stationary, in particular,
if they follow random walks, a regression of one against another can lead to spurious results. Detrending the variables before running the regression will not help, since the detrended series will still be non-stationary.

The unit root tests is applied here again to identify the order of integration of the time series. The procedure is as described in section 4.5. The following regression was therefore estimated for each series:

$$\Delta X_t = \alpha + \beta t + (\rho - 1)X_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta X_{t-i} + \varepsilon_t \quad (6.4)$$

where $X$ is the variable under consideration, $\Delta X_t = X_t - X_{t-1}$; $\Delta X_{t-i}$ is the first difference of the observation at time $t - i$; and $k$ is the number of lags that ensures that the error term, $\varepsilon$, is white noise. A regression can be run to test if $\rho = 1$. This testing of the null hypothesis of $\rho = 1$ is called the unit root tests, indicating that the variable $X$ is non-stationary. The statistic used, $\tau$, is the usual $t$-statistic calculated under the null hypothesis.

A Dicky-Fuller unit-root test was run on each of the variables under investigation by estimating the regression in equation (6.4), and comparing the results with the critical values in the Dicky-Fuller Table. Analogous to equation (4.40) in section 4.5, a distinction was made whether the series are TSP or DSP, by testing the null hypothesis $\beta = 0$. The results are presented in Table 6.2. All the variables were transformed into their natural logarithms before the analysis was undertaken. As was explained earlier, given that most empirical series are integrated of order one, that is, require differencing once to remove time dependence in the mean, a useful result emerges when the difference and logarithmic transformations are combined.

Table 6.2: Unit-Root Tests for the Series

<table>
<thead>
<tr>
<th>Series</th>
<th>Levels</th>
<th>First differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa output</td>
<td>-2.69</td>
<td>-6.42</td>
</tr>
<tr>
<td>Cocoa prices</td>
<td>-2.25</td>
<td>-5.71</td>
</tr>
<tr>
<td>Maize prices</td>
<td>-4.44</td>
<td>...</td>
</tr>
<tr>
<td>Manufacturing supply</td>
<td>-1.47</td>
<td>-4.45</td>
</tr>
<tr>
<td>Real exchange rate</td>
<td>-1.07</td>
<td>-4.63</td>
</tr>
<tr>
<td>Weather</td>
<td>-3.93</td>
<td>...</td>
</tr>
</tbody>
</table>

$\dagger$All variables are in natural logarithms for the 1960–89 period. ... Not calculated. Notes: The asymptotic critical values of $\tau_0$ are $-4.38$, $-3.60$, and $-3.24$ at the 1%, 5%, and 10% significance levels, respectively (Fuller, p. 373).

Source: Computed by the Author.

In each case there are 30 observations. Comparing the Figures in the Table to the critical value for sample size of 25 in the Dicky Fuller Table, indicates that the null hypothesis of unit root at the 5% level (critical value of -3.60) cannot be rejected for the series, with the exception of the price of maize and weather variables. Even at the 10% level (critical value of $-3.24$), it can be observed that in all cases, again with the exception of maize price and weather variables, the hypothesis of unit root cannot be rejected.

In the estimated equations for cocoa output, cocoa prices, manufactured supplies, and real exchanges rate exchange rate equations, $\beta = 0$, indicating that the series are DSP, and therefore require differencing. The very high figure obtained for the maize price series,
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reflects a common characteristic of prices of agricultural commodities in the absence of price stabilization measures. Because of the high output dependence on weather, the inelastic demand of the products, as well as the low short-run supply elasticity, the prices are subjected to high fluctuations than prices in other sectors. On the other hand, the null hypothesis of unit root in the first differences of all the series can be rejected, indicating that they are stationary in first differences.

As discussed in section 4.5 of chapter 4, a further examination of the autocorrelation and partial autocorrelation functions are necessary to be certain of the order of integration of the variables. This was therefore undertaken, and the results of the autocorrelation functions are presented in Table 4.2.

**Autocorrelation Function Analysis**

An analysis of the autocorrelation functions of the individual variables also reveals that with the exception of maize prices, the rest of the variables are non-stationary. It can be observed from Table 6.3 that the autocorrelation coefficients of the level variables (critical value is 0.37) are high and decay slowly.

| Table 6.3: Sample Autocorrelations of the Natural Logs of Annual Data† |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Series                   | $p_1$ | $p_2$ | $p_3$ | $p_4$ | $p_5$ | $p_6$ | $p_7$ | $p_8$ |
| $A_t$                    | 0.81  | 0.71  | 0.62  | 0.54  | 0.43  | 0.29  | 0.19  | 0.07  |
| $P_t^c$                  | 0.75  | 0.54  | 0.43  | 0.28  | 0.13  | 0.09  | 0.02  | -0.04 |
| $M_t^m$                  | 0.84  | 0.58  | 0.29  | 0.06  | -0.13 | -0.26 | -0.29 | -0.33 |
| $P_t^m$                  | 0.29  | -0.08 | 0.03  | 0.14  | -0.04 | 0.02  | 0.32  | 0.05  |
| $RER_t$                  | 0.91  | 0.80  | 0.66  | 0.53  | 0.40  | 0.26  | 0.13  | 0.02  |
| $W_t$                    | 0.35  | 0.04  | 0.17  | 0.16  | -0.15 | -0.21 | 0.08  | -0.20 |

† Natural logs of all the data are used. $p_i$ is the $i^{th}$ order autocorrelation coefficient.

Notes: The large sample standard error under the null hypothesis of no autocorrelation is $T^{-1/2}$ or roughly 0.37 for the series of the length considered here. $A^c$ = Cocoa output; $P^c$ = Cocoa prices; $P^m$ = Maize prices; $RER$ = Real exchange rate; $M^s$ = Index of Manufactured goods supply.

Source: Computed by the Author.

The autocorrelation coefficients of the first differences presented in Table 6.4 below, shows clearly that the coefficients are low, indicating stationary series. Referring to the partial autocorrelation functions also presented in Table C.1 in Appendix C reveals that all the variables practically decay after the first lag, suggesting a first-order autoregressive process $AR(1)$. That is, with the exception of the first lags in Table C.1, all the values that follow fall below the critical value for the sample — 0.37.

Since the level variables are unit-root non-stationary, any regression with these variables will lead to spurious correlation. On the other hand, the analysis of the first differences shows that the series are stationary in differences. It is, therefore, appropriate to revert to
Table 6.4: Sample Autocorrelations of First Differences

<table>
<thead>
<tr>
<th>Series</th>
<th>$\rho_1$</th>
<th>$\rho_2$</th>
<th>$\rho_3$</th>
<th>$\rho_4$</th>
<th>$\rho_5$</th>
<th>$\rho_6$</th>
<th>$\rho_7$</th>
<th>$\rho_8$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_t^c$</td>
<td>-0.24</td>
<td>-0.11</td>
<td>-0.00</td>
<td>0.00</td>
<td>0.15</td>
<td>-0.12</td>
<td>0.01</td>
<td>-0.12</td>
</tr>
<tr>
<td>$P_t^c$</td>
<td>-0.11</td>
<td>-0.21</td>
<td>0.14</td>
<td>0.05</td>
<td>-0.21</td>
<td>0.04</td>
<td>-0.07</td>
<td>-0.12</td>
</tr>
<tr>
<td>$M_t^f$</td>
<td>0.35</td>
<td>0.15</td>
<td>-0.09</td>
<td>-0.06</td>
<td>-0.18</td>
<td>-0.25</td>
<td>0.00</td>
<td>-0.26</td>
</tr>
<tr>
<td>$RER_t$</td>
<td>0.23</td>
<td>0.20</td>
<td>-0.03</td>
<td>-0.05</td>
<td>0.10</td>
<td>-0.09</td>
<td>-0.23</td>
<td>-0.20</td>
</tr>
</tbody>
</table>

Notes: The large sample standard error under the null hypothesis of no autocorrelation is $T^{-1/2}$ or roughly 0.37 for the series of the length considered here. $A_t^c =$ Cocoa output; $P_t^c =$ Cocoa prices; $P_t^m =$Maize prices; $RER_t =$ Real exchange rate; $M_t^f =$ Index of Manufactured goods supply.

Source: Computed by the Author.

first differences to solve this problem of spurious correlation. The positive autocorrelation at lag one only, displayed by the variables except maize price and weather variables is also inconsistent with the TSP. The only TSP process that gives rise to autocorrelation only at lag one is the case of serially random deviations around the trend. This therefore confirms the fact that the series are DSP (Nelson and Plosser, 1982).

Co-integration Analysis

This section primarily aims at estimating how cocoa farmers respond to economic incentives, in particular price signals. An error correction model — using first differences — is therefore derived to examine the impacts of price changes on cocoa supply. As pointed out in chapter four, one drawback of the procedure of differencing is that it results in loss of valuable "long-run information" in the data. The concept of co-integration and error correction model which was also discussed in the above-mentioned chapter will therefore be applied here. The co-integration equation is used here to determine the long-run relationship between the variables. The question therefore is whether $A_t$, $P_t^c$, and $M_t^f$ are co-integrated. As mentioned earlier, according to Engle and Granger, if the co-integrating vector is unique, ordinary least squares estimators of regressing $A_t$ on $P_t^c$ and $M_t^f$ are "super consistent".

The co-integrating regression for cocoa output, real cocoa producer price and index of manufacturing output is

$$A_t = 1.03 + 0.43M_t^f + 0.625P_t^c + Z_t$$

\( (0.39) \quad (2.36) \quad (5.1) \)

\[ R^2 = 0.79 \quad DW = 0.86 \quad (6.5) \]

Since $P_t^m$ and $W_t$ are I(0) processes, they do not have to be included in the co-integrating regression.
The Dicky-Fuller test for co-integration is used here to test whether the residuals, $Z_t$, are stationary or not. If in the regression of $\Delta Z_t = \sigma Z_{t-1} + \nu_t$, $\sigma$ is found to be negative and statistically significant, then the null-hypothesis ($Z_t$ is $I(1)$) can be rejected, and the alternative hypothesis, ($Z_t$ is $I(0)$) can be accepted. Running such a regression gives

$$\Delta Z_t = -0.77Z_{t-1} + \rho_t$$

$(-3.88)$

$R^2 = 0.38 \quad DW = 1.97 \quad (6.6)$

The t-statistic ($-3.88$) given here is significant at the 10% level (critical level is $-3.65$) for the analysis (see Table 2 in Engle and Yoo, 1987; or Table 1 in Mackinnon, 1991). Hence the null-hypothesis (i.e., $Z_t$ is not stationary) can be rejected in favour of the alternative hypothesis. That is, $A_t$, $P_t^c$, and $M_t^r$ are co-integrated.

Once it has been established that $A_t$, $P_t^c$, and $M_t^r$ are co-integrated, an error correction model can now be formulated to capture the short-run dynamics of cocoa supply response. Such a formulation takes the form:

$$\Delta A_t^c = a_0 + a_1 \Delta P_t^c + a_2 P_t^m + a_3 \Delta M_t^r + A_4 P_t^m + a_5 W_t - \gamma (A_{t-1} - P_{t-1}^c - M_{t-1}) + U_t \quad (6.7)$$

where $\Delta A_t^c$ is the change in cocoa supply, $\Delta P_t^c$ is the change in cocoa price, $\Delta M_t^r$ is the change in manufactured goods supply. The term inside the brackets in equation (6.7) provides the error-correction mechanism, with $\gamma$ representing the error-correction term. If the supply of cocoa rises above its long-run equilibrium level at time $t - 1$, the term in the brackets become positive. However, because $\gamma$ is negative, its effect at time $t$ is to reduce the growth rate of the observed output towards its steady state path. It is absolutely important to note that because $P_t^m$ and $W_t$ are stationary series (i.e., $I(0)$), they do not have to be differenced again. Once they are not differenced, they do not have to be included in the error-correction term.

Empirical Results of the ECM

In accordance with Engle and Granger (1987), the simplest error-correction model was first estimated, and then tested for added lags in order to establish that the joint distribution of $A_t$, $P_t^c$, and $M_t^r$ is an error-correction system. The error-correction term is of the appropriate sign and is significant. Of all the lagged changes, only the first lag of cocoa price is significant. The final model, thus has an error-correction term estimated from the cointegrating regression, changes in in cocoa output and cocoa price, changes in manufacturing supply, lagged changes of cocoa price, levels of maize price and weather variables.

Table 6.5 presents the results of the regression described above. The signs of all estimates of the coefficients agree with a priori expectations. The model also passes a diagnostic test for serial correlation. The weather coefficient is positive, but statistically insignificant even at the 10% level, and is as such omitted from the final model. A dummy variable, added to test whether some allowance should be made for the impacts of the ERP, was not significantly different from zero.
Table 6.5: Estimated Results for Incentive Response

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficients</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma$</td>
<td>-0.401$^a$</td>
<td>2.92</td>
</tr>
<tr>
<td>$\Delta A_{t-1}$</td>
<td>0.601$^c$</td>
<td>1.78</td>
</tr>
<tr>
<td>$\Delta P_{t}^c$</td>
<td>0.250$^b$</td>
<td>2.72</td>
</tr>
<tr>
<td>$\Delta P_{t-1}^c$</td>
<td>0.312$^c$</td>
<td>1.98</td>
</tr>
<tr>
<td>$P_{t}^m$</td>
<td>-0.125$^b$</td>
<td>2.36</td>
</tr>
<tr>
<td>$\Delta M_t^*$</td>
<td>0.163$^c$</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Notes: $\gamma$ represents the error-correction term, is the residual ($Z_{t-1}$) from the co-integrating regression. $A_{t-1} = $ lagged cocoa output; $P_{t}^c = $ cocoa producer price; $M_t^* = $ supply of manufactured goods; $P_{t}^m = $ maize price. Significance levels are (90%)$^c$ (95%)$^b$ and (99%)$^a$.

It can be observed from the Table that $\gamma$, which represents the error-correction term carries the expected sign and is statistically significant at the 1% level. The magnitude of the coefficient is however low. The coefficient of $-0.401$ indicates that deviations of cocoa output from the long-term equilibrium level is partly corrected by about 40% per annum. This implies that in years when cocoa output deviates from the log-run equilibrium level, farmers are able to adjust by 40% to the equilibrium level the following year. Although the tendency to move towards the equilibrium is not very strong, the statistical significance of the parameter still demonstrates that corrections towards it does occur annually.

The results also show that real producer prices of cocoa have significant impacts on cocoa output. The estimated elasticities indicate that cocoa supply is inelastic, both in the short and the long run. The price coefficient ($\Delta P_{t}^c$) of 0.250 indicates that in the short-run, a 10% increase in real producer price of cocoa leads to a 2.5% increase in cocoa output. The coefficient for the lagged price change which is also positive and 0.312 indicates that price changes in year $t-1$ positively influence the output of cocoa. These results are quite plausible because in Ghana producer prices are announced well in advance of the main harvest season, thus eliminating uncertainty for the farmer. In this case, current prices are able to influence the farmer's decisions on the allocation of resources to various enterprises. The effects of past price changes on current output is also captured by the lagged change in the price variable. This confirms the fact that previous prices do influence current production, because of their effects on spraying, pruning, weeding, canopy repair, and other practices that may affect yield in subsequent seasons.

The coefficients of the exogenous variables in the co-integrating regression (equation 6.5), which shows the long-run equilibrium relationship can be used to compute the long-run supply elasticities. The co-integration coefficient of 0.63, indicates the long-run supply elasticity is 0.63. Note that the long-run elasticity can also be derived from the coefficient of the error-correction term and the coefficient of the variable in question in the error-correction model (i.e., the short-run elasticity). Consider, for example, a steady state relationship such as $y = \mu + x\varepsilon$ where $y$ is the logarithm of cocoa supply, $\mu$ is the logarithm of the intercept, $x$ is the logarithm of the row vector containing the predetermined variables, and $\varepsilon$ is the column vector made up of the long-run price elasticities. These long-run elasticities can also be computed from $x = \theta/\gamma$ where $\theta$ is the short-run elasticity and $\gamma$ is simply the error-correction term in equation (6.7).
The estimated coefficient of the price of maize carried the postulated negative sign, and is significantly different from zero at the 5% level. The significance of the changed variable here suggest that farmers are able to predict prices of food crops in advance during the growing season to influence their decisions as to how to harvest cocoa. The coefficient of \(-0.12\) indicates that a 10% increase in the price of maize, while the price of cocoa remains unchanged leads to a 1.2% decrease in cocoa supply in the short run. In the least, the results is consistent with the situation that obtained prior to the ERP.

The producer prices of cocoa relative to food crops were so low in the early 1980s that cocoa farmers cut down cocoa trees to plant maize. Between 1978 and 1980, while producer prices of maize increased by almost 300%, that of cocoa rose by only 50%. Maize prices again increased by over 400% between 1981 and 1983, while cocoa prices rose by only 70%. Besides expanding output of maize to sell on the markets, cocoa farmers also produced some maize for self consumption, since it was relatively more profitable to produce and consume and to produce cocoa for the market and purchase maize for consumption. A totally different picture is observed since the implementation of the ERP. The significant increases of cocoa prices relative to maize has made the production of cocoa once again more attractive than maize. The liberalisation of the economy has also brought with it liberalized cereal imports, particularly maize and rice, which were heavily protected as import-substituting crops. Hence enormous price increases has been prevented since the implementation of the programme. In real terms, maize farmers have faced price falls. The cocoa/maize producer price ratio which was 0.63 in 1983, rose to 1.86 in 1984 and finally to 4.79 in 1985. While the production of maize has remained stable since the mid-1980s, cocoa has experienced substantial increases in output.

The coefficient for manufactured goods output is positive and statistically significant at the 10% level, lending support to the hypothesis that the availability of manufactured goods encourages farmers to produce for the markets. The magnitude of the coefficient implies that a 10% increase in the supply of manufactured goods results in a 1.6% increase in cocoa output in the short-run. The co-integration coefficient of 0.42 in equation (equation 6.5) reveals a long-run elasticity of 0.42. It can be noticed here again that cocoa output is more responsive to manufactured goods supply in the long-run than in the short-run.

The estimate for the coefficient of the lagged cocoa output variable is also positive and significant, \(a_2\) at the 10% level, indicating that output in the previous year positively influences output in the current period. Cocoa being a tree crop, output in the year before is most likely to affect output in the current year, confirming also the positive impacts certain cultivation measures can have on output for a couple of years, granting that other conditions remain favourable. Another plausible reason is that since cocoa generates over two-thirds of foreign exchange earnings of Ghana, its exports may have an impact on imports of manufactured goods, as well as the imports of intermediate goods for the production of manufactured goods. That is, cocoa output in year \(t - 1\) could have an impact on the imports of consumer goods in \(t\), while the latter can influence the production of cocoa in the same year, or year \(t + 1\).

Although the results obtained here are not directly comparable with the studies mentioned earlier, these studies also report inelastic supply of cocoa. These elasticities, however, are based on static models which assume that adjustments toward equilibrium are instantaneous. For example, Stryker (1990) estimated short-run output elasticities of 0.22 and \(-0.14\), respectively, for cocoa price and maize price. Jaeger's (1992) estimated short-run price elasticities of export crops for 21 African countries including Ghana, utilising pooled cross-section time-series procedure and data for the 1970-87 period, ranged between 0.1 and 0.3. Berthelemy and Morrison (1989), in a time series analysis of the impacts of manufactured goods on aggregate agricultural output response, using a log-linear model also
obtained 0.1 and 0.2 elasticities for the short- and long-run, respectively.

**Impacts of the Real Exchange Rate**

The real effective exchange rate (RER) is a measure of the competitiveness of agriculture, and as such incorporates some of the incentives accounted for by the real producer price. It also provides a more general measure of the distortions in the product and factor markets, and further serves as a proxy for the indirect effects of the exchange and trade controls that usually accompany overvaluation (Jaeger, 1992).

In view of this close relationship between the RER and the real producer price, the impacts of the real producer price on cocoa output can only be efficiently captured in an estimation without the RER variable. This is the major reason why the RER variable was not included in the analysis above. In order to examine the extent to which RER changes influences producer response, an estimation of the cocoa supply response will be undertaken with the RER variable in this section.

The way it affects the export sector was illustrated at the beginning of the present chapter. To add more light to these explanations, let's consider the fact that one of the measures often used to calculate the RER is the ratio of the price of home goods (non-traded) to price of traded goods. As will be extensively discussed in a later section, a policy of overvaluation (appreciation of the RER) makes imports cheaper for consumers but dearer for producers. Producers will produce less traded goods either because they cannot break even in traded goods or because there is more profit in home goods (Dornbusch, 1988). Appreciation of the exchange rate therefore serves as a disincentive to the producers of export crops. This implies that a positive relationship will be expected between the RER and cocoa output.

**Estimation and Results**

The basic analytical framework is again the Nerlove model, with the error-correction model (ECM) and co-integration being utilised for econometric reasons as explained earlier. As stated in the previous analysis, a prerequisite for an (ECM) is that the variables be co-integrated. From the measure of the real exchange rate (see Data section), a positive sign will be expected for the coefficient of the RER variable. The postulated positive sign is due to the fact that a deterioration of the real exchange rate (a depreciation of the domestic currency) is expected to increase incentives for the exportables sector, while an overvaluation of the domestic currency is expected to reduce the profitability of export crops. That is, as the amount of cedis in real terms that have to be exchanged for foreign currencies increases (a devaluation), the incentives to the export sector is expected to increase, followed by an increase in the supply of export products.

A co-integrating regression for output, real exchange rate and index of manufacturing output gives the following results:

\[
A_t = 4.67 + 0.298 M_t + 0.420 RER_t + \epsilon_t
\]

\[
(1.72) \quad (4.14) \quad (9.63)
\]

\[R^2 = 0.70 \quad DW = 1.11\] (6.8)
To test whether the residuals, $\varepsilon_t$, are stationary or not, a regression of $\Delta E_t = \sigma E_{t-1} + \nu_t$, was run, which gives the results:

$$\Delta \varepsilon_t = -0.77 \varepsilon_{t-1} + \zeta_t$$

$$(-4.19)$$

$$R^2 = 0.38 \quad DW = 1.97$$

(6.9)

The t-statistic ($-4.19$) given here is significant at the 5% level (critical level is $-4.03$) for the analysis (see Table 2 in Engle and Yoo, 1987). Hence the null-hypothesis (i.e., $Z_t$ is not stationary) can be rejected in favour of the alternative hypothesis. That is, $A_t$, $RER_t$, and $M_t^*$ are co-integrated.

The empirical results are presented in Table 6.6. The results show that real exchange rate changes have significant effects on the supply of cocoa. The magnitude of the coefficient for the $RER$ variable indicates that a depreciation of the real exchange rate by 1 per cent leads to a 0.22% increase in output of cocoa. On the other hand, an appreciation or overvaluation of the real exchange rate by 1% results in a fall in output of 0.22%. The significance of the lagged variable also shows that past exchange rate depreciations positively influence cocoa supply. The coefficient of 0.42 in the co-integrating regression, which represents the long-run relationship shows the long-run elasticity of cocoa supply with respect to real exchange rate changes.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficients</th>
<th>$t$-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\varpi$</td>
<td>-0.522$^a$</td>
<td>3.13</td>
</tr>
<tr>
<td>$\Delta A_{t-1}$</td>
<td>0.591$^c$</td>
<td>1.85</td>
</tr>
<tr>
<td>$\Delta RER_t$</td>
<td>0.215$^b$</td>
<td>3.60</td>
</tr>
<tr>
<td>$\Delta RER_{t-1}$</td>
<td>0.198$^c$</td>
<td>1.67</td>
</tr>
<tr>
<td>$\Delta M_t^*$</td>
<td>0.153$^c$</td>
<td>1.97</td>
</tr>
<tr>
<td>$R^2 = 0.46, \quad DW = 2.11$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: The numbers in parenthesis are $t$-statistics. $\varpi$ = which represents the error-correction term, is the residual $(E_{t-1})$ from the co-integrating regression. Significance levels are (90%)$^c$ (95%)$^b$ and (99%)$^a$.

Similarly, $\varpi$ which is the error-correction term carries a negative sign, and statistically significant at the 1% level. The size of the coefficient also implies that with the effects of the real exchange rate taken into consideration, deviations of output from the long term equilibrium level is partly corrected by about 52% per annum.

The results again suggest that the supply of manufactured goods have significant impacts on response of cocoa farmers. The coefficient of 0.153 indicates that a 10% increase in the supply of manufactured goods results in a 1.5% increase in the supply of cocoa in the short-run. The long-run elasticity here is given by 0.153/0.522, which is 0.293, again suggesting that farmers response is higher in the long-run than in the short-run.
Policy Implications

These findings lend support to the hypothesis that farmers do respond to economic incentives given the limited freedom available to them. That is, despite the short-run infrastructural and other institutional constraints, farmers can still react to economic incentives. Particularly interesting in the case of Ghana is the fact that the results are consistent with the widely expressed view that the deterioration in real producer price of cocoa contributed significantly to the decline in cocoa output between the early 1970s and mid-1980s. The low producer prices cocoa farmers received for their products was exacerbated by the unrealistically overvalued exchange rate. The combined effect was to raise the effective export duty on cocoa from a high 54.3\% in the second half of the 1960s to 88.9\% in the second half of the 1970s and early 1980s (World Bank, 1986).

For example, in 1982, the producer price of cocoa was about one-third of the 1970 price and about half the price in real terms. As demonstrated in Table 6.1, the real exchange rate also appreciated by 92\% between 1969-71 and 1981-83. That is, the index fell from 100 in 1969-71 to 23\% in 1978-80, and finally to 8\% in 1981-83. As a result cocoa was not replanted, disease control was minimal and even relatively healthy, productive farms were neither well tended nor intensively plucked. No wonder cocoa production fell from 413,000 tons in 1970 to 159,000 in 1983.

The producer prices were so low to the extent that a substantial price differential existed between Ghana and its neighboring cocoa producing countries (see Table 6.7). These price differences further served as incentives for farmers and rent-seeking agents to smuggle cocoa to the neighboring countries, resulting in huge losses of revenues to the Ghanaian government. Broken-down bridges, bad roads and frequent breakdowns of vehicles further contributed to creating a transportation bottleneck, which hindered the evacuation of cocoa to the ports.

<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio of Côte d'Ivoire Price to Price in Ghana</th>
<th>Ratio of Togo Price to Price in Ghana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>9.98</td>
<td>6.56</td>
</tr>
<tr>
<td>1978</td>
<td>6.98</td>
<td>4.43</td>
</tr>
<tr>
<td>1979</td>
<td>6.56</td>
<td>4.99</td>
</tr>
<tr>
<td>1980</td>
<td>5.45</td>
<td>4.28</td>
</tr>
<tr>
<td>1981</td>
<td>7.68</td>
<td>5.63</td>
</tr>
<tr>
<td>1982</td>
<td>4.97</td>
<td>3.78</td>
</tr>
<tr>
<td>1983</td>
<td>3.13</td>
<td>2.45</td>
</tr>
<tr>
<td>1984</td>
<td>5.60</td>
<td>4.40</td>
</tr>
<tr>
<td>1985</td>
<td>4.28</td>
<td>3.42</td>
</tr>
<tr>
<td>1986</td>
<td>3.18</td>
<td>2.63</td>
</tr>
</tbody>
</table>

Source: Azan and Besley, 1989.

It can be seen from Table 6.7 that between 1977 and 1986 the ratio of cocoa prices in Côte d'Ivoire to that in Ghana ranged between 3.1 in 1983 and 10 in 1977, while that
between Togo and Ghana ranged between 2.5 in 1983 and 6.6 in 1977. Ghana's share of export markets slumped from 40% in 1961–63 to 18% in 1980–82; Togo's market share grew slightly; that of Côte d'Ivoire rose from 9% in 1961–63 to 29% in 1980–82. The World Bank (1986) documents that this increase in Côte d'Ivoire's market share, particularly in the early 1980s was greater than its exportable surpluses, confirming the fact that it was the higher producer prices that prevailed in the country relative to that in Ghana, that strongly attracted the extensive smuggling of Ghanaian cocoa into it.

Another interesting point from Table 6.7 is the fact that the price differential started declining gradually as the ERP progressed effectively in 1984. However, some amount of smuggling was still taking place as late as 1987, since the producer price was still comparatively lower than those in the neighbouring countries. The decline in world cocoa prices, which forced Côte d'Ivoire to reduce the producer prices for its farmers in 1989, ironically left the Ghanaian cocoa farmer in a relatively better situation for two main reasons. First, his share of the export price rose from 28% in 1988 to 47% in 1990, as a result of the ERP. Second, the Ivorian price which is the relevant comparator for smuggling purposes became less attractive (Roe and Schneider, 1992).

A closer look at the development of real producer price of cocoa and cocoa output as illustrated in Figure 6.3 reveals that the prices cocoa farmers receive for their products have improved tremendously since the implementation of the ERP in 1983. The ERP 1 implemented an increase in the producer price of cocoa to 86,000 cedis per tonne for the 1986/87 crop year — a more than 50% increase relative to 1985/86 and a quadrupling relative to 1983/84. In all, there was more than sevenfold increase in the producer price of cocoa between 1983 and 1987. The price was further increased by about 60% between 1987 and 1990/91. Although subsidies on production inputs such as pesticides, fertilizers and machinery were gradually reduced and finally removed, cocoa production remained profitable. As 6.3 demonstrates, output responded positively.

![Figure 6.3: Real Producer Price and Output of Cocoa](image)

As stated earlier, the response of cocoa supply in the short-run is limited. The magnitude of the short-term elasticity confirms this. The apparent increases in production reflect greater applications of pesticides and labour. A portion, however, may be a shift of trade which had previously gone through Togo and Côte d'Ivoire.
There have also been a tremendous improvement in infrastructure, alongside the price measures. The magnificent improvements in rails, roads and port facilities as well as banking services to cocoa farmers, prompt payment of cocoa farmers through the Akuaffo cheque system, have further reinforced the price effect to boost output. As shown earlier on, improvement in the domestic availability of consumer goods has positively influenced the supply of cocoa. Table 6.8 is used to illustrate the relationship between the supply of manufactured goods on the markets and cocoa output. Taking 1970 to be the base year, and considering the index of average output, it can be observed that during 1983–85, when manufacturing output was very low, cocoa output was also extremely low.

<table>
<thead>
<tr>
<th>Year</th>
<th>Manufacturing Output</th>
<th>Cocoa Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961–63</td>
<td>66</td>
<td>96</td>
</tr>
<tr>
<td>1971–73</td>
<td>95</td>
<td>97</td>
</tr>
<tr>
<td>1981–83</td>
<td>57</td>
<td>48</td>
</tr>
<tr>
<td>1987–89</td>
<td>88</td>
<td>59</td>
</tr>
</tbody>
</table>

Source: Central Bureau of Statistics, Accra, Various Years.

As discussed earlier, the absence of consumer goods on the Ghanaian market was also part of the reason why farmers close to the boarders chose to smuggle cocoa to the neighbouring countries to sell and purchase the required commodities. Results of other studies also indicate that not only cocoa exports responded positively to the change in macroeconomic environment, but also the exports of non-traditional products. For example, a study by Jebuni et al., (1992) reveals that the value of agricultural non-traditional exports increased from 17.82 million in 1986 to 28.78 million US dollars in 1990, while the number of exporters of non-traditional agricultural products increased from 377 in 1987 to 627 in 1989.

The results of the models would certainly have been improved, if a proxy variable could be found for transaction costs (market structure, transport costs, banking services, information services, etc.). The structure of these costs prior to the ERP was quite different from the period after the programme. This is due to the fact that a good deal of emphasis was placed on a reform of the marketing arrangements of the Cocoa Marketing Board (now Cocobod), with the objective of reducing the distribution margins paid to the the Board, so as to release a larger portion of the cocoa price to farmers. As mentioned somewhere else in this study, a different system of payment to cocoa farmers was also established in an effort to prevent the long delays in payments that characterised the pre-ERP period. All these factors affect the nature of transaction costs, which invariably influence farmers response to incentives.

In summary, a few points can be deduced from the foregoing analysis; First, the real producer prices farmers receive for their products influences the way they allocate resources to the production of different crops. If farmers receive high prices for their commodities relative to other goods, they would be encouraged to increase output within their limits. Second, the real exchange rate is a measure of the competitiveness of the agricultural sector. An overvaluation of the domestic currency serves as a disincentive to the production of tradables, particularly exportables. Third, the domestic availability of manufactured goods influences the decisions of farmers to produce for the market. In a situation where farmers are fully aware that they cannot purchase manufactured goods from the income they obtain from selling their products, they can revert to subsistence production, or smuggle the products to neighbouring countries where they can obtain certain basic goods. Thus, although export
taxes is an important source of income for the Ghanaian government, like for many other African governments, applying high tax rates (direct or indirect) may, in the long-run, result in a loss in total revenue due to declining output over time.

The Non-Cocoa Sector

The preceding analysis focused on the development of the export sector, and in particular, the cocoa sector. While a comprehensive discussion of the non-cocoa sector is not intended here, it is still necessary to highlight on the development of output of other crops in the country. Ghana's policies for the development of non-cocoa sector prior to the adjustment phase had been dominated by a bias toward state enterprises (see, for example, Killik, 1978 and Alderman, 1991 for reviews).

The agricultural sector has generally enjoyed tax-free imports of inputs like fertilizers, insecticides, and agricultural machinery. Domestic prices of most agricultural inputs, prior to the ERP had been influenced less by trade taxes than by government policy and regulations regarding input distribution. Particularly the heavily overvalued cedi had a significant effect on the pricing of inputs, as it tended to favour capital-intensive, mechanized techniques over labour-intensive techniques. Although fertilizer was heavily subsidized, a major problem was inadequate supplies imported by the Ghana National Procurement Agency (GNPA) and distributed by the Ministry of Agriculture. The inability of the GNPA's to gain access to adequate foreign exchange, as well as smuggling of the imported fertilizer across the borders combined to make fertilizer procurement, in particular by small farmers extremely difficult. For example, in March 1977, while the official price of fertilizer was 2 cedis per bag, the village market price was 9 cedis per bag (Stryker, 1990).

With the realignment of the exchange rate and partial removal of subsidies following adjustments, the relative profitability of agro inputs has reduced considerably. As is apparent from Table 6.9, the price relation between maize and one of the most commonly used fertilizer (15-15-15) has shifted massively in favour of the latter. This has contributed to a fall in demand for fertilizers, as is reflected in the decline in imports. Asiedu-Saforo (1989) estimates that the average of 51,243 tons for 1978-82 was approximately 21,000 tons higher than the average recorded during the four years of structural adjustments.

An important qualification of this development, however, is the fact that relative profitability considered here is in terms of official prices of fertilizer. As stated in the last example, due to the high subsidies and overvalued Ghanaian cedi, prior to the ERP, the fertilizers were very cheap at the official prices, but hardly reached farmers at the government stipulated prices. The gradual removal of input subsidies has to a large extent removed "rent-seeking" in fertilizer distribution, so that in the final analysis, the farmer benefits, since he now has timely access to fertilizer without difficulty of late arrivals, and complex administrative procedures (Jebuni et al., 1990).

Although the government invested heavily in agriculture, much of the investment was in

---

14 Between 1970 and 1984, the subsidy rate ranged from 49% to 86%, even without the additional indirect subsidy resulting from the overvaluation of the cedi. Apart from the inefficiency and inequity in allocation and delays in distribution, the fertilizer subsidy grew to be an important public sector expense. For example, in 1976/77 the subsidy amounted to 25% of the current budget for all agricultural development, excluding cocoa.

15 Price statistics from the Crop Services Department of the Ministry of Agriculture show that the average subsidy level on fertilizers declined from 80% in 1970-79 to 45% in 1981-83, and finally to about 40% in 1985-86.

16 A survey of farm households in the Northern Region of Ghana during the 1986/87 cropping by Hailu (1990), however, revealed that 98% of respondents who didn't use sufficient quantities of fertilizer gave limited supply as the reason, while only 2% gave liquidity problems as the major reason.
Table 6.9: Relative Profitability of Fertilizer Use in Maize Production, 1980–88;

<table>
<thead>
<tr>
<th>Year</th>
<th>Price of fertilizer (50 kg)²</th>
<th>Price of Maize (100 kg)³</th>
<th>Relative Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>15</td>
<td>413</td>
<td>27.55</td>
</tr>
<tr>
<td>1981</td>
<td>30</td>
<td>774</td>
<td>25.79</td>
</tr>
<tr>
<td>1982</td>
<td>53</td>
<td>798</td>
<td>15.04</td>
</tr>
<tr>
<td>1983</td>
<td>53</td>
<td>3858</td>
<td>72.78</td>
</tr>
<tr>
<td>1984</td>
<td>440</td>
<td>2338</td>
<td>5.31</td>
</tr>
<tr>
<td>1985</td>
<td>440</td>
<td>2038</td>
<td>4.63</td>
</tr>
<tr>
<td>1986</td>
<td>780</td>
<td>2375</td>
<td>4.22</td>
</tr>
<tr>
<td>1987</td>
<td>1380</td>
<td>5258</td>
<td>5.54</td>
</tr>
<tr>
<td>1988</td>
<td>2300</td>
<td>6622</td>
<td>4.26</td>
</tr>
</tbody>
</table>

¹Estimates are Average National Wholesale Prices. ²Refers to 15-15-15.

unproductive mechanised enterprises. Little support was granted for small-scale activities, research received little funding and extension services were dismantled. As a result of the common pro-urban policy bias, the production of food crops and cash crops rose or, more often, declined together throughout the 1960s and 1970s. Quite interesting is the fact that decline in domestic terms of trade for cocoa and other cash crops is not found for food crops (ref. Stryker, 1990 and Alderman, 1991). This partly indicates that the decline in Ghanaian agriculture is not wholly or even mainly attributable to the absence of price incentives, cocoa and other cash crops excepted. Since the Ghanaian government seldom and ineffectively intervened in food crop pricing, any low incentives might have arisen would stem from general economic collapse and subsequent weak demand, than direct errors in policies pertaining to foodgrains (Alderman, 1991).

As Table B.5 in the Appendix B illustrates, agricultural production has picked up since the implementation of the ERP. This steady upward climb in production indicates a reversal of the earlier decline. Per capita food production increased significantly between 1984-89. These increases, however, can hardly be attributed to price increases alone. Production of food and root crops is dominated by subsistence cultivation making it partly insensitive to policy measures, as stated above. The sharp decline of output in 1983 was due to severe drought, while the enormous increase in output in 1984 was the combined effect of good weather conditions and an increase in agricultural land put under cultivation, in response to the food shortages in 1983. Nevertheless, the sector benefited from policy measures and reforms implemented during the adjustment programme. For example, small-scale farmers may have benefited from improved transportation, which is being sought for reasons only partially related to agricultural policy.¹⁷

The government's current level of intervention in output markets for food crops is completely ineffective. It had to abandon attempts to set official retail prices, while the existing

¹⁷It is also very necessary to state that the initial recovery of agriculture in 1984, which has been attributed greatly to acreage increases also took place partly because of the exorbitant food prices that obtained in 1983.
6.2. AGRICULTURAL SUPPLY RESPONSE

floor price policy is largely irrelevant. For instance, while most estimates put the marketed share of maize at over 50%, the state trading company, Ghana Food Distribution Company (GFDC) has never sold more than 20,000 tons, or 3–4% of total production. Despite the fact that storage capacity has increased, the government has not been able to defend a floor price for maize due to insufficient liquidity. This in a way brings to light the problems associated with price stabilization schemes. The intervention in the grains market has been ineffective as a result of lack of financial resources.

As rightly stated by Timmer (1989), two distinct forms of financial resources must be committed on behalf of the public food logistics agency if they are to be effective. First, if the agency is implementing a floor and ceiling price as the GFDC is doing, through a combination of domestic procurement, market injections from short-run buffer stocks, and international trade, it needs a line of credit to purchase domestic grain during harvest and to store it until needed for market injection. Second, a continuing budget allocation to cover operational losses incurred because of the squeeze on the price margin is required. Both financial sources have not been available to the GFDC. The activities of the GFDC have even been more reduced since the implementation of adjustments measures. The latter being due to the fact that the country was operating under strict credit ceilings imposed by an IMF standby agreement.\(^{18}\) The food price policy been pursued by the government now is virtually in line with the free market school.\(^{19}\) The present state of distorted world commodity prices mainly caused by agricultural policies of developed countries, however, distorts the pattern of world trade in agricultural commodities, and to some extent even diverts trade. A successful completion of the current GATT Uruguay Round which aims at gradually removing distortive trade policies may be in the interest of rural farmers, if they are able to increase productivity and output in the medium to long run.

In view of the institutional and structural problems facing the food crop sector, there is hardly any reason to expect more in the short run. Alderman (1991) rightly notes that wholesale prices for major food crops in Ghana historically have not been low,\(^{20}\) and therefore there is little scope for revitalising agriculture by getting prices right. He argues further that in the absence of a technological change in any of the crops cultivated, agricultural growth will be the product of many small changes by many agents and producers and not likely as easily achieved as a real exchange devaluation.

These arguments are in line with the widely held view that price measures such as a

\(^{18}\)A remarkable point here is that the demand for credit becomes unstable, as grain prices stabilize. Now transmittal of such instability in credit and budget requirements to the rest of the economy can impose significant adjustment costs, irrespective of the fact whether the food logistics agency is increasing or decreasing its credit and budgetary resources.

\(^{19}\)This is one of the major schools of thought as far as food price policy is concerned. They argue that all agricultural prices should reflect their opportunity costs at the border, no matter what the international market processes are, that determine the prices, and no matter what the price levels happen to be. The result of such a pricing strategy is supposed to be optimal efficiency of resource allocation, as well as minimal rent-seeking activity with its associated losses in X-efficiency. On the other hand, the structuralist school argues that the entire border price paradigm for domestic price determination is misdirected, at least for a select list of commodities, such as basic foodstuffs, that have important roles in the macro economy and welfare of consumers. The border prices themselves are largely influenced by distortions in agricultural policies in developed world, are highly unstable, and thus carry minimal information on how resources should be allocated in the long run. According to them, prices should be set to favour income distribution objectives in conjunction with macroeconomic stability. A third school, labelled the 'stabilisation' school by Timmer, contends that by following short-run price movements in international markets an economy incurs significant efficiency losses, but the economy equally incurs significant efficiency losses by not following longer-run trends in international opportunity costs. Optimal efficiency thus calls for some degree of market intervention to stabilize short-run prices, but there must be sufficient flexibility to allow domestic prices to reflect international price trends (see Timmer, 1989 for a detailed review).

\(^{20}\)see Table 5.12 in chapter 5. The farm-gate prices are far below wholesale prices mainly because of poor infrastructure rather than price policy.
devaluation will benefit the poor as producers, if accompanied with infrastructural investments in remote areas, together with projects to raise the ability of poor farmers to produce marketable surpluses of tradables.21

In summary, it can be concluded from the foregoing analysis that if prices are not set right, farmers will generally not invest, which in turn, will retard agricultural growth. Low prices also encourage rural-urban migration. Public investments in agriculture, particularly in research and infrastructure have a strong impact on agricultural growth. A good price policy is very necessary for rapid growth, but has to be accompanied with other non-price measures such as the social and economic infrastructure. In addition, the structure of property rights in many developing countries need to be reformed, if incentives have to be provided to farmers. The structure of property rights in these countries allow politicians or dictators to transfer rents from poorly organised farmers to urban dwellers, to enable them maintain their power. The existence of these artificially-contrived transfers in these economies, thus become an obstacle to policy reforms that may lead to greater efficiency and economic growth.

As mentioned in the introduction section of the study, the Busia regime in Ghana was overthrown after the government adopted policies that greatly increased food prices. In Zambia, after the government removed food price controls, to provide better incomes for farmers, riots erupted in the urban areas leaving a large number of people dead. In the end, the government had to reverse its policy on food pricing which the International Monetary Fund had recommended. This indicates that non-economic, including social and political reforms are all required to provide a conducive environment for farmers to increase output.

Having examined some of the factors that influence the supply response of agricultural commodities in this section, an attempt will now be made in the next section to investigate how policy environment directly affects the sectoral transfer of resources.

\[21\] For example, Rohrbach (1988) found in Zimbabwe that four interrelated factors, in addition to price increases, was responsible for the tripling of small-holder maize production in the 1980s. These factors include the end of wartime disruption, improved technology appropriate to small-holder conditions, expanded farmer credit, and improvements in both public and private marketing systems that converted the technological potential into the reality of rapid growth in small-holders' purchases of improved inputs and sales of maize.
6.3 General Equilibrium Approach

As indicated at the end of the preceding section, this section will take a broader look at how certain macroeconomic policies affect the allocation of resources between sectors. This is essential because the analysis done in the fore-going section mainly dealt with how macroeconomic policies influence meso-level variables in one sector (i.e., the agricultural sector), and how households respond to these changes at the markets. Such an analysis, while capturing the response of households to macroeconomic policies in one sector, does not provide information on the allocation of resources between different sectors. As rightly documented in recent economic literature, an examination of the extent to which changes affect households over time requires information at each of the macro, meso and micro levels with respect to individual sectors in the economy (World Bank, 1990). Such an analysis is absolutely significant, particularly in the case of developing countries where the policy message over the last two decades has revolved around dealing with a domestic distortion by introducing another domestic distortion that just offsets the initial distortion.

However, it is extremely difficult to have a single modelling approach that incorporates the interaction between these three sectors. A useful approach in such a situation is therefore a macro-meso modeling initiative that can be complemented by a careful meso-micro analysis of household-level data directly without any formal household modeling. This approach is what is adopted in the present analysis. A macro-meso analysis is first undertaken to examine the impacts of macroeconomic policies on the meso-level variables. Available household data is then used to analyse how households respond to changes at the meso-level.

6.3.1 Macro-Meso Analysis

Analysis at the macro-meso level involves the investigation of the differential impacts of macroeconomic policies on the markets (both product and factor, formal and informal) and infrastructure, (roads, communications, irrigation, health and education services). To the extent that output and income growth in agriculture is directly linked to growth in the rural non-farm sector (as demonstrated in the previous chapter), determining the necessary economic prerequisites for output and income growth in the former would help policy makers in their search for factors that promote growth in the rural non-farm sector.

As Schuh (1978) points out, the agricultural sector in most developing countries tends to produce relatively large share of tradable commodities for export and import-substitution. Consequently, changes in the real exchange rate — which converts foreign prices in domestic prices and vice versa — will influence the relative prices of agricultural commodities. This, thus reveals the close linkage between the performance of agriculture and macroeconomic developments and policies.

The above-mentioned structure of the agricultural sector also makes the sector to be sensitive to policies or exogenous shocks that reduce the relative prices of exportables, since this tends to reduce the relative prices of agricultural output.

The hypothesis to be tested here is how terms of trade shocks (i.e., changes in relative prices of exports to imports) or trade policies such as import tariffs, and inappropriate macroeconomic policies such as overvalued exchange rates, excessive fiscal and monetary expansion of the public sector influences relative product prices.
6.3.2 Analytical Framework

Assuming a country is a price taker in the world market, and that two commodities are produced, an exportable (X) and an importable (M). Their prices (P_x and P_m, respectively) are given by world markets. A non-tradable good (N) or home good (the terms are used interchangeably here) is also produced, its price being P_n (see Dornbusch, 1974; Sjaastad, 1980; and Collier, 1988). Before proceeding to present the analytical framework, a distinction between tradable and non-tradable goods, which is of prime significance for our analysis shall be given. This is essential because various definitions are encountered in economic literature.

Tradables and Non-tradables

Traded goods are those that cross national barriers and, in theory, their prices are determined by world market conditions. In contrast, non-tradables are goods and services whose prices are determined by domestic supply and demand. This is due to either the nature of the good involved, or prohibitive transport costs prevent the import or export of the good, and as such insulate it from the world markets. The two major reasons why goods are non-traded are transport costs and trade policies such as import quotas. The distinction between the two sectors can be made quite clear, if we let x be the transaction markup and P_w the world price of a commodity. In this case, the domestic price of the commodity must be equal to or less than \( P_w/(1+x) \) for it to be an exportable — in the absence of trade taxes or subsidies. Similarly, for the commodity to be importable, its domestic price must be greater than \( P_w(1+x) \) to enable its importers to compete with domestic suppliers (World Bank, 1990). Following this, a defined range of domestic prices for which the commodity is non-tradable is given by:\(^{22}\)

\[
P_m > P_w(1+x) > P_n > P_w/(1+x) > P_x \quad (6.10)
\]

From this definition, it can be observed that a commodity price can change from being non-tradable to either importable — if the price rises, or exportable — if the domestic price falls substantially. Another major problem with this definition is the geographical situation of a reference spot. As is quite common in many developing countries, particularly in Sub-Saharan African countries, roads and transportation networks are poorly developed, so that a commodity that is importable at the port or near the point of entry may turn non-tradable as transportation cost increase its prices in remoter areas.

It is quite evident from the preceding discussion that classifying individual sectors in developing countries poses problems. Quite clear is the fact that several government services fall within the class of non-tradables, while the production of export crops can be termed tradables. As the World Bank (1990) rightly notes, between these pure cases, is an area of conceptual ambiguity. For the purposes of the present analysis, commodities that are heavily protected by import restrictions are termed non-tradables, since changes in world prices of such commodities will only affect the margins of importers, while domestic prices remain unchanged. Food production will be considered as tradables.\(^{23}\) The need to distinguish between the price effects of tradables and non-tradables in the present study derives from the high degree of tradability of agricultural output in Ghana.

\(^{22}\)That is, the commodity is neither an exportable nor an importable.

\(^{23}\)Food production, as compared to manufacturing are hardly protected in several developing countries, in particular Sub-Saharan African countries.
Domestic Prices of Tradables

The domestic price of exportables \( (P_x) \) will be determined by the world price \( (P^w_x) \), the nominal exchange rate \( (C) \), and any export taxes or subsidies imposed \( (T_x) \). That is, \( P_x \) is given as:

\[
P_x = P^w_x \cdot C(1 - T_x)
\]  

(6.11)

Where there are no taxes or subsidies on exports, \( P_x = P^w_x C \). This, however, is a very rare situation in low-income countries, where state marketing boards have effective control over agricultural export trade. In this equation, \( T_x \) represents the implicit export tax showing the difference between the World market price \( P^w_x (\text{in domestic currency}) \) and the domestic price set by the government.

The domestic price of importables \( P_m \) will also be given by the world price \( (P^w_m) \), the exchange rate \( (C) \), and any import controls or tariffs in place \( (T_m) \), that is,

\[
P_m = P^w_m \cdot C(1 + T_m)
\]  

(6.12)

The prices of non-tradable goods, are determined by domestic supply and demand factors, the latter being partly dependent on monetary and fiscal policies. Ceteris paribus, an expansionary fiscal and monetary policy will lead to an increase in the prices of non-tradable goods, since this will exert an pressure pressure on the demand for non-tradables.

The model is further simplified by the assumption that all the three commodities are only for final consumption and are not used as intermediates in the production process. Furthermore, domestic consumption is confined to importables and non-tradables, with exportables solely consumed abroad. In the short-run, capital is sector specific and cannot be reallocated between sectors. Under such conditions, only labour reallocations can change the output composition in the economy. Of course, in the long-run both capital and labour may be reallocated between sectors. The labour and capital markets are also assumed to be perfectly competitive, in which case the economy is in equilibrium on its production frontier, with prices of capital and labour being flexible.

There are thus three relative prices defined in such a model: \( P_n/P_m, P_x/P_n \) and \( P_x/P_m \). While \( P_x/P_m \) depends on the international terms of trade and on trade restrictions, \( P_n/P_m \) will be determined by the exchange rate and the domestic money supply (see World Bank, 1990).

Graphical Analysis

In a situation of balanced foreign trade, the equilibrium condition of such a model can be analysed in terms of the equilibrium in the non-traded goods market. Figure 6.4 illustrates such an equilibrium. The horizontal and vertical axis in the figure can be used to represent \( P_n/P_m \) and \( P_x/P_m \), respectively. Changes in the domestic terms of trade, \( P_x/P_m \) occur only for vertical movements, while changes in the ratio of non-tradables to importables occur on horizontal movements. Consider \( SS \) to be a locus of points that represent these relative prices, and gives equilibrium in the non-tradables market.

Along \( SS \), the the supply of and demand for non-tradables will be expected to be equal. Now if the demand for home goods is represented by
Figure 6.4: Changes in Relative Prices Source: Adapted from World Bank, 1990.

\[ D_n = D_n(P_x/P_n, P_m/P_n, M_n) \]  \hspace{1cm} (6.13) \\
and the supply of home goods is written as:

\[ S_n = S_n(P_x/P_n, P_m/P_n, K_n) \]  \hspace{1cm} (6.14) \\

Then the equilibrium condition for non-tradables along the curve SS, is given as:

\[ D_n(P_x/P_n, P_m/P_n, M_n) = S_n(P_x/P_n, P_m/P_n, K_n) \]  \hspace{1cm} (6.15) \\

where \( M_n \) and \( K_n \) represent total expenditure in terms of non-tradables and capital stock, respectively. Although the two variables are expected to change over time, they are assumed to be fixed in this present comparative static analysis. The analysis is therefore restricted to the role of relative price changes. In line with Sjaastad (1980), it is also assumed by definition that the effects of commercial policy are limited to relative prices. In this case, if a change in relative prices induced by the exercise of commercial policy generates (for example, import tariffs, income/expenditure from export taxes/subsidies) positive or negative fiscal revenue, the said revenue shall be attributed to fiscal policy. The SS curve (which is in relative price space) is drawn on the assumption that total expenditure in terms of non-tradables, \( M_n \), and the capital stock, \( K_n \), are constant. Following this, changes in any of these will shift SS. For example, transferring capital from the tradable sector into the non-tradables will shift SS to the left. This is because an increase in the capital supply to the non-tradable sector leads to an increase in demand for its products, which exerts an upward pressure on the prices of these products. Analogously, if capital is transferred out of the non-tradables sector, an excess supply of its products is likely to result, with a downward pressure on the prices of its commodities. The SS curve will then shift to the right.

The curve DD can also be drawn to show values of relative prices that yield equilibrium in the money market, on the assumption of constant real income, money supply and asset demand. In this case DD will shift in response to changes in real income, money supply and
asset demand. An increase in the money supply — caused either endogenously by a balance of payments surplus or exogenously through discretionary policy — will shift the DD curve downward. The point C in Figure 6.4 depicts the full equilibrium point, where both the money and non-tradables markets are in an equilibrium. It can be deduced from Walras law that there is zero excess demand in the tradables market and the balance of payments is in equilibrium. The preceding analysis was mainly concerned with illustrating the conditions under equilibrium in the economy. Once that has been achieved, a vivid attempt will be made in the section that follows to analyse how macroeconomic destabilization and adjustment can influence the discussed relative prices (World Bank, 1990).

Effects of changes in Relative Prices

An analysis of how the effects of changes in relative prices influence the demand for home goods calls for a differentiation of equations (6.13) and (6.14). Differentiating the two equations while \(M_n\) and \(K_n\) are held constant yields:

\[
\frac{\delta D_n}{D_n} = \sigma_x (\delta P_x/P_x - \delta P_n/P_n) + \sigma_m (\delta P_m/P_m - \delta P_n/P_n) \quad (6.16)
\]

and

\[
\frac{\delta S_n}{S_n} = \varepsilon_x (\delta P_x/P_x - \delta P_n/P_n) + \varepsilon_m (\delta P_m/P_m - \delta P_n/P_n) \quad (6.17)
\]

where \(\sigma_x\) and \(\sigma_m\) are the cross-price elasticities of demand for non-tradables with respect to the relative price of exportables and importables, respectively, whereas \(\varepsilon_x\) and \(\varepsilon_m\) are the corresponding cross-price elasticities of supply with respect to the relative price of exportables and importables, respectively.\(^{25}\)

These two equations can also be written simply as

\[
\hat{D}_n = \sigma_x (\hat{P}_x - \hat{P}_n) + \sigma_m (\hat{P}_m - \hat{P}_n) \quad (6.18)
\]

and

\[
\hat{S}_n = \varepsilon_x (\hat{P}_x - \hat{P}_n) + \varepsilon_m (\hat{P}_m - \hat{P}_n) \quad (6.19)
\]

the \((\cdot)\) over a variable denoting a proportionate change.

Since it was assumed in equation (6.15) that \(D_n = S_n\), the relationship \(\hat{D}_n = \hat{S}_n\) also holds. This equilibrium can then be used for an examination of the comparative static properties of the model.

\(^{24}\) According to Walra's law, the sum of price-weighted excess demands, summed over all markets, must be zero. So if one market has positive excess demand, another must have excess supply; and if all but one are in balance, so is that one.

\(^{25}\) The cross-price elasticity \(\sigma_x\) can be represented as

\[
\sigma_x = \frac{\delta D_n}{D_n} \frac{(\delta P_x/P_x)/(P_x/P_n)}{(\delta P_n/P_n)}
\]

while \(\varepsilon_x\) can be represented as

\[
\varepsilon_x = \frac{\delta S_n}{S_n} \frac{(\delta P_x/P_x)/(P_x/P_n)}{(\delta P_n/P_n)}.
\]
\[
\phi_x(\dot{P}_x - \dot{P}_n) + \phi_m(\dot{P}_m - \dot{P}_n) = 0 \tag{6.20}
\]

where \(\phi_x\) is the difference between the demand elasticity for non-tradables with respect to the relative price of exportables (\(\sigma_x\)), and the supply elasticity for non-tradables with respect to the relative price of exportables (\(\varepsilon_x\)). That is, \(\phi_x = \sigma_x - \varepsilon_x\); and \(\phi_m\) is the difference between the demand elasticity for non-tradables with respect to the relative price of importables (\(\sigma_m\)), and the supply elasticity for non-tradables with respect to the relative price of importables (\(\varepsilon_m\)). That is, \(\phi_m = \sigma_m - \varepsilon_m\).

Consequently,

\[\phi_m(P_m - P_x) + \phi_m(P_m - P_n) + \phi_x(P_x - P_n) = 0 \tag{6.21}\]

hence

\[\dot{P}_x - \dot{P}_n = \omega(P_x - P_m) \tag{6.22}\]

The changes in nominal prices of non-tradables can thus be represented by

\[\dot{P}_n = (1 - \omega)\dot{P}_x + \omega\dot{P}_m \tag{6.23}\]

where \(\omega = \phi_m/(\phi_m + \phi_x)\). In a comparative static sense, equation (6.22) is a necessary relationship among the domestic prices of exportables, importables and non-tradables when the economy is displaced, from one equilibrium state to another (Bautista, 1987). \(\omega\) varies between 0 and 1. The parameter will be non-negative, or less than unity, if \(\phi_m\) and \(\phi_x\) are positive. That is, if the cross-price elasticities of excess demand for non-tradables are positive. This parameter indicates the extent to which relative changes in prices between exportables and non-tradables are affected by changes in the relative prices between exportables and importables. In other words, for any given change in the prices of importables (\(P_m\)) and prices of exportables (\(P_x\)) due, for example, to changes in exchange rate and trade policies, \(\omega\) determines the induced change in the domestic price of exportables relative to non-tradables.

The magnitude of \(\omega\) reveals the extent to which an import substitution policy affects the export sector. This is more the case, the more \(\omega\) approaches unity. If \(\omega = 1\), this implies that the rate of increase in the prices of importables and non-tradables are the same, while the prices of exportables remain constant. There is a tendency of \(\omega\) to approach unity when importables and non-tradables are close substitutes and when non-tradables and exportables are not substitutes or the substitutional relationship is very weak. On the other hand, \(\omega\) will converge towards zero when non-tradables and exportables are close substitutes, with importables and non-tradables, remaining weak substitutes.

It is quite obvious that an absolute increase in the prices of importables, leaving the prices of exportables unchanged, will raise the prices of importables relative to exportables. However, the extent to which the rise in the relative price of importables affects the exportables sector depends on the extent of the rise in the price of non-tradables; the larger the increase in non-tradables prices relative to the exportables, \(\Delta\dot{P}_n\), the greater the shifting

\[\text{As clearly stated by Dornbusch, this condition does not require that non-tradables and tradables be substitutes both in production and in demand, or that exportables and importables are necessarily substitutes or complements.}\]
of the burden on to the exporters. The share or incidence of this burden depends, how¬
erver, on the degree of substitutability (in demand and supply) between the products of
the importable sector and the other unprotected sectors (see Greenway and Milner, [1987];
Herrman, [1990]).

As a result of the fore-going discussions about the interpretation of the magnitude of
\( \omega \), it may be concluded that: If \( \omega = 1 \), then the export sector fully bears the burden of
policies such as import protection. If \( \omega = 0 \), then the non-tradable and export sectors bear
equally the burden of import protection. Finally, in case \( \omega \) ranges between 0 and 1, and
particularly if it is significantly higher than zero, import protection places a heavier burden
on the export sector than the import sector.

In line with Bautista (1987), the impacts of trade restrictions on the domestic prices
of importables and exportables relative to non-tradables, can be explicitly examined by
transforming equation (6.22) into an expression for the real exchange rate, defined as the
ratio of the nominal exchange rate to the price of home goods. Substituting the equations
(6.11) and (6.12) derived at the beginning of this section into equation (6.22) gives the
following two main equations

\[ P_X - P_n = \omega (f_X - f_m) \]  
(6.24)

and

\[ P_m - P_n = -(1 - \omega)(T_x - T_m) \]  
(6.25)

Equations (6.24) and (6.25) clearly show the impacts of trade restrictions, represented by
\( T_m \) and \( T_x \), on the domestic prices of importables and exportables relative to non-tradables.

Agricultural and Non-agricultural Exports

Equation (6.21) can be modified to explicitly distinguish the agricultural export sector from
the non-agricultural export sector. Thus,

\[ [\phi_m(P_m - P_x) + \phi_{az}(P_{az} - P_n)] + \phi_{nx}(P_{nx} - P_n) = 0 \]  
(6.26)

where \( P_{az} \) and \( P_{nx} \) are the domestic prices of agricultural and non-agricultural export
products, respectively, and \( \phi_{az} = \sigma_{az} - \varepsilon_{az} \) and \( \phi_{nx} = \sigma_{nx} - \varepsilon_{nx} \), with the \( \phi \)'s, \( \sigma \)'s and \( \varepsilon \)'s
deﬁned as before, but now representing the two classes of export goods.

6.3.3 Empirical Estimation

The basic estimating equation of relative prices can then be written as

\[ \log P_x / P_n = c + \omega \log(P_x / P_m) + u \]  
(6.27)

Equation (6.27) can again be disaggregated into agricultural export, \( P_{az} \) and non-
agricultural export goods, \( P_{nx} \). This, however, is not normally possible with imported
goods, since in most countries, particularly developing countries, imported goods are not
disaggregated into exchange control categories. As a result, importables are represented by
one variable, $P_m$. However, a disaggregation of the exportables into agricultural and non-agricultural export goods is not necessary for the purposes of the present study, since the primary objective of the study is to examine the impacts of macro-policies on the agricultural sector, particularly agricultural exports.

In view of the fact that cocoa exports constitute the main agricultural exports of Ghana, accounting for over two thirds of total export earnings, and over 95% of agricultural exports, the index of domestic prices of cocoa will be used as a proxy for agricultural exports.

It will be expected that deterioration in the world market price of cocoa relative to importables, that is, a fall in the terms of trade, or trade polices that favour importables relative to the domestic price of exportables, and as such a decline in $P_e/P_m$, while fiscal and monetary expansion will result in a rise in $P_m$ so that $P_e/P_m$ falls, as a result of increased demand for non-tradables, and granting that $P_e$ remains unchanged (i.e., an appreciation of the real exchange rate). These relative price changes, as will be argued later in this section, can result in resource reallocations from exportables to non-tradables and importables.

6.3.4 Results

In estimating the incidence parameter, an essential modification is required before equation (6.27) can be used. This is because estimating the equation with time series data would violate the assumption which was made for analytical convenience. That is, the assumption of constant income and productive capacity, and of balanced external trade. These variables therefore have to be included in the analysis. Since income and productive capacity are highly correlated, only income is used in the analysis, and is represented by the Gross National Product. A balance of trade variable is also included, defined as the ratio of the trade balance (exports minus imports) to exports. Data on both of these variables were taken from Quarterly Digest of Statistics.

Serial correlation of the error terms appears to be significant in the initial regressions for each equation. The Cochrane-Orcutt iteration technique is used to correct for positive serial correlation. The regression equations are estimated on the basis of annual data for 1960-87. In addition to total exports, estimates are produced for cocoa exports. The price indexes for total exports and cocoa exports are constructed from corresponding unit export values in cedis. The price indexes for imports are also constructed from the corresponding unit import value in cedis. The price index for non-tradables are constructed from indexes of prime building costs. This is a reasonable proxy for a developing country like Ghana with very low degree of mechanisation, where the labour cost with the other cost components, such as sand, stone, timber, cement, roofing materials, energy can hardly be internationally traded. These price indexes were all obtained from the Ghana Statistical Service's Quarterly Digest of Statistics. It is significant to note, however, that each of these price indexes suffers from the usual index number problem, including deficiency of coverage and in measuring quality changes.

The estimation results for the aggregate equation is presented in Table (6.10). For comparison, the parameter estimates given by the iterative Cochrane-Ocutt procedure and OLS are presented. It would be noticed that correcting for autocorrelation in the errors has resulted in a significant change in the estimates of the parameters.

The estimated coefficient of the incidence parameter of total exports (coefficient of

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27In their estimation of supply response of non-traditional exports, Jebuni et al., (1992) also use prime building costs for non-tradable price index.
6.3. MACROECONOMIC POLICY EFFECTS

Table 6.10: Estimated Results for Aggregate Exports

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Iterative C-O</th>
<th>OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.761*</td>
<td>-0.938*</td>
</tr>
<tr>
<td></td>
<td>(2.72)</td>
<td>(6.74)</td>
</tr>
<tr>
<td>log(Px/Pm)</td>
<td>0.616*</td>
<td>0.936*</td>
</tr>
<tr>
<td></td>
<td>(3.40)</td>
<td>(4.60)</td>
</tr>
<tr>
<td>log GNP</td>
<td>0.958*</td>
<td>0.976*</td>
</tr>
<tr>
<td></td>
<td>(3.84)</td>
<td>(6.32)</td>
</tr>
<tr>
<td>BOT</td>
<td>0.162</td>
<td>0.061</td>
</tr>
<tr>
<td></td>
<td>(0.44)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>R squared</td>
<td>0.79</td>
<td>0.86</td>
</tr>
<tr>
<td>D.W.</td>
<td>1.84</td>
<td>0.97</td>
</tr>
<tr>
<td>p</td>
<td>0.514</td>
<td>...</td>
</tr>
</tbody>
</table>

Notes: Px = Domestic prices of aggregate exports; Pm = Domestic prices of importables; Pn = Domestic prices of non-tradables; BOT = Balance of Trade; Cochrane-Ocett procedure used for the estimation. The numbers in parenthesis are t-statistics. Significance levels are (95%) and (99%).

log(Px/Pm) and that of income are both positive and statistically significant at the 1% level. The coefficient of trade balance, on the other hand, was found not to be statistically significant. The point estimate of the incidence parameter of 0.62 is quite high, and suggests that a 1% increase in the price relation between importables and exportables, for example, as a result of an increase in import duties, results in a 0.62% increase in the price relation between non-tradable and exportables.

The results indicate that trade and exchange rate policies adopted during the period under consideration were biased against exportables relative to import-competing production and have tending reduce substantially the relative incentive to produce export goods vis-a-vis non-tradables (home goods).

The results for the estimates for cocoa exports are also presented in Table (6.11). Here again, both the OLS and the C - O procedures are presented for comparison.

It is apparent from Table (6.11) that the statistical goodness of fit is very good. The incidence parameter for cocoa exports (coefficient of log Px/Pm) is highly significant with a positive sign. The incidence parameter of 0.93 indicates that, other things remaining the same, a 10% rise in the domestic price of importables (for example, due to tariffs) relative to domestic prices of cocoa exports is associated with a 9.3% decline in the domestic price of cocoa exports relative to home goods. This demonstrates the extent to which price increases in the export sector, as a result of policies that tend to raise the price of imported goods implicitly taxes the export sector.

The results generally indicate that the degree of incidence of trade and exchange rate policies on exports is very high. The high ω value generally implies that Ghana's home goods and importables are fairly close substitutes, while the substitutability between exportables and home goods is insignificant. As a result of this, an increase in import tariffs meant to protect the domestic industrial sector results in an increase in the prices of non-tradables almost to the same extent. The price of exportables on the other hand, would remain
Table 6.11: Estimated Results for Cocoa Exports

<table>
<thead>
<tr>
<th>Dependent variable: log($P_{cx}/P_n$)</th>
<th>Iterative C-O</th>
<th>OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.349</td>
<td>-0.568*</td>
</tr>
<tr>
<td></td>
<td>(7.06)</td>
<td>(2.82)</td>
</tr>
<tr>
<td>log($P_{cx}/P_m$)</td>
<td>0.934*</td>
<td>0.969*</td>
</tr>
<tr>
<td></td>
<td>(11.17)</td>
<td>(4.44)</td>
</tr>
<tr>
<td>log GNP</td>
<td>0.417*</td>
<td>0.506*</td>
</tr>
<tr>
<td></td>
<td>(2.68)</td>
<td>(4.19)</td>
</tr>
<tr>
<td>BOT</td>
<td>0.267*</td>
<td>0.311</td>
</tr>
<tr>
<td></td>
<td>(2.02)</td>
<td>(1.27)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.82</td>
<td>0.89</td>
</tr>
<tr>
<td>D.W.</td>
<td>1.89</td>
<td>0.75</td>
</tr>
<tr>
<td>$\rho$</td>
<td>0.625</td>
<td>...</td>
</tr>
</tbody>
</table>

Notes: $P_{cx}$ = Domestic prices of cocoa exports; $P_m$ = Domestic prices of importables; $P_n$ = Domestic Prices of non-tradables; BOT = Balance of Trade; Cochrane-Ocutt procedure used for the estimation. The numbers in parenthesis are t-statistics. Significance levels are (95%)* and (99%)*.

unchanged, leading to a deterioration in terms of trade of the export sector, as against the non-tradable sector.

It is well documented in earlier studies and notably in Stryker (1990) that trade policies prior to the ERP based on import licensing, and first introduced for balance-of-payments reasons in 1961, progressively shifted the balance of incentives in the economy towards non-tradables and away from exportables. For example, between 1960 and 1966, domestic prices of exportables declined by 28%, while the general level of prices measured by the GDP deflator almost doubled. Although the cocoa sector suffered mostly under these policies, the other main established exports such as gold, diamonds, timber and bauxite were similarly (although less dramatically) adversely affected. In all these cases, production and export levels declined in the 1970s and early 1980s in the face of the serious overvaluation of the real exchange rate.

The high coefficients also imply that Ghana's exportables, being primarily resource-based (minerals and timber products) or agricultural products, are fairly inelastic in supply (see also Oyejide (1986), for the case of Nigeria). In other words, as the real returns to production factors decline, producers cannot immediately abandon production and reallocate resources to other production sectors. In this case, they tend to absorb a large proportion of the tariff incidence in the form of reduced rents to the natural resource or land.

The results show that over the period under consideration, import tariffs fell entirely on producers of exportables, notably cocoa farmers. Since most of the protection for the import-competing activities was done at the expense of the exportable (primarily agricultural) sector, subsidising agricultural exports could have been viewed as a means of reducing the negative impacts of industrial protection. On the contrary, agricultural exports (mainly cocoa) have been traditionally taxed. Krueger et al. (1988) have shown that between 1975-79, as well as 1980-84, Ghana recorded a net negative nominal protection rate for cocoa. A net positive nominal protection rate was, however, recorded for rice — an importable (see
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Table C.4 in Appendix C).

Major trade policy reforms undertaken under the Economic Recovery Programme, however, tried to reduce these effective taxation on exportables, and to lower the positive protection for importables. According to estimates from UNCTAD, incidence of quantitative restrictions (discretionary licencing, quotas and import prohibitions) was reduced from 100% in 1985 to 45% in 1988, though this has been accompanied by a corresponding increase in import charges from 33% to 36% over the same period (UNCTAD, 1989).

Similar estimates by the Ghana Statistical Services show the same trend as Table 6.12 reveals.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total exports</th>
<th>Non-cocoa exports</th>
<th>Cocoa exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>28.69</td>
<td>2.15</td>
<td>70.18</td>
</tr>
<tr>
<td>1984</td>
<td>21.73</td>
<td>5.20</td>
<td>31.08</td>
</tr>
<tr>
<td>1985</td>
<td>27.38</td>
<td>2.29</td>
<td>44.51</td>
</tr>
<tr>
<td>1986</td>
<td>18.12</td>
<td>0.77</td>
<td>33.17</td>
</tr>
<tr>
<td>1987</td>
<td>18.34</td>
<td>0.02</td>
<td>39.77</td>
</tr>
<tr>
<td>1988</td>
<td>11.89</td>
<td>0.00</td>
<td>28.50</td>
</tr>
<tr>
<td>1989</td>
<td>11.34</td>
<td>0.00</td>
<td>30.08</td>
</tr>
</tbody>
</table>

†Average export tax rates are calculated as the ratio of export duties to export values.


Table 6.12 shows clearly that cocoa taxes account for the bulk of export taxes. Taxes on timber primarily make up the taxes on non-cocoa exports. Although cocoa exports are still taxed, it can be observed that the average tax has declined steeply since the implementation of the ERP in 1983. There were no taxes recorded for non-cocoa exports in 1988 and 1989. This is consistent with the government’s efforts to realign relative prices in favour of production and export sectors, and to relax the strict regime of trade and payments control.

In both regressions, the positive and statistically significant coefficients of the income variable is in line with a priori expectations. Other things remaining the same, increasing income leads to a rise in demand for non-tradable goods, which tend to exert an upward pressure on their prices, thereby reducing the prices of exportables relative to non-tradables — a fall in $P_x/P_n$. If the real exchange rate is defined as the ratio of price of traded goods to price of non-traded goods, such a shift will imply an appreciation of the real exchange rate.

Similarly, the balance of trade variable (BOT) would be expected on a priori grounds to be positive, since a balance of payments surplus results in increased spending on the goods in the non-tradable sector, which as mentioned, exerts an upward pressure on the prices of goods in this sector, and consequently, a fall in $P_x/P_n$. The results show that the variable is significant at the 5% level in the estimation for the cocoa sector, but statistically insignificant in the first regression involving the entire export sector.

The results obtained here are similar to earlier results obtained for Philipines (Bautista, 1987), for Columbia (Garcia Garcia, 1981), for Nigeria (Oyejide, 1986), and for Peru (Her-
It is probably essential to mention that the estimated values of the incidence parameters presented above represent the average values over the entire period, and that although statistical tests for differences in sub-periods could be done, such an estimation has not been undertaken since it is not clear whether it is desirable in the absence of an a priori judgement on the directions in which the underlying supply and demand elasticities might change from one sub-period to the next (ref. Bautista, 1987).

6.3.5 Conclusions

The concept of true protection applied in the foregoing analysis emphasises the need to design consistent policies in order to meet a given strategic objective. That is, whether one wants to adopt import protection or export promotion. A distinguishing feature between the procedure and the commonly used nominal protection is the fact that it partly brings to light the hidden nature of the costs of protection. In this case, it helps to explain why the failure of certain export promotion policies may be traced to extraneous factors. An interesting feature of the analysis is that it suggests that if the overall objective of the policy maker is export promotion then one of the most efficient means to this goal may simply be to change relative incentives — thus, to move towards trade liberalisation. This is in contrast to the policies adopted in a greater part of the period investigated in the analysis. It is, therefore, possible that the overall effect of the policies used during the period investigated was to encourage the shifting of resources away from export promotion activities and into import substitution activities.

The analysis reveals that trade policy is a major source of exchange rate distortion and price bias against agriculture. The significant relationships obtained from the empirical estimations between the real exchange rate and relative agricultural prices show that the real exchange rate is partly an indicator of the competitiveness of agriculture. As demonstrated in the estimation of the supply response model, the role of the real exchange rate in influencing agricultural incentives and performance is revealed in the recent encouraging performance of the Ghanaian agricultural sector, particularly the export crops, since the implementation of the ERP. This in principle confirms the hypothesis that the scope for increasing agricultural price incentives is equally as great whether governments control agricultural prices or not because devaluation creates the potential to reward the producers of tradables (which include most farm products — food and export crops) relative to consumers of tradables and producers of non-tradables (especially administrative services).

From the results of the empirical analysis of real agricultural wage rates in chapter four, it was observed that agricultural terms of trade have positive and significant impacts on the real agricultural wage rate. This implies that trade policies indirectly influence the wage rates in the agricultural sector — since they influence relative prices in the economy. That is, to raise real wage rates in the agricultural sector in order to reduce rural poverty calls for trade policies that reward producers of tradables.

As can be found in the trade and development literature, popular arguments for protection (or even banning of some imports) with a view to curbing luxury consumption of the rich in poor countries, is not the first-best policy for achieving this or other solely domestic goals. Bardhan (1993) states, for example, that if curbing luxury consumption

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28 It is, however, interesting to note that if two firms in two countries constitute a duopoly, and play a Cournot game in determining their market shares for a commodity, there is an opportunity for strategic trade-policy actions to shift welfare in favour of one of the countries, as argued by Baldwin (1992). Krugman (1984) has shown that import protection by one of the countries would accomplish this. If, for example, a government keeps foreign goods out of its home market, increased domestic sales by the home firm reduce its marginal costs and enable the firm to expand its foreign market share credibly. Thus, as stated by Krugman,
is the objective, the first-best policy is to have a consumption tax on luxuries; if reducing economic inequality is the objective, progressive income and wealth taxation may be better than tariffs on luxury imports. Similarly, if an infant industry cannot take off the ground as a result of difficulties in raising credit to cover initial losses in an imperfect market, then the optimum policy may be to subsidize credit, not to protect such industries. The infant-industry argument, the most popular argument for protection in developing countries has been criticized in economic literature on the ground that the "infant," once protected, often refuses to grow into an adult and keeps on lobbying for prolongation of the "temporary" protection. It has been explicitly stated in the literature that the commitment to remove the protection after some years was not binding.

According to Baldwin (1992), even if a new firm entering a perfectly competitive international market faces higher unit costs because of its lack of production experience, it is not a sufficient reason for temporary protection on efficiency grounds. If the firm can become internationally competitive with sufficient production experience, it should be able to raise funds in the capital market to cover the excess of expenditure over revenues in its early production stages. He, however, states that if informational asymmetries are important in capital markets, specifically, borrowers know more about the riskiness of a project than the lenders, and if as is the case, the liability of borrowers is limited by law, the possibility of banks charging more than the social value of funds because of the adverse selection problem arises. In this case, the appropriate policy response to these circumstances is an interest rate subsidy. DeMeza and Webb (1987), however, consider a somewhat different type of information asymmetry, and demonstrate that interest rate subsidies can attract borrowers least likely to succeed and thus may reduce social welfare. The preceding analysis shows that since it is difficult to distinguish between cases where interest rate subsidies are and are not desirable, some caution has to be exercised in introducing such subsidies.

In summary, it is quite clear that while the causes of Ghana's agricultural decline in the 1970s and early 1980s are complex, they include inadequate price and institutional policies (particularly trade policies) of the kind that structural adjustment programs seek to correct. Adjustment is, therefore, a necessary condition for the reversal of the process of agricultural decline, as long as an adequate share of price gains related to devaluation is passed on to farmers.

6.4 Meso-Micro Analysis

Recalling that the agricultural export sector is relatively more labour intensive as compared to the importable sector (see Table C.3), shifting resources out of the former will lead to long-term adjustment in factor markets that raise the rental rate and lower wages. This is an export-promoting policy.

Quite remarkable is the fact that both new and traditional trade theorists emphasize that domestic rather than international policies are usually the first-best responses to these market-distorting conditions. The case of ban on wheat imports in Nigeria illustrates how trade protection can sometimes be disastrous. In an attempt to encourage domestic farmers and bakers, the Nigerian government slapped a ban on wheat imports in 1987. However, due to climatic conditions, the only wheat the country can grow does not bake into decent bread. The result was a sharp rise in bread prices, while smuggling from French bakers in Benin flourished. As a result, Nigerian millers and bakers run into financial problems, while states exaggerated the size of their modest wheat crops to get bigger state fertilizer subsidies. At the end of 1992, the government realized its folly and lifted the ban, and bread prices dropped (Economist (21.08.1993)). The case of the Guinness, however, deserve to be mentioned as a success story (at least temporary). As a result of the government's ban on barley malt, Guinness developed a stout brewed from malt extracted from millet and sorghum. It looks the same, taste different, and has been a smash, helping make Nigeria Guinness's third-biggest market, after Ireland and Britain.
because, as resources are reallocated from the agricultural export sector into the importables or non-tradable sectors, the upward pressure on prices tend to raise rental rates of factors such as land or capital. On the other hand, since labour is freed from the former sector — which is more labour-intensive — the increase in the supply of labour would tend to exert a downward pressure on wages. In view of the fact that rural poorer households derive part of their income from selling their labour services, such shocks can have disastrous effects on them.

Table (C.3) given in Appendix C shows that cocoa, which is the major agricultural export crop requires the largest input of labour. As the Table reveals, there is difference between full bearing cocoa trees and cocoa seedlings. While full bearing, hence mature, cocoa is a low-labour crop and requires about 27 man-days per acre in a year, new cocoa in the first year of establishment is a labour intensive crop, requiring about 100 man-days of labour in a year. A change in production pattern, that is in the crop mix, that favours the substitution of a less labour-intensive crop for a more labour-intensive crop will therefore bring about a decrease in demand for farm labour. For example, shifting from cocoa production to cassava-plantain or cocoyam-maize-plantain crop mixtures can lead to a reduction in labour demand. This trend was clearly observed in Ghana the late 1970s and the mid 1980s, as mentioned earlier was a shift from cocoa farming to food crop farming (ILO, 1985). If one considers fully matured cocoa farms, then from the labour input point of view, this was desirable, since starchy staples require an average of about 53 man-days per acre, as compared to 27 man-days per acre on matured cocoa farms. Such a reallocation of labour, however, had serious implications for the economy since cocoa is the chief export and earns most of the foreign exchange. Since most of the cocoa farms were aged and needed to be replaced, it is quite obvious that clearing the old trees to plant new ones would have boosted the demand for labour use in the cocoa sector.31

6.4.1 Agricultural Credit

Another factor quite significant to agricultural production is the availability of institutional credit. Particularly small-scale farmers in developing countries, and for that matter in Ghana, face capital constraints in their production processes. It is, however, a well established fact that formal credit is concentrated in the public sector and urban services and industries that produce mainly non-tradable goods. Available evidence shows that the credit facilities opened to the agricultural sector is still minimal, bearing in mind the proportion of GDP the sector constitutes. Even the small percentage share of agricultural credit hardly reaches the farmer who is really engaged in farming (G.C.B., 1980). In the absence of institutional financing possibilities, smallholders in rural areas are forced to resort to private money lenders. This, however, is not a suitable alternative to most smallholders since the interest rates charged on such loans are mostly higher than rates demanded by credit institutions.32 Table 6.13 presents bank credit to the agricultural sector during the period the banks were heavily involved in the sector.

As is evident from the Table, institutional credit to the agricultural sector has been very low. The factors often cited as constraints on agricultural credit include higher risks, administrative costs, lower interest rates, higher incidence of default, and the lack of other

31 Area under cocoa harvested decreased from an average of 1.8 million hectares in 1961-64 to 1.5 million hectares in 1971-73, and finally to 1.1 million in 1981-84, FAO Production Yearbooks, Diverse Years.

32 For example, a survey undertaken by the Nyankpala Agricultural Extension Station (NAES) in the 1987/88 farming season among forty-eight small-scale rice producers in two villages around Tamale showed that about 25% of the respondents had the opportunity of using credit from private money lenders at an interest rate of 40% for a period of six to seven months. This, compared to the 20% official interest rate of banks at that time was quite substantial (NAES, 1989).
supportive infrastructural and input facilities necessary for the implementation of any meaningful credit programme (G.C.B., 1980). The liquidity problem is in particular distinct in areas where the time lag between the last harvest and the next season is relatively longer.

As shown by Hailu (1990), the development of an appropriate financial infrastructure is particularly crucial for the speedy adoption and use of modern farm practices that need purchased non-farm inputs. The Agricultural Development Bank (ADB) was established in 1965 to help expand institutional credit to agriculture. The ADB rapidly established itself as the single most important source of institutional credit to agriculture. It increased its share of total agricultural credit substantially from less than 5% in 1965 to 54.7% in 1972. This share, however, declined to 33.1% in 1976 (Bank of Ghana, Annual Reports, Various Issues). Although institutional credit doubled in real terms between the mid-1960s and mid-1970s, a large proportion of the resources went to private large-scale mechanized holdings. In spite of substantial nominal increase in lending, the share of smallholdings in the total amount disbursed by the ADB during 1976 was only just over one-third. In 1976 less than 10% of all smallholders had access to credit under the bank’s crop scheme (Akoto, 1987). The bank’s expanded lending to agriculture therefore benefited only a few smallholders, with the bulk of it going to a relatively small number of large-scale operators. According to an estimation by an FAO consulting team, in 1985, the situation had not improved even after ten years (Shepherd, 1987).

Real institutional credit to agriculture as a whole increased by about 20.5% during 1982-87. The recent increases in agricultural lending rates (due to interest rate liberalization) which have characterised the recovery programme’s tight money and credit policy have, however, made the cost of agricultural credit, like borrowing for other economic activities, very high — making credit required to purchase agricultural technology degenerate into an agricultural growth constraint, particularly for smallholder farmers (Jebuni et al., 1990). While it is, therefore, appropriate to suggest that financial assistance in the form of credit services could help farmers (in particular small-scale farmers) to expand output, the possible negative impacts of such measures cannot remain unmentioned.

The high transaction costs that obtain, given the existence of moral hazard and adverse selection find their logic in rational choice but not in perverse behaviour; first, there is the danger of many farmers failing to pay back such credits, and second, it is likely the farmers
might divert the monies into more profitable ventures other than agriculture. For example, during the 1992/93 farming season, 12,000 farmers in the Upper West Region of the country failed to repay an amount of 41.8 million cedis they received as loans from various banks under the Sasakawa-Global 2000 scheme. While the farmers blamed the default on late delivery of inputs, drought, flooding and other natural disasters, the regional co-ordinator of the scheme blamed the defaults on the "stubbornness" of the farmers (West Africa, 1993). An efficient way of providing credits to farmers may be through farmer co-operatives or village associations. An analysis of the credit scheme for small farmers by Shepherd (1987) revealed that banks prefer group financing in order to avoid default problem.\(^{33}\) This requires that farmers form groups and apply for loans. It is believed that under such contracts, personal relations and communities play a role in the enforcement mechanism. Farmers, are therefore more likely to repay loans because of their reputations. Studies of successful schemes of traditional rotating credit associations and also group loans in some poor countries have focused attention on the idea of "peer monitoring" (to quote Bardhan [1993]), which as argued by Arnott and Stiglitz (1991) can be an important mechanism for controlling moral hazard in credit markets, labour markets and insurance markets in both developed and less-developed countries.\(^{34}\)

The credit union of Cameroon is one of the several successful rural savings mobilization by co-operative institutions surveyed by the ILO in recent times. According to the union leaders, the major contributing factor to this success is the applied concept of "member-owned and controlled co-operatives," which in turn, own and control the entire network or movement (see ILO, 1993). Evidence from The Grameen Bank in Bangladesh also demonstrates that if effective procedures for bank transactions can be established with the poor, they can utilize loans and repay them. The lack of collateral often cited as a major hindrance for allocating credit to the poor should therefore not stand in the way of the bank in providing credit to them. The Ghanaian banks involved in lending to farmers can be more efficient in their provision of loans to poor farmers by making the funds available at the appropriate times. As mentioned earlier, the approval of loans long after the beginning of the farming season, encourages farmers to divert the funds into non-agricultural pursuits. The government can further set up institutions that would provide relevant services for the effective mobilization of rural savings, which could then be used as co-operatives' loans.

### 6.4.2 Impacts of Monetary Expansion on the Real Exchange Rate

Quite apparent from the preceding analysis is the fact that only a small proportion of total institutional credit goes to agriculture, and that a large share goes to commerce — nontradable sector — the impacts of an increase in the money supply on the entire economy in a country like Ghana can now be traced. The effect of a monetary expansion on the supply side of the product market will tend to reinforce the effect on the demand side of the associated real appreciation to further shift output toward non-tradables, as the cost of credit falls, and producers find it cheaper to borrow from the banking system. It has been explained earlier in this section how an expansion of the money supply in the domestic economy leads to an increase in demand for non-tradables, and price increases in this sector, if output is not able to respond enough to the excess demand. Consequently, it would be

---

33 According to Shepherd, the drawback of the system is that the bank normally undertakes a feasibility study of their project before approving their loan requests. However, the study shows that loan approvals are often received quite late since requests are usually channeled through head offices. Such delays contribute to unproductive use of agricultural loans.

34 It is, however, interesting to mention that Akerlof (1984), drawing partly upon the example of the Indian caste system, has built models to demonstrate how economically unprofitable or socially unpleasant customs may persist as a Nash equilibrium when an individual conforms out of fear of loss of reputation.
expected that policies that make credit supply cheap for the urban sector would help shift resources from the exportable to the non-tradable sector.35

Thus, an expansionary monetary policy, as was the case that obtained in Ghana during the 1970s and early 1980s, result in excess demand for non-tradables, causing the relative prices of exportables to non-tradables to fall (i.e., a fall in $P_x/P_n$), which invariably leads to an appreciation of the domestic currency. The hyperinflation of the 1970s, when the CPI increased 12,000% between 1970 and 1983, was clearly due to large public deficits and excessive monetary expansion. As Table A.1 in Appendix A illustrates, inflation rate in Ghana increased from 9% in 1970 to 122.9% in 1983. It needs, however, to be mentioned that the high rate of 1983 was not only due to monetary and fiscal policy, but was also attributable to unprecedented drought which increased food prices astronomically. As adjustment proceeded, the inflation rate declined gradually to 10.4% in 1985, and started rising slowly again until it reached 37.2% in 1990. The recovery of food production which characterised the early stages of adjustment, rather than adjustment policies themselves contributed significantly to bringing down inflation.36

As a result of the excessive borrowing of the public sector at cheap rates, prior to the adjustment programme, the government was able to create excessive public sector employment by increasing the workforce beyond the needs of production. As noted earlier, this diversion of capital into unproductive urban employment deprived productive sectors of essential investments, while the hyperinflation encouraged capital flight out of the economy.

6.5 Government Expenditure and Investment Bias

Having examined macroeconomic policies that affect the agricultural sector, a look is now taken at the allocation of public resources to major sectors of the economy, and in particular, agriculture. Given the present analysis, the emphasis on the expenditure patterns of the government for agriculture is clearly warranted. Since agricultural growth is the key factor fostering rural non-farm employment, there are important indirect benefits for non-farm activities from investments in irrigation, agricultural research and improvements in the efficiency of rural credit systems. Table 6.14 depicts the percentage share of agriculture and industry in total fiscal expenditure in the period 1970-80. The share of public administration has been included for comparison.

The share of agriculture in total fiscal expenditure, which averaged 10.5% in 1965-66, was reduced to 7% in 1975, before increasing to record levels of up to 14% in 1978. A closer look at agricultural output growth in the 1970s, however, reveals that the increase in the share of agriculture in total fiscal expenditure did not make much impact on the performance of the sector, since aggregate agricultural output declined rapidly (see also Akoto, 1987). This indicates that merely increasing the share of expenditure per se does not increase output, but how efficiently the funds are invested determines the productivity and output. The share of industry also declined towards the end of the 1960s. This was, however, necessary because of the large industrial capacity installed before 1966, and which had been operating below

35 Even when increases in government expenditure are financed through taxes, an excess demand for non-traded goods develops if the marginal propensity of the government to spend on non-traded goods is larger than the corresponding marginal propensity of the private sector, leading to an increase in prices of non-traded goods.

36 The deterioration of inflation performance after 1985 is due to three main factors. First, the inability to sustain increased food production, and as such to prevent the resulting high rate of increase of some food prices. Second, the sharp deterioration of the cedi resulting from the effect of the auction and unification of the exchange rate in 1987. Finally, the higher import prices, especially petroleum products, has occasionally contributed to a surge in domestic prices (see also Roe and Schneider, 1992).

<table>
<thead>
<tr>
<th>Years</th>
<th>Agriculture</th>
<th>Industry</th>
<th>Public Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>6.5</td>
<td>6.8</td>
<td>30.0</td>
</tr>
<tr>
<td>1971</td>
<td>7.0</td>
<td>2.8</td>
<td>30.8</td>
</tr>
<tr>
<td>1972</td>
<td>7.0</td>
<td>2.8</td>
<td>28.4</td>
</tr>
<tr>
<td>1973</td>
<td>6.8</td>
<td>2.7</td>
<td>29.1</td>
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<tr>
<td>1974</td>
<td>6.2</td>
<td>2.7</td>
<td>29.1</td>
</tr>
<tr>
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<td>7.0</td>
<td>2.5</td>
<td>26.3</td>
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<tr>
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<td>23.6</td>
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<td>13.7</td>
<td>2.1</td>
<td>20.8</td>
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<tr>
<td>1980</td>
<td>12.3</td>
<td>2.2</td>
<td>21.7</td>
</tr>
</tbody>
</table>


capacity due to the constraints of the balance of payments which restrained the volume of imports of industrial raw materials.

Although the government planned to increase public financial support for agriculture during the recovery programme, available evidence clearly shows that the government's goal of switching expenditure in favour of agriculture — a target of 18% — to stimulate increased agricultural output has not been achieved. During the period 1983-88, public expenditure on agriculture declined in real terms by 2.53% per annum. Between 1986-90, the share of the agricultural sector averaged 4.0%. Whereas agriculture's share in 1982 was 10.42%, it declined to 4.95% in 1984, and by 1990 it was only 3.46% (Ministry of Agriculture, Accra). Considering the fact that the sector's share of total fiscal expenditure in 1982 was 10.42%, which declined to 4.95% in 1984 and finally to 3.46%, it is evident that resources have not been sufficiently channelled into it in the last decade.

Stryker (1990) has utilised the Government Investment Bias (GIB) to estimate the bias towards agriculture with respect to government investment in Ghana. The GIB is the share of agriculture in government investment expenditures divided by agriculture's share in GDP. His analysis shows that public investment has been strongly biased against agriculture. In many years, particularly during the Nkrumah regime, the ratio was less than 0.4. During the period from 1968 to 1972, it averaged over 0.55, but then slipped somewhat to 0.43 between 1973-80, before increasing to 0.75 in 1981-84, when the average was 0.75. Although Table 6.14 shows that agriculture's share in total fiscal expenditure increased between 1970-80, the analysis of Stryker, which takes into consideration the sector's share of GDP reveals that resources were transferred out of agriculture. This indicates that the agriculturally related transfers imply only minimal income transfers in favour of rural areas and specifically agriculture.

Since adequate public financial support is needed to create a conducive environment — in particular, the requisite agricultural infrastructure and extension services to disseminate research findings — for private agricultural investment and for stimulating increased agricultural supply response, it can be inferred that declining public financial support has been an important constraint on agricultural growth in Ghana. As clearly demonstrated by Antle (1983), infrastructure, education and research have positive and significant impacts on
agricultural productivity and output in developing countries. While agricultural research expands the set of technologies from which farmers may choose, the extent to which farmers are able to use new technologies to their advantage depends on the costs and benefits of learning and using them. However, these costs are a function of the country's stock of infrastructural capital and the resulting costs of infrastructural services.

The 256 farmers in the survey mentioned in the previous chapter were asked if they had received visits from extension officers during the past 10 years. Their responses reveal that very few farmers enjoy the services of extension officers (see Table 6.15).

<table>
<thead>
<tr>
<th>Farmer</th>
<th>Yes [%]</th>
<th>No [%]</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small scale</td>
<td>13</td>
<td>5.8</td>
<td>218</td>
</tr>
<tr>
<td>Large scale</td>
<td>21</td>
<td>54.8</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>13.1</td>
<td>222</td>
</tr>
</tbody>
</table>

†In the Savelugu district. Sample size = 256.

Source: Survey data.

The Table shows that only 13% of the 256 farmers interviewed have benefited from extension services in the past ten years. It can, however, be observed from the Table that there exists a difference between small and large scale farmers with regards to benefits from extension services. Whilst 55% of the latter benefited from the services of extension officers, only 6% of the former were visited by extension officers. It may be inferred from this survey data that efforts being undertaken to improve the productivity of farmers, in particular, smallholders are minimal, since research findings can only reach farmers through extension services. A study undertaken by the Overseas Development Institute (ODI) to examine the impacts of recovery programmes on smallholder farmers in Sub-Saharan Africa also revealed that in most cases, the programmes have not generally benefited most smallholders.

6.5.1 Conclusions

The analysis shows that sound macroeconomic policies and sector-specific policies are significant for the successful performance of the agriculture, particularly in developing countries. Quite evident is the fact that the implicit taxation of export crops, as well as the trade and exchange rate policies, adopted by the government were biased against agriculture, and resulted in an effective transfer of resources out of agriculture into the other sectors. These transfers are quite massive, if compared to the amount transferred into agriculture through government expenditure. While it is not the intent of this study to argue against the widely held view of extracting surpluses from agriculture to finance capital formation in the rest of the economy, the resources used in the non-agricultural sector raises a number of doubtful questions as the present study shows. What is clear is the fact that these transfers which are made in the interest of particular interest groups, is crucial for the maintenance of power by politicians, in particular dictators. The existence of such artificially-contrived transfers in an economy, therefore, becomes an obstacle to policy reforms that may lead to greater efficiency and economic growth.

In particular, large-scale prestige projects financed with surpluses from agriculture and excessive borrowing from the central bank tend to penalise agriculture both directly and indirectly. The expansive fiscal and monetary policies of the pre-ERP period increased
the supplies of money in the country, which in turn, raised the demand for non-traded goods, thereby exerting an upward pressure on the prices of non-tradables, and helping to shift resources from the tradables to the non-tradables sector. For the agricultural sector to contribute successfully to the country's continuous economic growth, not only sector specific policies need to be considered, but the general macroeconomic environment that determines the real exchange rate has to be put on a sound base. This justifies the ERP, which sought to realign the real exchange rate and correct distortions in the economy.

Sector-specific policies such as price incentives, infrastructural improvement, agricultural research, and provision of institutional credit are, however, essential to improve agricultural productivity. While presidential elections do not necessarily mean democracy in the real sense, the current parliamentary and presidential elections that have taken place in Ghana and some other African countries still deserve praise, in view of the fact that governments could be compelled to allocate substantial portions of development expenditure to rural areas in future. Recalling that the rural dwellers form the majority of the population, the politicians would need to win the votes of the rural folks for re-elections, compelling them to take measures that favour them.
Chapter 7

Conclusions and Policy Recommendations

In the background of the present study the problem of declining economic growth, increasing poverty, hunger and malnutrition in a large group of developing countries in the last three decades, inspite of the significant economic progress that have been achieved by developing countries in general is found. In several developing countries, rural poverty and malnutrition is several times the level in the urban areas. This increasing rural-urban income gaps has resulted in the flow of the populations to the cities. Part of the explanation to these developments is found in inappropriate economic policies as well as inadequate economic and social institutions that implicitly extract resources from the rural sector to finance state expansion and profitable urban production.

An empirical analysis of the determinants of agricultural wages and urban unemployment revealed that incomes of agricultural workers can be effectively improved by policy measures that help to increase the productivity of agricultural workers as well as agricultural terms of trade. Measures that lower urban unemployment also contribute significantly to wage increases in the agricultural sector. Urban unemployment, on the other hand, can be maintained at low rates by increasing rural incomes and expanding output in the industrial sector. In addition, the setting of government minimum wage rates above the market-clearing wage rate tends to reduce employment in the industrial sector, thus raising unemployment rates in the urban areas. In examining the question of whether it is useful to subsidize agricultural employment to curb the increasing rural-urban migration, the analysis revealed that the problems associated with the feasibility of a labour subsidy in the subsistence or agricultural sector may be significant, due to the very high disbursement costs. However, similar effects can be brought about by public funds to improve rural infrastructure, so as to make life in the villages more attractive and hence raising wages in real terms.

The results of an incentive response model of Ghanaian cocoa farmers showed that price incentives do encourage farmers to increase the supply of their output, within their limitations. However, the supply responses were found to be inelastic both in the long- and short-runs. The availability of manufactured goods was also found to have a positive effect on output supply, indicating that in a situation of shortages or rationing of basic consumer goods, where farmers cannot buy commodities with the income from the sale of their products, they may reduce output.

A General Equilibrium model used to examine the impacts of trade policies and expan-
sionary fiscal and monetary policies on the real exchange rate, and on agricultural exports also revealed that over the period considered, import tariffs fell entirely on producers of exportables, notably cocoa farmers, supporting the widely held view that trade policy is a major source of exchange rate distortion and price bias against agriculture. The significant relationships obtained from the empirical estimations between the real exchange rate and the relative agricultural prices show that the real exchange rate is partly an indicator of the competitiveness of agriculture.

An investigation of the institutional constraints facing farmers suggests that the credit facilities opened to the agricultural sector is still minimal, while the Government’s Investment Bias (GIB) has been very unfavourable for agriculture. An interview of a sample of 256 farmers in the Savelugu district (Northern Region of Ghana) revealed that non-institutional credit is the major source of financing for agricultural producers in this region. The survey further revealed that very few farmers enjoy the services of extension officers. It also came to light that in the absence of well functioning credit markets, risk-averse farmers often diversify into non-farm activities to spread risk.

The results of the study, as shown by the magnitudes of the linkages between the agricultural and non-agricultural sectors, clearly reveal that a sustainable economic growth can be achieved through balanced economic policies that promote growth both in the agricultural and non-agricultural sectors. The analysis brings to light that in developing countries characterised by predominant agricultural sectors, the agricultural sector can serve as an “engine of growth”. An essential qualification of the impacts of price incentives on agricultural supply response is that without improvement in the input supply, technology generation, and farmer training systems, price policy is likely to be ineffective in increasing production and broad-based food security.

It is evident from the analysis in the study that the price bias against agriculture in Ghana, due to trade, agricultural pricing and exchange rate policies that invariably translates into an effective resource transfer out of the agricultural sector is quite large compared to the amount transferred into the sector through government expenditure. While the need to extract resources from agriculture to finance capital formation in the rest of the economy during development is a widely accepted proposition in development economics, serious questions arise as to the efficiency with which these transferred resources are used in the rest of the economy.

It is, however, clearly shown in the study that the scope for increasing incentives in the agricultural sector is equally as great, whether governments have control over agricultural prices or not. This is because exchange rate realignments create the potential to reward the producers of tradables (which include most farm products — food and export crops) relative to consumers of tradables (particularly urban-based consumers) and producers of non-tradables. The review also showed that a successful adjustment — defined in the study as basic policy changes aimed at allowing internal and domestic markets to play a greater role in co-ordinating national economic activities — requires a macroeconomic stability, as well as a microeconomic environment that is favourable to new investment. A prerequisite for the former is a low and sustainable rate of inflation, a realistic exchange rate, and a manageable level of fiscal expenditures.

The results from a survey of the rural non-farm sector in Northern Ghana revealed that the sector is quite labour-intensive, and technology used is mostly adapted. Barriers to entry are quite low, since the cost of equipment and level of skills required to operate to it are quite low. The sector as a whole faces strong competition from goods of large urban manufacturing firms and imported items. Some enterprises under severe competition from imported goods are able to survive because of their ability to switch production to meet consumer taste and
demand. Moreover, it reveals that the non-farm sector is an area capable of expanding to provide employment avenues for the increasing population, and to supplement incomes of most agricultural households.

An examination of possible policy options on the basis of the quantitative and qualitative results achieved in each chapter suggests that policy changes that tend to raise the productivity and income of rural dwellers is crucial for the overall development of a nation. Investment in agricultural infrastructure and research to increase agricultural productivity, as well as the provision of price incentives for the production, marketing and consumption of agricultural commodities are some of the measures that can boost agricultural output and rural incomes.

As research and extension systems have not greatly benefited most smallholders, stronger and more focused effort is needed in the provision of agricultural support services with specific orientation towards smallholders. Besides permitting the release of labour from agricultural to non-agricultural pursuits, increased farm labour productivity can boost per capita income to levels that encourage consumer diversification from foods into non-foods.

For the agricultural sector to contribute successfully to the country's continuous economic growth, not only sector specific policies such as price incentives need to be considered, but the general macroeconomic environment that determines the real exchange rate. Hence the ERP adopted by the Ghanaian government since 1983 aimed at allowing external and domestic markets to play a greater role in co-ordinating national economic activities is in the right direction. Additional reforms include the structure of property rights which enable well-organised interest groups to exert pressure on governments to extract resources from rural dwellers to urban workers. Political reforms that give rural folks the chance to vote would enable them exert some pressure on politicians to consider their interests.

The analysis show that improved rural incomes and better rural living conditions are also important prerequisites needed to reduce the rural-urban migration, and the resulting urban unemployment. The price bias against agriculture resulting from trade and exchange rate policies translates into an effective transfer of resources out of agriculture, that is quite substantial relative to the amount transferred into the agricultural sector through government spending. Moreover, if rural non-farm enterprises are to achieve their full potential for income generation, policy makers will have to redress the common urban-bias policies. This requires agricultural price incentives and massive investments in rural infrastructure to help reduce production and transaction costs, and also to make life in the rural areas more attractive.

The productivity of the rural non-farm sector can also be improved through financial, management and technical assistance to re-orientate production and marketing in the face of competition. The Intermediate Technology Transfer Units set up by the Ghanaian government therefore has to intensify its efforts to reach the rural non-farm entrepreneurs. Programmes of foreign technical and managerial assistance could be of immense help in this area. Since women play a key role in the non-farm economy, mobilization of women's groups to help them improve their productivity would raise output and income in the sector significantly. These measures can help increase rural employment and incomes, and curb the rural-urban migration.
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Appendix A

Development Strategies and Economic Performance

Table A.1: Selected Economic Indicators for Ghana, 1970-90

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation [%]</th>
<th>Official Exchange Rate [C/U$]</th>
<th>Real Effective Exchange Rate 1980=100</th>
<th>GDP per Capita (cedis) 1975 Prices</th>
<th>Real Economic Growth [%]</th>
</tr>
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<tbody>
<tr>
<td>1970</td>
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<td>1.02</td>
<td>28.1</td>
<td>...</td>
<td>...</td>
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<tr>
<td>1975</td>
<td>30.0</td>
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<td>30.8</td>
<td>493</td>
<td>...</td>
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<tr>
<td>1980</td>
<td>50.0</td>
<td>2.75</td>
<td>100.0</td>
<td>466</td>
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<tr>
<td>1981</td>
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<td>2.75</td>
<td>220.5</td>
<td>438</td>
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<tr>
<td>1982</td>
<td>22.0</td>
<td>2.75</td>
<td>276.8</td>
<td>394</td>
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<tr>
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<td>122.9</td>
<td>3.45</td>
<td>242.0</td>
<td>366</td>
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<td>1984</td>
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<td>10.4</td>
<td>54.00</td>
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<tr>
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<td>1989</td>
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<tr>
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<td>330.00</td>
<td>17.2</td>
<td>464</td>
<td>3.1</td>
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Notes: ⋯ = Not Available.

Table A.2: Basic Indicators

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<td>Sub-Saharan Africa</td>
<td>157</td>
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<td>33,310</td>
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<td>East Asia &amp; Pacific</td>
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<td>3,460</td>
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<td>Middle East &amp; North Africa</td>
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Notes: • = not available; Primary net enrolment = The percentage of school age children who are enrolled in school; Adult illiteracy = The proportion of the population over the age of fifteen who cannot, with understanding read and write a short, simple statement on their everyday life. Infant mortality rate = The number of infants who die before reaching one year of age, per thousand live births in a given year; Life expectancy at birth = Indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

### Table A.3: Decline of Agricultural Population, 1965–90

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**Notes:** EAP = Economically Active Population  
**Source:** FAO Production Yearbook, Diverse Years.
Table A.4: Annual Growth Rate of Rural Population, 1960-2000

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Notes: †Forecasts.

Table A.5: Relative Increase of Urban Population, 1960–90

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Notes: Figures for 2000 are forecasts.

Appendix B

Agricultural Wage Rates and Urban Unemployment

Table B.1: Real Wages [cedis/month], 1966-90

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Source: Central Bureau of Statistics, Accra, Various issues.
### Table B.2: Output Indexes of the Various Sectors, 1968–88

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Table B.3: Growth Rates of Urban Population and Unemployment [in %]

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*Source: ILO Statistical Yearbook, various issues.*
Table B.4: Total and Economically Active Population [000 persons]

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Notes: †Refers to all persons engaged or seeking employment in an economic activity.

Source: FAO Production Yearbook, Various Issues.
Table B.5: Output of Major Crops [000 metric tons]

<table>
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**Notes:** Output data for cocoa is adjusted for smuggling.

**Source:** Ministry of Agriculture, Accra.
Table B.6: Real Producer Prices\(^\dagger\) of Major Agricultural Crops

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Notes: \(^\dagger\) cedi per metric ton. Announcement of Producer Prices by the Government ceased from 1987. Rural wholesale price used as producer price for 1988–89.

Source: Nominal prices taken from Ministry of Agriculture, Accra.
Table B.7: Indexes of Real Domestic Prices* of Major Food Crops

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*National Wholesale price index.  ... = Not available.

Source: Nominal prices taken from Quarterly Digest of Statistics, Accra. Various Issues
## Table B.8: Sample Partial Autocorrelations of the Natural Logs

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</table>

† First differences of the data are used. $\rho_i$ is the $i^{th}$ order autocorrelation coefficient.

**Notes:** The large sample standard error under the null hypothesis of no autocorrelation is $T^{-1/2}$ or roughly 0.41 for the series of the length considered here. $LP_a$ = Labour productivity in the agricultural sector. $W_u$ = Urban wages. $RP$ = Rural population; $U_{um}$ = Urban unemployment rate; $P_a/P_{na}$ = Agricultural terms of trade; $O_m$ = Manufacturing output; $W_a$ = Wage rate in the agricultural sector; $LP_m$ = Labour productivity in the manufacturing sector; $W_m$ = Government minimum wage rate; $U_p$ = Urban population.

**Source:** Computed by the Author.
Table B.9: Sample Partial Autocorrelations of the First Differences of Annual Data†

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<tr>
<td>$W$</td>
<td>0.23</td>
<td>-0.15</td>
<td>0.03</td>
<td>-0.26</td>
<td>-0.16</td>
<td>-0.05</td>
<td>-0.01</td>
</tr>
<tr>
<td>$LP_m$</td>
<td>0.06</td>
<td>0.19</td>
<td>0.24</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.23</td>
<td>-0.29</td>
</tr>
<tr>
<td>$W_m$</td>
<td>0.00</td>
<td>-0.26</td>
<td>-0.06</td>
<td>-0.27</td>
<td>-0.08</td>
<td>0.03</td>
<td>0.07</td>
</tr>
<tr>
<td>$O_m$</td>
<td>-0.05</td>
<td>0.06</td>
<td>0.09</td>
<td>-0.02</td>
<td>-0.17</td>
<td>-0.09</td>
<td>-0.07</td>
</tr>
<tr>
<td>$U_p$</td>
<td>0.30</td>
<td>0.18</td>
<td>0.14</td>
<td>-0.15</td>
<td>-0.31</td>
<td>0.05</td>
<td>0.04</td>
</tr>
</tbody>
</table>

†First differences of the data are used. $\rho_i$ is the $i^{th}$ order autocorrelation coefficient.

Notes: The large sample standard error under the null hypothesis of no autocorrelation is $T^{-1/2}$ or roughly 0.41 for the series of the length considered here. $LP_a$ = Labour productivity in the agricultural sector. $W_a$ = Urban wages. $RP$ = Rural population; $U_{um}$ = Urban unemployment rate; $P_a/P_{na}$ = Agricultural terms of trade; $O_m$ = Manufacturing output; $W_a$ = Wage rate in the agricultural sector; $LP_m$ = Labour productivity in the manufacturing sector; $W_m$ = Government minimum wage rate; $U_p$ = Urban population.

Source: Computed by the Author.
Appendix C

Incentives in Ghanaian Agriculture

Table C.1: Sample Partial Autocorrelations of Annual Data

<table>
<thead>
<tr>
<th>Series</th>
<th>$\rho_1$</th>
<th>$\rho_2$</th>
<th>$\rho_3$</th>
<th>$\rho_4$</th>
<th>$\rho_5$</th>
<th>$\rho_6$</th>
<th>$\rho_7$</th>
<th>$\rho_8$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_i$</td>
<td>0.81</td>
<td>0.15</td>
<td>0.04</td>
<td>0.00</td>
<td>-0.13</td>
<td>-0.20</td>
<td>-0.04</td>
<td>-0.12</td>
</tr>
<tr>
<td>$P^c_t$</td>
<td>0.75</td>
<td>-0.03</td>
<td>0.09</td>
<td>-0.15</td>
<td>-0.09</td>
<td>0.10</td>
<td>-0.07</td>
<td>-0.03</td>
</tr>
<tr>
<td>$M^m_t$</td>
<td>0.83</td>
<td>0.58</td>
<td>0.29</td>
<td>0.06</td>
<td>-0.13</td>
<td>-0.26</td>
<td>-0.29</td>
<td>-0.33</td>
</tr>
<tr>
<td>$P^m_t$</td>
<td>0.28</td>
<td>-0.18</td>
<td>0.13</td>
<td>0.08</td>
<td>-0.11</td>
<td>0.12</td>
<td>0.29</td>
<td>-0.20</td>
</tr>
<tr>
<td>$RER_t$</td>
<td>0.91</td>
<td>-0.23</td>
<td>-0.18</td>
<td>-0.01</td>
<td>-0.03</td>
<td>-0.18</td>
<td>-0.06</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Notes: Natural logs of all the data are used. $\rho_i$ is the $i^{th}$ order autocorrelation coefficient. The large sample standard error under the null hypothesis of no autocorrelation is $T^{-1/2}$ or roughly 0.37 for the series of the length considered here. $A^c$ = Cocoa output; $P^c$ = Cocoa prices; $P^m$ = Maize prices; $RER$ = Real exchange rate; $M^m$ = Index of Manufactured goods supply.

Source: Computed by the Author.
Table C.2: Domestic Price Indexes, 1960-87

<table>
<thead>
<tr>
<th>Year</th>
<th>Exportables</th>
<th>Importables</th>
<th>Non-tradables</th>
<th>Cocoa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>62</td>
<td>40</td>
<td>46</td>
<td>62</td>
</tr>
<tr>
<td>1961</td>
<td>50</td>
<td>40</td>
<td>46</td>
<td>48</td>
</tr>
<tr>
<td>1962</td>
<td>46</td>
<td>38</td>
<td>49</td>
<td>44</td>
</tr>
<tr>
<td>1963</td>
<td>47</td>
<td>37</td>
<td>57</td>
<td>47</td>
</tr>
<tr>
<td>1964</td>
<td>48</td>
<td>40</td>
<td>61</td>
<td>51</td>
</tr>
<tr>
<td>1965</td>
<td>40</td>
<td>47</td>
<td>67</td>
<td>39</td>
</tr>
<tr>
<td>1966</td>
<td>42</td>
<td>48</td>
<td>76</td>
<td>38</td>
</tr>
<tr>
<td>1967</td>
<td>56</td>
<td>52</td>
<td>76</td>
<td>57</td>
</tr>
<tr>
<td>1968</td>
<td>79</td>
<td>57</td>
<td>80</td>
<td>80</td>
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<tr>
<td>1969</td>
<td>94</td>
<td>64</td>
<td>84</td>
<td>93</td>
</tr>
<tr>
<td>1970</td>
<td>102</td>
<td>70</td>
<td>88</td>
<td>118</td>
</tr>
<tr>
<td>1971</td>
<td>87</td>
<td>77</td>
<td>90</td>
<td>88</td>
</tr>
<tr>
<td>1972</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1973</td>
<td>140</td>
<td>112</td>
<td>115</td>
<td>132</td>
</tr>
<tr>
<td>1974</td>
<td>217</td>
<td>155</td>
<td>142</td>
<td>212</td>
</tr>
<tr>
<td>1975</td>
<td>236</td>
<td>177</td>
<td>176</td>
<td>244</td>
</tr>
<tr>
<td>1976</td>
<td>227</td>
<td>204</td>
<td>228</td>
<td>224</td>
</tr>
<tr>
<td>1977</td>
<td>344</td>
<td>239</td>
<td>323</td>
<td>412</td>
</tr>
<tr>
<td>1978</td>
<td>357</td>
<td>270</td>
<td>525</td>
<td>660</td>
</tr>
<tr>
<td>1979</td>
<td>425</td>
<td>321</td>
<td>823</td>
<td>1390</td>
</tr>
<tr>
<td>1980</td>
<td>517</td>
<td>390</td>
<td>1204</td>
<td>1314</td>
</tr>
<tr>
<td>1981</td>
<td>333</td>
<td>388</td>
<td>2362</td>
<td>812</td>
</tr>
<tr>
<td>1982</td>
<td>253</td>
<td>377</td>
<td>2826</td>
<td>626</td>
</tr>
<tr>
<td>1983</td>
<td>1604</td>
<td>2387</td>
<td>5493</td>
<td>3694</td>
</tr>
<tr>
<td>1984</td>
<td>4280</td>
<td>46021</td>
<td>9903</td>
<td>11870</td>
</tr>
<tr>
<td>1985</td>
<td>5764</td>
<td>12766</td>
<td>13454</td>
<td>16522</td>
</tr>
<tr>
<td>1986</td>
<td>12872</td>
<td>15038</td>
<td>16817</td>
<td>30518</td>
</tr>
<tr>
<td>1987</td>
<td>19086</td>
<td>24407</td>
<td>23544</td>
<td>48789</td>
</tr>
</tbody>
</table>

Source: Central Bureau of Statistics, Accra, Various issues.
Table C.3: Labour Input for Selected Crops in Ghana.

<table>
<thead>
<tr>
<th>Crop/Crop Mixture</th>
<th>Average Labour Input/Acre †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoyam-Maize-Plantain</td>
<td>22.0</td>
</tr>
<tr>
<td>Cassava-Plantain</td>
<td>29.0</td>
</tr>
<tr>
<td>Sorghum</td>
<td>40.0</td>
</tr>
<tr>
<td>Millet</td>
<td>40.0</td>
</tr>
<tr>
<td>Cassava-Cocoyam</td>
<td>52.0</td>
</tr>
<tr>
<td>Groundnut</td>
<td>53.0</td>
</tr>
<tr>
<td>Maize</td>
<td>55.4</td>
</tr>
<tr>
<td>Rice (rainfed)</td>
<td>62.0</td>
</tr>
<tr>
<td>Plantain</td>
<td>62.0</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>65.5</td>
</tr>
<tr>
<td>Cassava</td>
<td>66.0</td>
</tr>
<tr>
<td>Yam</td>
<td>81.5</td>
</tr>
<tr>
<td>Cocoa</td>
<td>100.0</td>
</tr>
<tr>
<td>Cocoa †</td>
<td>27.0</td>
</tr>
</tbody>
</table>

Notes: † In Man-Days. ‡ Refers to full bearing cocoa farms.

Table C.4: Nominal Protection Rates for Cocoa and Rice [%]

<table>
<thead>
<tr>
<th>Product</th>
<th>1975-79</th>
<th>1980-84</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct</td>
<td>Indirect</td>
</tr>
<tr>
<td>Cocoa</td>
<td>26</td>
<td>-66</td>
</tr>
<tr>
<td>Rice</td>
<td>79</td>
<td>-66</td>
</tr>
</tbody>
</table>

† Also defined as the ratio of (1) the difference between the relative producer price and the relative border price, and (2) the relative adjusted border price measured at the equilibrium exchange rate and in the absence of all trade policies.
### Table C.5: Villages in Which Survey Was Conducted

<table>
<thead>
<tr>
<th>Districts</th>
<th>Savelugu</th>
<th>Tolon-Kumbungu</th>
<th>Tamale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savelugu</td>
<td>Kumbungu</td>
<td>Yilona yilli</td>
<td></td>
</tr>
<tr>
<td>Diare</td>
<td>Nyankpala</td>
<td>Buglong-fong</td>
<td></td>
</tr>
<tr>
<td>Tampiong</td>
<td>Kpalsogu</td>
<td>Kanville</td>
<td></td>
</tr>
<tr>
<td>Kanshegu</td>
<td>Kpachelo</td>
<td>Kukuo</td>
<td></td>
</tr>
<tr>
<td>Nyoglo</td>
<td>Guno</td>
<td>Kogni</td>
<td></td>
</tr>
<tr>
<td>Nantong</td>
<td>Tolon</td>
<td>Vitting</td>
<td></td>
</tr>
<tr>
<td>Tampion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagdigu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kpachelo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nabogu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pong-Tamale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gushie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandu</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bunglung</td>
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<td></td>
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<tr>
<td>Kadia</td>
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<td></td>
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<tr>
<td>Duko</td>
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<td></td>
</tr>
<tr>
<td>Libga</td>
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<tr>
<td>Kadia</td>
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<td></td>
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<tr>
<td>Yemo</td>
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<td></td>
</tr>
<tr>
<td>Yong</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagbani</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nantonkurigu</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CURRICULUM VITAE

Name: Awudu Abdulai
Place of birth: Tamale, Ghana
Date of birth: 4.6.1958
Nationality: Ghanaian
Marital status: Single

Elementary Education

1965 – 1969: Primary school, Savelugu
1969 – 1971: Middle school, Tamale

Secondary Education

1971 – 1976: O Level, Tamale
1976 – 1978: A Level, Tamale

Higher Education

1/1979 – 10/1982: B.Sc. (Hons) Agriculture, University of Science and Technology, Kumasi, Ghana

Professional Activities

10/1991 – present: Research Fellow at the Department of Agricultural Economics at the ETH-Zurich
4/1989 – 8/1990: Research Assistant to the Professor of Quantitative Methods in Agricultural Economics at the Swiss Federal Institute of Technology, Zurich