THE ECONOMICS OF MIGRATION IN THE VOLTA BASIN OF GHANA

Household and District-level Analysis

Daniel Tsegai

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I dedicate this work to my beloved parents for their great decision to send me to school, their confidence in me, their encouragement and unconditional love.

ABSTRACT

This study addresses migration determinants and effects in the Volta Basin of Ghana. The study is carried out at household and district levels, in which the two major data sources are the household survey and the Ghana Census 2000 data (a complete matrix of inter-district migration flows) respectively. Based on the household survey data, this study investigated the determinants of the decision to migrate within the Volta Basin of Ghana with a special emphasis on the role of migration income affecting household migration decisions. To do this, it built upon the New Economics of Labour Migration (NELM), a theory which considers the role of intra-household exchange of information for the migration decision of household members. As migrants are non-random part of the population, the migration equation was corrected for selectivity bias using the Heckman procedure. The direct and indirect effects of rural out-migration in the source community are also examined using the survey data. Iterated Three Stages Least Squares (3 SLS) method was employed to determine and measure the net effect of migration on the income sources of households. This study, using the Ghana Census 2000 data, also attempted to explain gross inter-district migration flows by readily relating migration to certain aggregate proxy district-level variables. The gravity model is employed and modified to include basic district characteristics.

Estimation results showed statistically significant effects of income differential on the households' decision to participate in migration. This result lends credence to the importance of economic incentives on the intra-household migration decision making process. Results of the 3 SLS model also showed that the loss of labour to migration has a negative effect on household farm income in source areas. However, there is also evidence that remittances sent home fully compensate for this lost-labour effect, contributing to household incomes directly and also indirectly by stimulating farm and non-farm self-employed production. Consequently, these findings present evidence in support of the NELM hypothesis that remittances loosen constraints on production and the imperfect market environments characterizing rural areas in developing countries.

In the district level analysis, important district attributes explaining the 'in' and 'out' flows are illuminated. Based on the findings of the preliminary analysis and pertinent theoretical reasons, the 'gross' migration, instead of the 'net' migration flow approach is chosen. Results demonstrate that

there is much overlap between places of moderately high in- and out-migration rates. Overall, migration in the Volta Basin of Ghana is predominantly over short distances and economic factors and health facilities play a significant role in directing migration flows in the Volta Basin of Ghana.

KURZFASSUNG

Die vorliegende Studie beschäftigt sich mit den Bestimmungsfaktoren für und Auswirkungen von Migration im Voltabecken in Ghana. Die Daten für die Studie stammen aus einer Haushaltserhebung und dem Ghana Zensus 2000. Auf Basis der Haushaltsdaten untersucht die vorliegende Studie die Faktoren, die für die Entscheidung zu einer Migration innerhalb des Voltabeckens in Ghana ausschlaggebend sind mit Schwerpunkt auf der Frage, in wie weit das Einkommen, das durch Migration erwirtschaftet wird, die Entscheidung der Haushalte zur Migration beeinflusst. Dazu wurde die „New Economics of Labour Migration“ (NELM) Theorie herangezogen, die die Rolle des Informationsaustauschs innerhalb des jeweiligen Haushalts für die Migrationsentscheidung von Haushaltsmitgliedern betrachtet. Da Migranten einen von Zufallswirkungen unabhängigen Teil der Bevölkerung darstellen, wurde die Migrationsgleichung mit Hilfe des so genannten Heckman Verfahrens für Selektivitätsfehler korrigiert. Die Ergebnisse der Schätzung zeigten signifikante Effekte der Einkommensunterschiede zwischen Haushalten auf die Entscheidung der Haushalte, an der Migration teilzunehmen. Dies unterstreicht die Bedeutung von ökonomischen Anreizen für den Migrationsentscheidungsprozess innerhalb der Haushalte. Die direkten und indirekten Effekte von Wanderungsbewegungen aus ländlichen Gebieten auf die Herkunftsgemeinde wurden in dieser Studie ebenfalls mit Hilfe der Daten aus der Haushaltserhebung untersucht. Die „Iterated Three Stages Least Squares“(3 SLS) Methode, gefolgt von einem „Bootstrapping“ Verfahren, wurde eingesetzt, um den Nettoeffekt der Migration auf die Einkommensquellen von Haushalten zu bestimmen und zu messen.

Die Ergebnisse der Schätzung zeigen, dass der Verlust von Arbeitskräften durch Migration einen negativen Effekt auf das Haushaltseinkommen aus der Landwirtschaft in den Ursprungsregionen hat. Allerdings gibt es auch Hinweise, dass Geldsendungen aus dem Zielland der Migration in die Herkunftsregion diesen Arbeitskraftverlust voll kompensieren, da sie sowohl direkt als auch indirekt durch Steigerung der selbständigen Agrar- und Nicht-Agrarproduktion zum Haushaltseinkommen beitragen. Die vorliegenden Ergebnisse unterstützen damit die „New Economics of Labour Migration“(NELM) Hypothese, dass Geldsendungen die Beschränkungen der Produktion und der unvollkommenen Marktumgebung lockern, die ländliche Gegenden in Entwicklungsländern charakterisieren.

Die Hauptdatenquelle für die Analyse auf Distriktebene ist der Ghana Zensus 2000 mit einer komplexen Matrix von Migrationsströmen zwischen den Distrikten, die Veränderungen des Aufenthaltsorts zwischen 1995 und 2000 zeigt. Wichtige Charakteristika auf Distriktebene, die die Zu- und Abströme erklären, werden ebenfalls beleuchtet. Auf Grund der Ergebnisse vorläufiger Analysen sowie theoretischen Erwägungen wurden Brutto-Migrationsströmen anstelle von Netto-Migrationsströmen betrachtet. Die Ergebnisse zeigen, dass es große Überschneidungen zwischen Orten mit moderaten Zu- und Abwanderungsraten gibt. Außerdem erklären die Merkmale eines Distrikts die Einwanderungsströme eher als die Abwanderungsströme. Insgesamt findet Migration im Voltabecken in Ghana hauptsächlich über kurze Distanzen statt. Sowohl ökonomische Faktoren als auch Gesundheitseinrichtungen spielen eine bedeutende Rolle für die Ausrichtung von Migrationsströmen im Voltabecken in Ghana.

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ABBREVIATIONS

CSF	Common Sampling Frame
EAs	Enumeration Areas
FAO	Food and Agricultural Organization
GLOWA	Globaler Wandel des Wasserkreislaufes (Global Change of the Hydrological Cycle)
GLSS	Ghana Living Standards Survey
IMR	In-Migration Rate
NELM	New Economics of Labour Migration
OLS	Ordinary Least Squares
OMR	Out-Migration Rate
PCA	Principal Component Analysis
SSA	Sub-Saharan Africa
TOT	Terms of Trade
VB	Volta Basin
ZIP	Zero Inflated Poisson

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CHAPTER 1 INTRODUCTION

1.1 Background

The unparalleled movement of people within the borders of their own countries is one of the greatest transformations witnessed in the 20th century. There is currently a growing recognition that migration can offer an important route out of poverty for many people from developing countries. Thus policy makers in many developing countries view migration as one of the most important factors affecting the path of development. It is within this perspective that the Globaler Wandel des Wasserkreislaufes (GLOWA-Volta) project1 launched this sub-project dealing with migration studies in the Volta Basin (VB) of Ghana.

Sub-Saharan Africa (SSA) has one of the world's fastest growing populations. This rapid population growth has led to increased pressure on available farmland and environmental deterioration, in which both problems affect the capacity of the farm households to carry out sustainable and sufficient production activities. The environmental deterioration additionally increases the costs of agricultural production and hence contributes to poverty and environmentally induced migration.[2] Given this environmental deterioration, farming rarely provides a sufficient means of survival in rural areas of SSA countries. Consequently, most households are found to depend on a diverse portfolio of activities and income sources.

According to Carney (1998) and Ellis (1998), poor rural households in West Africa have three principal options to improve their livelihoods: agricultural expansion/intensification or 'natural resource-based activities'; diversification into non-agricultural sources of income or 'non-natural resource-based activities'; and/or migration to other agricultural areas or to urban areas. These are not

[1] The GLOWA-Volta Project is an interdisciplinary project that strives to support sustainable water resource management in the Volta Basin. The primary goal is the development of a Decision Support System (DSS) that will help the authorities in Ghana, Burkina Faso and the other riparian countries to optimize water allocation within the basin. This study is one of the sub-projects in the context of the whole GLOWA-Volta project.

[2] Some authors, however, are against drawing a linear deterministic relationship between environmental degradation and population migration (Berger, 2002). Kliot (2001) (cited in Berger, 2002) mentioned, for example, that immediate causation between environmental degradation and migration is usually taken for granted but lacks documented evidence.

separate, mutually exclusive paths: the vast majority of rural households or families in SSA follow at least two of the three strategies simultaneously. These activities readily help farm households achieve production-consumption goals that are consistent with their resource levels and allows continuous farm production. For example, empirical studies show that in southern Africa, 80-90% of rural household incomes are derived from non-farm income sources (Ellis, 1998).

Important among the diverse portfolio of activities available to a farm household is migration. Migration, unlike other off-farm and non-farm self-employment activities, apparently makes a household member unavailable for farm activities for an extended period of time and thus reducing the existing farm labour force. Thus migration may reduce farm output; however, the migrant may send remittance which serves as compensation to the farm household. Additionally, migration of a farm household member, in spite of a possible loss of productive labour, reduces the size of the farm household relative to the family farmland, which subsequently reduces the pressure or demand upon the farmland. Therefore, this study tries to understand the combined effect of migration upon farm households.

In Ghana, migration comprises a large proportion of people's livelihood strategies and thus definitely shapes the national economy. The rural Ghana is no longer confined to its economic role of food production but it is at present a source of labour for urban areas. Accordingly, much policy attention has been directed to the issue of rural-urban migration, where the urgency in policy has to do with the perceived consequences of a fast city growth. As a leading cause for population distribution, migration is not only a reaction to changing patterns of resource availability and utilization but also the outcome of an individual, family, or group decision making process.

1.2 Problem Statement

Ghana has devoted much attention in the size, composition, distribution and activities of its population. The principal manifestation of this has been the highly structured census in 1960, 1970, 1984 and 2000 as well as the successive publication volumes documenting the results. The actual concern of Ghana's population, however, is not so much its size, which is about 19 million, but its annual population growth rate. The growth rate is currently estimated at 3%, which yields a doubling time of about 23 years (Boadu, 1999). This high population growth presents a big challenge to

Ghana's development and has far reaching implications. The resulting increased pressure on agricultural land and the continuous undertaking of the extensive-shifting cultivation by farm households affects and will continue to affect Ghana's development for years to come.

Thus, in Ghana, population dynamics and population growth in particular drives the intensification of agricultural production which places undue pressure on land, subsequently leading to rural-urban migration. Van de Giessen et al. (2001) mentioned that poverty and increasing population pressure have led to extensive migration and over exploitation of the natural resource in the VB of Ghana. This high population growth rate coupled with the extremely low incomes of much of the population, results in over-exploitation of natural resources of the basin, which seriously affects the region's sustainable development.

In view of the effects of high population growth, there are two contradictory approaches: the Malthusian and Boserup approaches. Malthus believed that human population increases geometrically while food supplies can only grow arithmetically since they are limited by available land and technological development. Boserup (1990), however has stressed the notion that population growth will stimulate the search for and adoption of new technologies of production, thus providing a positive impact. According to Boserup (1990) this is true not only of investment in traditional food production but also in the production of special export crops. In addition to the intensification option proposed by Boserup, this study considers that an individual may migrate as a coping strategy for poverty and as a means of diversifying income sources.

Large flows of migrants from relatively dry climatic areas to more humid zones are prevalent in the Sahelian zone of Africa. This flow of migrants reduces the soil depletion that would occur in the absence of such migration, whereas migration leads to environmental damage in the destination areas as forest is turned into cultivated land. Apart from its resource related influences, migration, if unmanaged or poorly managed, can have immense socio-economic costs for governments, societies and the migrants themselves.

As Stark (1993) has noted, research on developing countries which seeks to analyse the impact of out-migration from rural areas upon economic development and/or living standards in the area of origin must acknowledge that people's livelihoods are principally characterized by 'risk spreading'

behaviour. This is especially true for rural households in West Africa. The low returns to labour and the risk-proneness of the natural and economic environment in West Africa have implications for the study of migration. Causes, patterns and consequences of migration cannot be studied in isolation from people's other livelihood strategies nor their level of livelihood security.

This study applies migration modelling to different district characteristics, allowing an endogenous view on migration dynamics. This study additionally aims to characterize the determinants and effects of migration at the household-level. Knowledge about the correlations between migration flows and socio-economic development in Ghana is to date insufficient. There are many studies on seasonal migration to the cocoa plantations in Ghana and many more on rural-urban migration. But there is no regional-level migration studies in Ghana. Thus this research on district-level migration flows in the VB of Ghana represents a new frontier in migration studies in Ghana. This study concentrates on discovering the determinants of migration and developing a spatial migration model for the forecast of migration flows and ultimately investigating the possible relationship between migration and other socio-economic and environmental factors.

The research results will be relevant to policy makers, development planners and researchers. Investigating migration flows and decisions can be of principal interest to government and business planning. It helps governments formulate policies capable of enhancing, ameliorating or otherwise altering future internal migration flows, as well as responding to past migration by providing quantifiable rationalizations for the distribution of public goods. The optimal allocation of resources and services, matching the supply to the future demand of these resources and services to demand necessitates an accurate forecast of individuals' long term movements over spatial and temporal scales.

1.3 Objectives and Research Questions

In migration research it is important to discover why certain destinations attract large number of migrants than others. What attributes of a place make it attractive to a migrant and how sensitive are migrants to changes in these attributes? The answers to these questions can be used in forecasting migration patterns.

Many factors in the VB of Ghana affect the availability and usage of household resources, such as land conversion, shifts in land use, and developments in infrastructure: all actions which tie into and affect migration. These factors are, in turn, related to economic development, population dynamics, education, public health, security and governance, issues which also affect migration and migration decisions. Thus this research has the overall objective of analysing the determinants and effects of migration decisions at household and investigating district-level migration flows in the VB of Ghana.[3]

The specific aims of the research can be articulated as follows:

1. To examine the determinants of migration decisions at household-level, thus evaluating the income difference of migrant and non-migrant households; and, to explain and estimate a model of returns to migration which explicitly accounts for the self-selection of migrant households from the sample.

2. To investigate the direct and indirect effects of migration from the rural areas on the income sources of the households that send out-migrants; and, to measure the various and sometimes competing effects of migration on the sending households and discuss policy implications.

3. To identify the main factors shaping migration flows at the district-level and to consider the spatial flows of people by examining the net-sending and net-receiving districts in the VB of Ghana.

Accordingly, the particular research questions addressed in this study are the following:

1. What are the determinants of the household-level migration decision making process in Ghana's VB; what is the importance of income differentials in explaining the migration decision of households; and, are there significant differences between incomes of migrant and non-migrant households?

[3] This work is part of the over all integrated model in the GLOWA-Volta project. Therefore, at a later stage, the spatial migration flows results will be combined to water allocation, land-use and atmospheric models of other sub-projects in the project.

2. How does sending out a migrant from a household, which implies reduction in available labour, affect the farm and non-farm income in the short-term; and, what are the effects of remittances on income generated by the rural household in both its farm and non-farm self-employment enterprises?

3. What is the picture of inter-district migration flows in the VB of Ghana; and which district attributes (socio-economic and environmental factors) affect these migration flows within the basin?

1.4 Outline of the Study

The entire thesis is organized into eight chapters. Chapter 2 describes the history, dynamics and features of migration in Ghana. The stream of migration as well as the causes and impacts of migration in Ghana are observed in some detail in this chapter. Chapter 3 focuses on theoretical framework of migration modelling. Syntheses of selected theories of migration as well as the economic derivation of the gravity model and the theoretical relationship between in- and out-migration models are discussed. Chapter 4 is a descriptive chapter that helps to acquaint readers with the VB of Ghana. It includes an overview of the basin's environmental, and socio-economic conditions. This chapter also explains the sampling procedure and describes the census and survey data used in the study.

Chapter 5 explains the determinants of the household migration decision with a special emphasis on the role of income differential between migrant and non-migrant households in determining household migration decisions. The chapter builds upon the New Economics of Labour Migration (NELM), a theory which considers the role of intra-household exchange of information for the migration decision of household members. As migrants are non-random part of the population, the issue of self-selection is considered to estimate consistent migration incomes. Subsequently, the migration equation is corrected for selectivity bias using the Heckman procedure.

Chapter 6 examines the impacts of rural out-migration upon the source community. Explicitly, this chapter addresses the direct and indirect effects of migration from the rural areas on the income sources of the households that send out-migrants. In this chapter, the various effects of migration

upon the sending households are measured and subsequently policy implications are discussed. The Zero Inflated Poisson (ZIP) model is used to get the predicted number of migrants per household. The Iterated Three Stages Least Squares (3 SLS) method followed by a bootstrapping procedure is employed to determine and measure the net effect of migration on the households' income sources.

Chapter 7 analyzes the internal migration patterns at district-level and illuminates important district-level characteristics that explain the in- and out-flows. This is carried out by testing the influence of the conventional economic, environmental, infrastructural, and human capital factors on the direction of migration flows. We improve on previous studies of migration by analyzing gross flows rather than net flows in order to properly distinguish the determinants of in- and out-migration rates separately. Our major data source is the Ghana 2000 census data. The complete matrix of inter-district migration flows, which shows district-level changes of residence between 1995 and 2000, is the basis of the analysis. Using GIS mapping, chapter 7 identifies the net-sending and net-receiving districts.

Chapter 8 concludes the whole study by presenting a summary of the main findings of the dissertation, addressing program and policy implications and finally providing suggestions for future research.

CHAPTER 2 HISTORY, DYNAMICS, AND FEATURES OF MIGRATION IN GHANA

The aim of this chapter is to present historical and descriptive overview of the general migration phenomenon in Ghana. The first section is an introduction into the chapter. The second section deals with the historical perspective of migration in Ghana. The features of migration in Ghana, specifying the structure of migration stream, the reasons for migration and the migrant characteristics is described in the third section. The fourth section presents the impacts of migration in the economy of households with special reference to the agricultural areas. Section five summarizes.

2.1 Introduction

Much of the land in Africa is too infertile to allow sedentary farming to be carried on indefinitely in one place (Caldwell, 1969). Consequently, shifting cultivation and nomadic herding, which may range over hundreds of miles, have been longstanding characteristics of African's lives. Due to the ecological limitations of the land and other economic reasons, the people of Africa are perpetually on the move perhaps more so than people of other regions of the world (Ammassari et al., 2001). Migration has long been a key element of people's survival and advancement strategies in Africa.

Within Africa, West Africa is one of the few regions of the world where relatively large-scale free movement of people takes place (Zachariah and Conde, 1981) in which internal migration accounts for most of the migratory movements (Adepoju, 2003). Traditionally, population movement has been a characteristic of the social and economic life of the people of West Africa. Studies (Russell et al., 1990 cited in Ammassari et al., 2001) indicate that the highest concentration of migrants and refugees are registered in West Africa, a region that is well known for its extensive migration systems that reach beyond the African continent. In West Africa, international migration remains predominantly intra-regional[4] and occurs mainly between neighbouring countries due to the artificial boundaries demarcating socially homogeneous people of West Africa into separate states.

[4] According to Adepoju (2003), most cross-border movements, involve female traders, farm labourers, unskilled workers, and nomads who pay little attention to arbitrary national borders are essentially intra-regional.

Within West Africa, Ghana and Côte d'Ivoire[5] used to be the major traditional migrant receiving countries in the sub-region while Burkina Faso, Guinea, Mali and Togo are the major labour-exporting countries (Adepoju, 2003). In Ghana, as in other West African countries, migration is not a recent phenomenon. It has been a way of life even before the advent of the market economy. That may be the reason for Caldwell (1969) to conclude that 'there cannot be many countries in the world in which migrant labour is as important as it is in the Ghanaian economy'.

2.2 Historical Perspective of Migration in Ghana

In the pre-colonial period, most of the population movements were unavoidable and were associated with war, slave trade disasters, the search for fertile farmland and the colonization of new areas (Adepoju, 1981). Hill (1970) mentioned that as far back as 1890s there were reports of migrant farmers in the Eastern Region, who moved out of their homes in search of fertile lands for cocoa cultivation. Migration in Ghana during the pre-colonial period was more of forced than voluntary.

During the colonial period, Ghana served as a destination for migrants from other parts of West Africa, namely, Côte d'Ivoire, Sierra Leone, Burkina Faso, Nigeria, Mali and Niger. Such substantial numbers of people immigrated to Ghana, that in 1960, 8.3% of the total population was classified as born outside Ghana (Nabila, 1974). The main reason was the job opportunities at the mines, cocoa farms and urban areas. Additionally, a few foreign immigrants from the Middle East (especially Lebanese and Syrians), India, Europe and North America were living in Ghana. These movements continued until the 1960s. However, in November 1969, the Government of Ghana ordered all aliens without valid residence permits to leave the country. As a result, many aliens (mostly African) left Ghana at such a rate that the proportion of people born outside Ghana fell from 8.3% in 1960 to only 4.1% in 1970 (Nabila, 1974).

The history of migration in Ghana is rich in accounts of various forms of movements within national boundaries for purposes of trade and as a consequence of natural disasters and warfare (Mabogunje, 1972; Addo, 1980; Adepoju, 1981). Though there was evidence of forced labour during the early colonial period (Zachariah and Conde, 1981), with the introduction of colonial rule and the

[5] Côte d'Ivoire is no longer a net migrant receiving country (World Fact Book, 2003).

accompanying stability, most of the population movements were linked to the economic strategies of colonial governments. Voluntary migrations became ordinary during the latter part of the colonial period for a variety of reasons. The reasons include an increase in economic activities and the associated need for labour at certain locations; a better developed infrastructure and the encouragement of free movements of people. In addition, there was an increased awareness among the people who moved of monetary gains and the acquisition of many other socio-economic benefits available at the place of origin (Nabila, 1974).

Since the beginning of the 20th century, there has been steady movement from northern to southern Ghana mainly for economic and social reasons. The cocoa industry, which has played an important role in the economic development of the country, grew rapidly as a result of successive, relatively short distance migrations of commercial cocoa farmers from the northern part of the country. These cocoa farmers have used seasonal migrant labour for many of the more difficult and menial tasks. The cocoa and mining industries triggered the process of social and economic change and modernization (Addo, 1980). As a result, the country's economy gradually expanded which in turn stimulated increased wage labour employment, the development of the country's infrastructure and brought Ghana into the orbit of world economy. Consequently, large human settlements became established in the areas where commercial agriculture was introduced and in the mining towns and in settlements where the country's administration was placed (Addo, 1980).

Although the cocoa producing areas received the majority of Ghana's migrant labour in the early 1950s, the cocoa farming and mining activities that previously characterized the Eastern region started to decline which forced people to move to other regions such as Greater Accra and the newly found cocoa growing areas in the Ashanti and Brong-Ahafo regions. The Ashanti, Brong-Ahafo, Eastern and Western regions, which constitute the areas of cocoa production continued to receive high shares of inter-regional migrants, while the Volta, Northern, Upper East, and Upper West regions have the lowest shares of the inter-regional migration in Ghana (Kwankye, 1995). These trends have changed slightly as evidenced by the Ghana 2000 population census. The census report indicated that while Western, Eastern, Ashanti, Northern and Upper East regions became areas of net in-migration, Greater Accra, Brong-Ahafo, Volta and Central regions have become net senders.

Figure 2.1: Regional Map of Ghana

Source: Pcl map collection

During the post-independence period, the urban bias of development strategy, introduction of free primary education, high population growth, and the impact of the investment pattern of multinational corporations reinforced the volume and intensity of migration, mainly towards the capital cities (Adepoju, 1981). Thus contemporary internal migration in Ghana is the result of the cumulative process of social and economic change as well as increasing modernization in the country (Addo, 1980; Kwankye, 1994).

2.3 Features of Migration in Ghana

Migration in Ghana is not a homogeneous phenomenon: it is dynamic and complex, and the general features are still gradually unfolding. Migration can be of rural-rural, rural-urban, urban-rural or urban-urban type. The rural-urban and rural-rural migratory movements are more pronounced in SSA

and have significant implications for agricultural development in the region (Abdulai, 1996). Migration can be temporary or permanent, short or long distance, and other kinds of migration including cyclical (circulatory), chain, step, and return migrations can be identified. These categories reflect the complex nature of human movement and the interpretation of migration by type of move is subsequently a difficult exercise. As in most African countries, the most important type of the migration in Ghana has been cyclical migration (Adepoju, 1981). Such migration is mainly rural-rural, and it is designed to meet differing peaks of labour demand in various parts of the country. Such movements are well established in a north-south direction, from the Savannah to the forest zone.

The most important type of internal migration in Ghana has been of rural-rural type especially during the cocoa boom in the 1960's directing to the cocoa producing areas of the Ashanti, Brong-Ahafo and Eastern regions. This migration pattern is confirmed in a number of studies including that of Caldwell (1969); Addo (1980); Adepoju (1981); Kwankye (1994) and Batse (1995). This rural-rural migration also involves cash-crop farmers, who move to cultivate food crops (Tutu, 1995). In Ghana, this is common in the Western region where mature cocoa farms are not suitable for cultivating food crops in a mixed crop system. Another instance of rural-rural migration is associated with the farming of export crops (Tutu, 1995) and gold mining (Caldwell, 1969). This has happened in Ghana, as people from the Ashanti and Eastern regions moved to the Brong-Ahafo and Western regions to set up cocoa farms (Adamako-Sarfeh, 1974 cited in Adepoju, 1981).

The temporary or seasonal migration in Ghana typically involves short-term movement of labour from the north to the south to take up temporal employment on cocoa plantations. Many of the people involved in this type of movement are agricultural labourers who come from the northern parts of the country to the forest, cocoa farms, and/or food farming areas to work for wages during the dry season and return to their homes during the wet season (Tutu, 1995; Abdulai, 1996). This may be the reason for Beals and Menzes (1970) to conclude that seasonal migration is more efficient than permanent migration and they further noticed that seasonal migration improves the allocation of resources and contributes significantly to economic growth of Ghana. They further noted that seasonal migration persists because the income brought together from the north and during the seasonal stay in the south exceeds income from full-time employment in the north or permanent migration to the south. The

changing pattern in the migratory process in Ghana is that an increasing number of migrants are staying longer in the towns than their predecessors; in other words, migration is becoming more and more permanent and long-term. This is especially the case with those who go into towns and those who go into commercial farming in distant lands (Caldwell, 1969; Abdulai, 1996).

The other essential type of migration in Ghana is that of return migration, which occurs when the migrant fails to adjust to the way of life in the urban area. This happens when the pull factor to the village and the push factor from the urban area are strong (Mensah-Bonsu, 2003). In Ghana, the strongest rural pull factor is the reluctance to break close ties with the family and the village (Caldwell and Caldwell, 1987). The situation has undergone some changes however and today most migrants only return permanently after retirement (Tutu, 1995). Permanent migration mostly involves movement of rural dwellers to other rural or urban areas for long period of time. Although both seasonal and short term migratory movements still exist in Ghana, long term and permanent migration is increasingly becoming a common practice (Zachariah and Conde, 1981; Caldwell, 1969).

2.3.1 Structure of the Migration Flows

Table 2.1 shows the structure of migration flows between 1960 and 2000. The intra-locality type of migration holds the highest share of migration, which shows that migration in Ghana is largely within the locality that the migrants live. According to the 1984 census, about 38% of Ghanaians of all ages lived outside their locality of birth (Table 2.1). From these, 19.6% were intra-regional, while the inter-regional migrants account for 17.7%. It is also shown that the intra-locality movement increased across time (1960-1984). Table 2.1 also shows that, from 1995 to 2000, a total of about 7% of Ghanaians of all ages moved permanently to other place of residence within the region (2.55%), outside the region (4.31%) and abroad (0.02%).

Table 2.1: Percentage distribution of migrants by place of birth (1960-1984) and usual place of residence (2000)

Kinds of migration	1960	1970	1984	2000*
Intra-locality	43.1	53.4	62.2	-
Intra-region movements	29.4	20.4	19.6	2.6
Inter-region movements	15.6	19.1	17.7	4.3
Abroad	11.9	7.1	0.5	0.02
All groups	100	100	100	-

Source: Batse (1995)

*Computed from Ghana 2000 census data (Change in the usual district of residence between 1995 and 2000)

Table 2.2 shows that the volume of migration for the four types of internal migration has changed in importance in the period 1960-1999. The majority of migrations were to or within rural areas. Rural-urban migration maintains relatively the same volume until 1984; however Ghana Living Standard Survey (GLSS IV) results in 1999 indicate that rural-urban migrants constitute only 8.8% of the total migrants. On the other hand, the urban-rural migration trend is shown to increase sharply across time (Table 2.2, row 5), which indicates the increasing importance of return migration. The people involved in urban-rural migration are mainly persons returning to their home villages either because of old age, retirement from work, or to take up a traditional position. Many may be facing some severe crisis in their life, such as chronic unemployment or acute illness; and, more recently, people who have made the decision to go back into farming also return (Litchfield and Waddington, 2003). Some of the returnees build better houses for their retirement, an activity that improves the rural infrastructure and adds to the dynamism of the rural environment. It has also been noted that many return migrants are generally more enlightened and innovative than their rural counter parts and many become community leaders and take an active role in the social and economic life of their villages on their return (Addo, 1980). Inter-urban migration is also shown to increase across time.

Table 2.2: Different types of migratory movements within Ghana (in percent)

Type of movement	1960	1970	1984	1998/99 [6]
Rural-rural	59.8	51.7	24.2	29.3
Rural-urban	17.6	16.6	16.2	8.8
Urban-urban	11.1	15.0	34.2	22.4
Urban-rural	11.5	16.7	25.4	32.7
Total	100	100	100	93.2

Source: Aniwa and Adeku (1995) and Litchfield and Waddington (2003)

According to Addo (1980), there are two major streams of internal migration that influence spatial mobility in Ghana. The first involves migration from the dry, northern Savannah areas to the middle forest belt, the mining towns, and coastal towns of the south and west. The second major stream consists of movements from the far eastern parts of the country (especially the Eastern and Volta regions) to the coastal towns of the south (especially Greater Accra) and west, as well as the agricultural areas of the Eastern region and further to the middle forest belt of the Ashanti and Brong-Ahafo regions. The other minor migration streams can also be classified as follows:

(1) The movements from certain parts of the Eastern region (principally, the old cocoa growing areas) to the relatively new agricultural regions, such as the Ashanti and Brong-Ahafo regions, and more recently Western region.

(2) The movements from the Eastern region to metropolitan areas, specifically Accra and Tema.

(3) The long distance movements from rural areas or small towns in a particular region to the main towns and cities of other regions.

[6] While the other columns are census data results, the data for the 1998/99 is taken from Litchfield and Waddington (2003) estimated from the GLSS IV (1998/9). And the total doesn't sum to 100 as the rest 6.8% represents migration outside the country.

The general pattern of the streams is summarized in the table below.

Table 2.3: General classification of migratory flows in Ghana

Type	Origin	Destination
Major	Northern parts of the country (Northern and upper regions)	Middle forest belt (i.e. the Ashanti and Brong-Ahafo regions and mining areas) Coastal towns, such as the Accra-Tema metropolitan area, Sekondi-Takoradi etc. Agricultural and mining areas in the Western region
	Far eastern parts of country (mainly Volta region)	Agricultural, especially cash crop (cocoa) growing areas in the eastern region Agricultural, especially cash crop (cocoa) growing areas in Ashanti and Brong-Ahafo regions Coastal towns of Accra-Tema metropolitan area and other cities
Minor	Eastern region	Agricultural, especially cash crop (cocoa) growing, areas in Ashanti and Brong-Ahafo regions Agricultural, especially cash crop growing, areas in the western regions Accra-Tema metropolitan area and other cities

Source: Addo (1980)

It should also be noted that the structure of the migration stream may also be dependent on the characteristics of the migrant (Mensah-Bonsu, 2003). Migrants with skills and adequate educational level are more likely to move to the national and regional capitals while most of the uneducated flow to the mining and cocoa growing areas. Information also plays a role in influencing the stream of migration in Ghana. The pioneer migrants usually send information back to their place of origin and may well induce their fellow villagers to migrate. Caldwell (1969) has shown that communication with relatives and friends is the leading mechanism in which information is provided about potential destinations.

2.3.2 The Reasons for Internal Migration in Ghana

There are quite a number of reasons for the internal movement of labour in Ghana. Abdulai (1996) pointed out that the high population growth rate in Ghana has generally increased the domestic supply of labour; and in areas such as the Upper East Region, high population growth rate has put pressure on the available cultivable land, which encouraged migration. Gaisie and de Graft-Johnson (1974) indicated that the macro-economic environment has also influenced Ghana's internal migration through urban-biased policies and the Terms of Trade (TOT) was turned against agriculture and the rural areas, contributing to wide rural-urban income differentials. Urban-biased policies, which included over-valued exchange rates, industrial protection and cheap food policies discriminated against the rural areas in general and agriculture in particular. These policies held farm prices and rural incomes down, encouraging a shift of labour out of agricultural production and led to subsequent increase in rural-urban migration. However, macro-economic and sector-specific policy reforms initiated in 1983 contributed to improving the domestic TOT in favour of the rural sector, thereby encouraging urban-rural migration. Ghana. Jaeger (1992) mentioned that research on current and prior employment of over 8000 individuals during that time revealed that among individuals who have changed occupations during this period, those moving from non-agricultural jobs into agricultural jobs outnumbered those moving in the opposite direction in a ratio of two-to-one. The survey data suggests that a significant reverse migration from urban to rural areas since the reform program was initiated, even though not all agricultural occupations imply rural residence and neither do all non-agricultural occupations entail urban residence.

Social conditions at the place of origin are also found to be compelling motivations for migration phenomenon in Ghana. However, once they decide to migrate, they base their choice of destination primarily on the economic opportunities available at that end. This means that the social conditions prevailing at the place of origin act as the main push factor while the economic opportunities available in a particular town act as the pull factor attracting migrants to that locality (de Graft-Johnson, 1974). Moreover, a survey conducted by Kasanga and Avis (1988) to examine internal migration and urbanization in Ghana revealed that over 80% of the respondents gave economic reasons for migrating from their previous locations, suggesting that income differentials contribute significantly to internal migration in the country. In addition, Caldwell (1969) mentioned that motives

for migration included the desire for more money, prestige and other similar economic motives, as well as preference for town life and its sophistication.

Conversely, Nabila (1985) characterized Ghana's internal migration as being influenced by three main factors: the differential vegetation zones of the Savannah and forest with its preponderance of cash crops (especially cocoa); the existence of mineral resources (gold, diamond, bauxite, manganese) in the forest areas; and the advent of European colonization, which fostered concentration of development in southern Ghana. But Oti et al. (1990) stressed that internal migration in Ghana is influenced by the clear differences in the levels of poverty between the North and the South, as well as their respective capacities to respond to new economic opportunities. Thus the North (Northern and Upper regions) and the Volta regions, which are referred as the least developed regions in the country (Botchie, 2000; UNICEF, 1984), have become source regions. Ewusi (1976) also used socio-economic indices for different variables to develop a composite index of the level of development of the various regions and observed that the Northern and Upper regions are the least developed regions. He mentioned that these differences partly account for the large-scale North-South migration in the country.

The uneven allocation of development and welfare expenditure to towns, such as the investment in productive enterprises or infrastructure, including water supplies or medical services have made towns relatively more attractive. This and many actions of government to make urban areas more attractive have encouraged rural-urban migration. Tutu (1995) listed some of the government's investments, which include job creation, availability of social amenities (housing, educational facilities, health facilities, potable water, toilets, electricity), and availability of consumer items. Most of the post-independence investment in projects outside agriculture was part of the then government's industrialization strategy. Most of the public corporations established to create employment were developed in urban areas, and as such attracted labour from the rural areas. Other direct urban-biased policies such as minimum wage legislations were also implemented to protect the interest of organized urban employees. These minimum wage rates which in some cases were put above the market clearing wage rate further reinforced the rural-urban wage differentials, thus encouraging rural-urban migration (Abdulai, 1996).

An additional factor that encouraged labour movement is the decline in costs of transportation and communication (Mensah-Bonsu, 2003). The extension of the road network into rural areas, particularly in the late 1960s and early 1970s through the construction of feeder roads, significantly decreased the costs of movement. As a result of this improved communication system, migrants were no longer faced with an unknown destination. Furthermore, this decline in costs of transportation and communication improved information exchange and as such lowered the risks of movement, which subsequently increased the chances of rural residents locating jobs in the urban centres. This change is also documented by Beals and Menzes (1970) in their study on migrant labour and agricultural output in Ghana, when they determined that reduced transport costs between the Southern and Northern parts of Ghana accelerated the north-south migration in the late 1960s and 1970s.

The rural community factors which act as push factors to encourage migration out of rural areas (Tutu, 1995) included the seasonality of agriculture, population pressure leading to less land per farmer, land ownership problems, inadequate agricultural resources (such as credit to small holders), lack of rural industry, lack of social amenities, increased deprivation and entitlement failure in rural areas. For the rural-rural migration, Gbortsu (1995) stressed that, the above factors and, especially the land tenure system forced the rural population to migrate. He indicated that since land ownership systems differ from place to place, it is common for rural populations to move to another rural area; and this accounts for the large volume of rural-rural migration.

On the other hand, a study by de Graft-Johnson (1974) showed that as distance rises the number of long-term absentees falls steeply. He noted that the number of migrants between Greater Accra and each of the remaining regions in the country is inversely proportional to the distance between them. This suggests that distance between the source and destination as well as transportation costs per se have influenced the inflow of migrants from other regions into Greater Accra. It is likely that distance weakens the attractive message percolating out from the towns and, makes the journey more difficult and expensive. Many of the forces working towards an increase in migration are products of social and economic modernization, which tend to negate the greater distances from the towns, while the latter are themselves the results of such change; they are the extreme type and the centre from which change diffuses further. However, distance has an additional effect: it makes the break with relatives and other villagers left behind more complete. In his study, Caldwell (1969) showed that the

proportion of long-term absentees who rarely or never come back rises with increasing distance between the village and town.

Regarding return migration, Nabila (1974) refers to some of the possible factors, which induce people to return such as the significance of kinship, lineage ties in the rural area and a need to work on farms back home in order to support parents and relatives. However, some rural areas, like the cocoa producing areas of Ghana have well developed cash crop economy and these areas tend to receive migrants and subsequently do not usually have many out-migrants.

2.3.3 Demographic and Socio-economic Profile of Migrants

The existing body of empirical evidence corroborates the selective behaviour of migration process. Migrants are not random part of the population living in the country of origin. For instance, young adult males and single people are generally more likely to migrate although there is evidence in Ghana that the movement of single women migrants has been under emphasized (Caldwell, 1969, Nabila, 1974). From the 1960 census, 24% of all females and about 18% of all males were reported as having been born in a different locality but within the same region. This suggests that women tend to participate more often in short distance or intra-regional migration than men, perhaps due to marital arrangements (Nabila, 1974). Kwankye (1994) also confirmed that migration is higher for females than males. Gbortsu (1995) showed that there is greater propensity for educated females to reside in towns compared to educated males. Based on GLSS IV in 1998/99, Litchfield and Waddington (2003) also showed that of all the internal migrants in Ghana, females constitute about 54 per cent. Regarding the age of migrants, Litchfield and Waddington (2003) found that about 50% of the migrants are aged below 34 years. This is supported by Caldwell (1969) and Gbortsu (1995) who found the young ones to be the most mobile part of the society.

Caldwell (1969) discovered that the out-migration of people from rural areas is directly proportional to the education level, literacy status, English speaking ability and marital status, singles being more likely to migrate. Addo (1974) has also determined that migration is more common among the educated and literate. Yet, as an apparent paradox, findings from the Litchfield and Waddington (2003) revealed that about 60% of the rural-urban migrants have no primary education (Table 2.4); and Gbortsu (1995) also found that the majority of those who migrated are virtually illiterates.

Table 2.4: Percentage distribution of educational background for migrants and non-migrants

Education	Migrants	Non-migrants
None	60.1	56.3
Basic	29.5	31.2
Vocational and above	10.1	12.2
Other	0.3	0.3
Total	100	100

Source: Litchfield and Waddington (2003)

According to Caldwell (1969), the number of living siblings in a family (household size) also influences migration. Members of large families are more likely by random chance to have at least one sibling in the town and persons with close relative in town are more likely to migrate. Thus the propensity to migrate is directly proportional to household size. Addo (1974) noted that with an increase in the number of siblings, the chance that at least one chooses to migrate to an urban area is greater; and, once this migration has occurred, the chances for the younger siblings to migrate increases. This important influence is perhaps related to what is referred to as chain migration (Zimmermann and Constant, 2003). Further more, Caldwell (1969) characterized households based on economic activity. His results indicated that households with migrant household members are more likely than those without to earn the greatest share of their incomes in the formal sector (public and private). Caldwell's findings indicate that a substantial migration stream in Ghana is indicative of a real income differential, not merely in cash incomes, but in real incomes and living standards between town and countryside. He further explained that this differential in average incomes is substantial. For instance, in 1960, the average income per head in Accra was twice the level in the south or the Ashanti region (Szereszewski, 1966 cited in Caldwell, 1969).

2.4 The Impacts of Migration upon the Agricultural Output of Households

Through remittances, migration is expected to have a positive impact on the sending households even though the loss of labour means a direct reduction in the farm and non-farm income of households. Burger (1994) indicated that migration enhances household's income when a migrant sends

remittances, which may be better than his contribution as a resident member, particularly if the household member was a net consumer (if production is less than consumption) before migrating.

In Ghana, internal migration has had significant impacts on agricultural production and general economic development (Abdulai, 1996). Abdulai distinguished between the effect of temporary and permanent migration on agricultural development. Temporary migration improves the allocation of resources and has contributed significantly to the growth of agricultural output in Ghana. The availability of seasonal labour from the North and from countries like Burkina Faso and Nigeria contributed largely to the expansion of the cocoa industry in the early 1950s when labour demand on new cocoa acreage increased. Beals and Menzes (1970) argued that without the inflow of seasonal migrants, the expansion of the cocoa production and export sector would have been categorically restricted.

Equally, permanent migration of agricultural workers and small scale farmers from the North to the South in the 1960s and 1970s led to declining acreage under cultivation in the region. Estimations by Bequele (1983) indicated that the acreage under food crop cultivation fell by 128,000 acres between 1970 and 1974. Abandonment of farms in the north, the main food-producing region of the country, resulted in the decline of per capita food production and dramatic increases in the producer prices for food stuffs in the late 1960s and early 1970s (Abduali, 1996). Examining labour-surplus models and labour deficit economies in West Africa, Godfrey (1969) argues that the decline in food production and rise in food imports in the country in the late 1960s was largely due to shortage of labour, resulting from the high (and increasing) rate of migration from local food production areas to the towns.

In the period between 1960 and 1980, food production grew at a rate lower than that of population, while cocoa production in particular declined. The decline of the agricultural sector and the subsequent food and foreign exchange constraints, which negatively affected the expansion of industries and services, contributed immensely to the general economic decline that persisted into the early 1980s. It is important to mention that the observed urban-rural migration during the early 1980s (Rakodi, 1997) positively affected productivity of both food and export agriculture. As opposed to the 1970 census which showed the decline of the acreage under food crops, the 1984 agricultural census shows that the total acreage under food crops increased tremendously in the 1980s. Between

1981 and 1992 alone, agricultural and food production per capita increased by 4.4% and 1.8%, per annum, respectively, which resulted in a massive decline in food imports (Abdulai and Hazell, 1995).

In general, the positive impacts of migration upon the sending areas include less competition for jobs and increased bargaining power of the migrant's social class remaining in the sending areas. Particularly in northern Ghana, where a large proportion of young workers migrated to the gold mines and other urban centres in the south, labour has remained a major constraint in the farming system of the region. This greater relative scarcity of labour has been translated into higher wage rates for farm workers. Labour shortage as constraint to acreage expansion is frequently reported from farmers in Upper West region of Ghana (Abdulai, 1996). Despite the fact that migrants have been returning to the rural areas since the late 1980s, labour bottlenecks still persist in the agricultural sector, especially during the peak seasons of planting and harvesting.

Another positive impact of rural-urban migration is the income increase of the sending households through the remittances received by the sending households. Available evidence indicates that remittances sent home by migrants also constitutes a substantial proportion of the recipient household's income. In a study of the challenges for agricultural development in the Guinea Savannah zone of the Upper West region in Ghana, the International Centre for Development Oriented Research in Agriculture (ICRA) reported that over 25% of the farmers interviewed stated that they rely greatly on remittances from relatives in urban centres as investment funds. In this way, migration has made it possible for the peasantry to overcome the imperfections of the rural credit market by creating opportunities to amass finance capital in the urban areas for subsequent investment in agriculture. Tutu (1995) has found that remittances are spent on fertilizer and learning new techniques.

The opinions of migrants and the source households of the effects of migration on the family can also help one to understand whether the source households provide any reason for migrants to return or whether they encourage them to remain migrants. Tutu (1995), in his contribution to the 1995 Migration Research Study in Ghana, reported that a majority (52%) of sending households indicated that agricultural output had not been affected by the absence of the migrant(s) in the short-run and expected the situation to remain the same in the long run. This indicates that the marginal product of migrants is close to zero and thus their absence does not have effect on output in the short run. This

agrees with the Lewis model of migration (chapter 3). According to Kranjac-Bersavljevic et al. (2001), about 54% of the respondent households in their study perceived no effect of migration on their soil and water conservation methods, while 12% perceived positive effect and the remaining 34% perceived negative effect.

2.5 Summary

There is a wide-ranging agreement in the literature that migrants move from low-income to high-income areas, which lends credence to the importance of economic opportunities in influencing the migration decisions of households in SSA. Internal migration has a positive effect for migrants who secure jobs in urban areas because this results in higher incomes for the migrants and remittances for their relatives and friends. Conversely, internal migration involves social costs in the form of reduced output in rural areas and augments unemployment in urban areas. Though farmers' opinion (Tutu, 1995) suggest that the agricultural output was not affected as a result of out-migration, generally, the Ghanaian experience shows that large scale rural-urban migration can lead to the abandonment of farmland, which would eventually cause the reduction of agricultural output, and higher urban unemployment rates.

The literature also suggests that appropriate measures are required to reduce the large scale rural-urban migration and the subsequent urban unemployment. However, the usual response to urban unemployment of many African countries' governments by creating unproductive public employment is not a first-best policy option, since it entails expenditure that "crowds out" productive investment (Abdulai, 1996).

Considering the characteristics of internal migrants, migration takes the best of the society away from the sending areas. This deprives the sending areas from the creative assets of these people and thus may be detrimental to the development potential of the areas. Hence, attempts should not be made to stop people from leaving but to get them to want to stay. This can be achieved by improving the socio-economic conditions at the place of origin. Policy measures such as improvement in the TOT of the agricultural sector (i.e. reduction of industrial protection and increases in producer prices of food and export crops); greater provision of public services in rural areas (especially education, sanitation, health, housing and electricity); and, a reform of the rural credit market will considerably

contribute in controlling the excessive out-migration of rural dwellers. Some African countries have taken steps in this direction to encourage young people to stay in rural areas. The provision of rural areas with feeder roads, clean water and electricity in Nigeria helped bring some migrants back to the rural areas. Tanzania offers two-year training courses in carpentry, masonry and plumbing to primary school graduates in order to encourage them to take up jobs in the rural areas (Abdulai, 1996). In Ghana, increased incentives to farm and improved rural infrastructure have resulted in reduced rural-urban migration and encouraged urban-rural migration. This suggests that if policy makers want to limit the flow of the rural dwellers to the urban centres, then increasing the desirability of returning to, or never leaving, the sending areas may be beneficial policy options.

Given the cumulative contextual and personal aspects that characterize the multidimensional selectivity of migration, it is possible to distinguish between two main categories of migrants in Ghana (Abdulai, 1996). On one hand, there are the poorer and the illiterates for whom migration represents a survival strategy. This group of people often has little choice other than to migrate. On the other hand, there are the wealthier and highly skilled people who choose migration as a strategy for advancement. For them, migration represents one of the many possible ways to improve their own family status and be socially mobile.

From the discussion, it can be inferred that internal migration in Ghana is mainly a youthful phenomenon. Regarding occupational types, more than half of the migrants are in the traditional agricultural sector, which suggests the prevalence of rural-rural migration since the agricultural production is concentrated in the rural areas. This rural-rural dimension suggests the relatively low level of education of the migrant labour since the majority of them participate in agricultural activity. Chain migration is a very notable phenomenon, especially migration to join family members and/or spouses who have earlier migrated. This indicates the important role of migration networks in affecting people to decide to migrate and where to migrate.

Generally, the analysis in this chapter reviews the literature to give an insight into what is known to date on migration in Ghana. Furthermore, the migration literature in Ghana is dominated by more of anthropological works with emphasis on links between migration and urbanization and most studies emphasize on the migrants themselves and not on the sending households. However, the NELM theory underscores that migration is precisely a household decision making process. Thus further

investigation is required to analyse the economic aspect of migration dynamics at household level. Moreover, the study examines the district level migration flows because *districts* as administrative units per se emerged only since 1991. Thus, the study also benefits from these new geographical units and does a pioneer research on inter-district migration flows.

CHAPTER 3 THEORIES AND EMPIRICAL IMPLEMENTATION OF MIGRATION

The aim of this chapter is to discuss the influencing theories of migration and consider their applications. The chapter starts with the introduction in the first section. The second section deals with the synthesis of selected theories of migration. The third section describes the macro and micro approaches to the analysis of migration determinants. The fourth section, which is the theoretical framework for the district-level migration model in chapter 7, mainly deals with economic derivation of the gravity model formulation, the theoretical relationship between in-and out-migration flows, and migration responses to regional wage differentials. The fifth section summarizes.

3.1 Introduction

The concept of migration has occupied the attention of sociologists, anthropologists, demographers, geographers and economists. Many theories have been developed in response to the intriguing issues created by the whole process of migration to predict the migration behaviour of individuals and forecast migration flows.

The earliest comprehensive treatment of the migration process is due to Ravenstein (1885, 1889). Ravenstein, as pioneer of migration theory, developed the main classic 'laws of migration' as follows: (i) migration is dominated by economic motives; (ii) natives of towns are less migratory than those of rural parts of the country; (iii) migration occurs by stages, gravitating towards the most rapidly growing cities; (iv) migrants who travel a long distance will go by preference to one of the big centres; (v) the majority of migrants move only a short distance; and (vi) each stream of migration produces a counter-stream and due to better communications and higher technology, migration will increase in time. These simple statements about migration flows have generated a remarkable amount of empirical research; thus many migration studies have been conducted ever since. Ravenstein's laws remain largely uncontested and may still be considered as pillars of most migration theories and models in the future.

Developing on Ravenstein's laws of migration, Stouffer (1940) proposed that the level of movement between two places is dependent on the nature and number of possible alternative migration destinations, which may exist between the places. In this model, it is the nature of places, rather than distance, which is more important in determining where migrants go. People will move based on the real or perceived opportunity at place of destination. According to Stouffer, therefore, the number of people moving over a given distance is directly proportional to the number of opportunities at that distance, and inversely proportional to the number of intervening opportunities.

Two refinements by Lowry (1966) and Lee (1966) offered analytical frameworks for empirical work. While Lowry focused on differences in economic opportunity as the force behind migration, Lee categorized the factors that influence the decision to migrate into origin and destination factors, intervening obstacles and personal features. The obstacles may be objective (distance, cost, climate, laws, etc.) or subjective (family ties, loss of friends, language, etc.). Distance is the most ubiquitous obstacle for the decision to migrate (Cadwallader, 1992). Lee formulated his concepts of migration as follows: (i) the greater the disparity of relevant criteria in geographically linked regions (in relative dependence of distance, cost, etc.), the greater the migration; (ii) the volume of migration varies directly with the diversity of the people; (iii) the volume of migration is inversely related to the overcoming of obstacles; (iv) expulsive factors are more important than attractive factors; and (v) migration is selective. Lee's concepts, like that of Ravenstein, generated massive quantity of empirical work and the relative importance of push and pull factors continues to provide a framework for much of the contemporary research. However, his hypotheses are of limited use for the formulation of government policies and strategies because of their high degree of generality and because of the interdependence of many of the hypotheses.

3.2 Towards the Theories of Migration

In this sub-section, we present analytical synthesis of selected theories of migration.[7] It begins with the role of migration in the Lewis's two-sector model, in which the rural sector is characterized as

[7] As we can not exhaust all the theoretical models of migration, we try to look at the most important models by emphasizing on the implications of these theories for empirical analysis of migrant labour supply.

having surplus labour, then presents Fei and Ranis neo-classical models followed by Harris-Todaro expected income models, human-capital models and the NELM.

3.2.1 Lewis's Dual Sector Model of Development

Lewis's (1954) seminal work on economic development with unlimited supplies of labour often reverberates in the modern economics literature on migration. The Lewis model is structural change model that explains how labour transfers in a dual economy. It was based on the assumption that many developing countries had dual economies with both the traditional agricultural sector and a modern industrial sector. An explicit migration model is not suggested by Lewis, rather he stresses on the means by which unrestricted supply of labour in traditional sectors might be absorbed by the technologically advanced, expanding modern industrial sector (Williamson, 1988). Though migration implies an opportunity cost for the rural economy, in the Lewis model, the assumption is that labour is available to the industrial sector in unlimited size at a fixed real wage. The Lewis model argues that economic growth requires structural change in the economy whereby surplus labour in traditional agricultural sector with low or zero marginal product, migrate to the modern industrial sector. Hence, the major hypothesis of the Lewis model is that rural out-migration is neither accompanied by a decrease in agricultural production nor by a rise in either rural or urban wages (Taylor and Martin, 2001).

The drawback of the Lewis model is that it treats the rural sector as a *black box* from which surplus labour is drawn for use in an expanding modern sector and for taking the value of the marginal productivity for labour to be almost zero for rural areas. This may be true for certain times of the year; however, during planting and harvesting, the need for labour is critical to the needs of the village. Furthermore, the assumption of a constant demand for labour from the industrial sector is questionable as increasing technology may be labour saving reducing the need for labour.

3.2.2 The Fei and Ranis Two-sector Analysis

In Fei and Ranis (1961) interpretation of the Lewis model, the perfectly elastic labour supply to the capitalist sector ends once the redundant labour in the rural sector ceases to exist and a relative shortage of agricultural goods emerges turning the TOT against the modern or capitalist sector

(Taylor and Martin, 2001). Thus the central hypothesis is that migration leads to an optimal spatial allocation of labour and eventually wage rates will be equalized across regional labour markets (Fei and Ranis, 1961). The dual economies merge into a single economy in which wages are equalized across space. In principle, rural-urban migration exerts upward pressure on wages and on the marginal value product of labour in rural areas, while putting downward pressure on urban wages, assuming that wages adjust to ensure that both rural and urban labour markets clear. The neo-classical theory of labour mobility suggests that labour moves in response to inter-regional wage differentials, with the volume of movement increasing as the wage differential increases (Clark and Gertler, 1983).

However, the Fei and Ranis approach has been subjected to criticisms. First, empirical evidence shows that urban formal-sector wages are fixed and migration tends to persist and even accelerate in the face of high and rising urban unemployment in the Least Developed Countries (Todaro, 1969) and documented persistent differences in wage rates for comparable agricultural tasks across geographical areas (Rosenzweig, 1978). Furthermore, as migrants tend to be disproportionately young and skilled, the high wage regions that gain-in population as a result of inter-regional migration will experience a favourable change in their population composition, while the reverse is true for the sending regions. Thus the net out-migration from depressed regions might reduce unemployment in the short run, only to create greater unemployment in the long run (Cadwallader, 1992).

3.2.3 The Harris-Todaro Expected Income Model

The above discussions on the idea of dualism developed by Lewis (1954) and extended by Fei and Ranis (1961) provided the setting for further refinements, by Todaro (1969) and Harris and Todaro (1970). Relying on the empirically proven predominance of economic migration motive, the Harris and Todaro (1970) model holds a central place in empirical research on migration. Todaro revealed that each potential migrant decides whether or not to move based on the objective of expected income maximization. The Harris and Todaro model recognizes the existence of a politically determined urban wage at levels substantially higher than agricultural earnings. According to Harris and Todaro (1970), despite the existence of positive marginal products and significant level of urban unemployment, rural-urban migration not only continues to exist, but indeed, appears to be

accelerating. In the Harris and Todaro's model, the individual must consequently balance the probabilities and risks of being unemployed/under employed for a considerable time-period against the positive differential between urban and rural real incomes.

Most microeconomic models of rural-urban migration are grounded on Harris and Todaro's influential work, which incorporates labour market imperfections, including urban unemployment into a migration model (Taylor and Martin, 2001). Expected urban income at a given setting is the product of the wage and the probability that a prospective migrant will get an urban job. Expected rural income is calculated similarly. Individuals are assumed to migrate if their discounted future stream of urban-rural expected income differentials exceeds migration costs. With the assumption of risk-neutrality of individuals, the strength of the Todaro model lies in its ability to explain the continuation and acceleration of rural-urban migration in the face of high and rising urban unemployment.

The Todaro model produces a richer set of rural welfare and policy implications than its classical or neo-classical predecessors, implicitly shifting migration and unemployment policy focus from the urban to the rural (i.e. labour supply) sector in two ways. First, job creation in the destination will increase the number of unemployed. New jobs in the destination will initially increase the probability of getting a job for migrants inducing migration to rise until the influx of new migrants drives down the probability of getting a job to its previous level; wages are fixed throughout (Todaro, 1994). The result is more workers in the destination with the same probability of getting a job as before, hence more employed and more unemployed migrants. Second, estimates of the shadow price of rural labour to the urban sector are likely to be biased downward if the migration elasticity is ignored. The lost agricultural product of the migrant, who secures an urban job, does not represent the full opportunity cost of rural out-migration. Because the opportunity cost of the rural sector also includes the loss of agricultural production of others who migrate but are less fortunate in finding urban employment. The other important policy implication of the Harris and Todaro (1970) model focuses on interventions in labour markets; that is combining urban wage subsidies with physical restrictions on migration is necessary to achieve economy wide production efficiency. According to the Harris-Todaro model, while subsidy changes the effective wage for determination of industrial employment, so long as the wage exceeds agricultural earnings there will be migration and urban unemployment.

Thus restriction of migration is also needed to prevent the minimum wage having its effect on unemployment.

The weakness of this model, as described in Gallup (1997), is the assumption that actual wage in the destination is known and fixed over time and the migrant considers future earnings, but does not consider that s/he may migrate in future, thus it is not a dynamic decision. Gallup added that implicitly the worker considers migrating only once and once the choice is made it is irrevocable. Cole and Sanders (1985) also highlighted a crucial shortcoming of the Todaro model. They revealed that the Todaro approach is limited to explaining the movement of persons possessing sufficient human capital to qualify them for modern sector employment. However, evidence shows that masses of relatively uneducated persons migrate and work in a subsistence world that cannot be explained by the structures of Todaran theory.

3.2.4 The Human Capital Model

This model portrayed migration decision as an investment decision, whereby differences in expectations about earnings prospects distributed individuals to localities promising the highest return to their human capital (Tunali, 1985). The individual migrates having considered the costs and benefits of migration, that is, migrants move when there is a net benefit from moving, which in practice is determined by labour market differences. The approach also suggests that mobility rates are likely to vary across different population groups, for example, migration diminishes with age because the older the migrant the fewer the years of payoff from the human capital investment in migration, while the cost of migration remains just as high. According to Sjaastad (1962) migration poses two broad questions for the economist: first concerns the direction and magnitude of the response of migrants to labour earnings differentials over space and the second pertains to the connection between migration and those earnings, that is, how effective is migration in equalizing inter-regional earnings of comparable labour? The human capital model deals with the later question. The model may be extended into a risk-theoretic framework by introducing uncertainty and attitudes to risk in the formation of expectations and also in the evaluation of discount rates (Langley, 1974 and Hart, 1975 cited in Molho, 1986).

The question of migrant selectivity in the neo-classical and Todaro worlds is developed by merging migration theories with human capital theory (Taylor and Martin, 2001). Human capital model of migration provides the migration theories presented above with a micro grounding, permitting tests of a far richer set of migration determinants and impacts. The human capital view of migration has the key implication that the types of individuals selected into migration are those for whom, over time, the discounted income differential between migration and non-migration is greatest and/or migration costs are lower. As human capital model is a dynamic model, the young should be more mobile than the old, in as much as they stand to reap returns from migration over a longer period of time.

However, the model fails to focus on the process whereby individuals acquire information. Individuals do not have information on all available opportunities immediately at their disposal in order to appropriately calculate relevant costs and returns, nor is the acquisition of such information without incumbent cost (Molho, 1986).

3.2.5 The New Economics of Labour Migration (NELM) Model

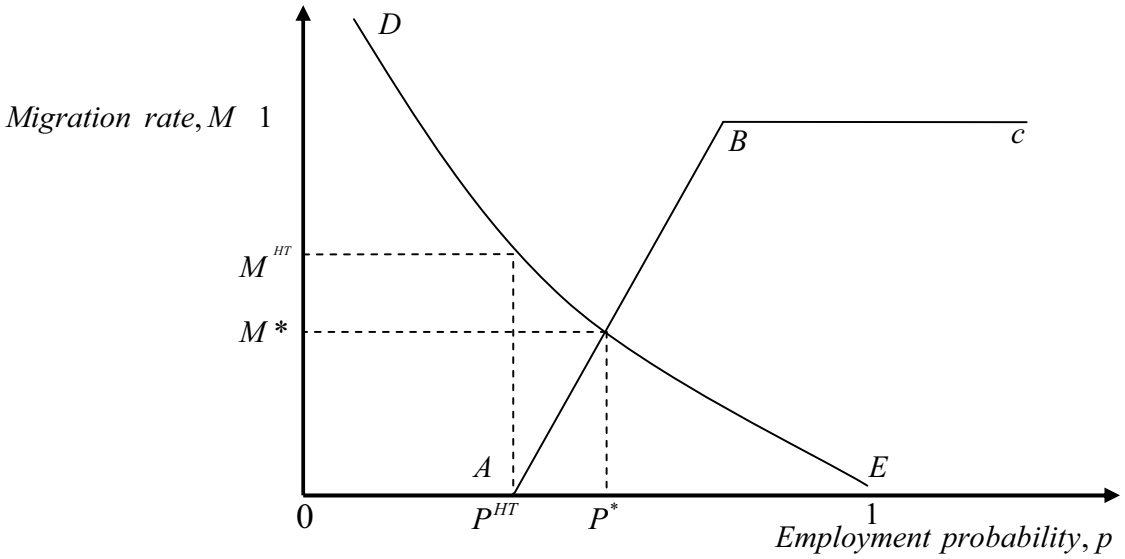
In contrast to classical and perfect market neo-classical models, the NELM suggests that the household is appropriate unit for the evaluation of migration decisions (Shields and Shields, 1993; Stark, 1993) and family members are assumed to act collectively to maximize expected income and also to loosen constraints associated with missing credit, insurance, and other markets (Litchfield and Waddington, 2003). Thus in the NELM, migration is the outcome of a family or group decision-making process induced by risk considerations and uncertainty. Because of this, the NELM perspective fits efficiently with the literature on agricultural household models (Barnum and Squire, 1979). Methodologically, the NELM approach, with its focus on risk and market imperfections, requires the use of simultaneous, rather than recursive, farm household models to analyze both the determinants and impacts of migration. A fundamental point in the household migration models is that, in the household approach, individual family members' labour time is allocated between migration and non-migration work so as to maximize household expected utility, which may be a function of both the expected value and variance of end-of-period household wealth.

Families spread their labour assets over geographically dispersed and structurally different markets to reduce risks (Stark, 1993). Thus if future earnings are uncertain and imperfectly but positively related

in a geographically specific area, the migration policy of a member of the income-pooling family diversifies risk (Stark, 1993). Evidence suggests that after migration, members of the family combine and share their incomes (Ghatak et al., 1996). Such pooling is regarded as a form of insurance against uncertain income flows from specific markets to smooth that family consumption growth path (Stark, 1993; Ghatak et al., 1996). An optimizing risk-averse small farmer family confronted with a subjectively risk-increasing situation manages to control the risk through diversification of its income portfolio via placing its best-suited member in the urban sector, which is independent of the agricultural production (Stark, 1993).

Figure 3.1 illustrates the NELM model. $OABC$ is the family decision given the probability of employment. The line AB is the migration rate and the employment probability (M, P) relationship while OA and BC are the corner solutions, $M = 0$ and $M = 1$. The curve DE is the (P, M) relationship in the model, the probability of obtaining employment in the model. The main point here is that the risk averse family arrives at an equilibrium migration rate $M = M^*$ and probability of employment $P = P^*$. In Todaro model, with risk-neutral individuals $P = P^{HT}$ is the equilibrium probability of urban employment resulting in a higher migration rate $M = M^{HT}$. Xu (1992) cited in Ghatak et al. (1996) mentioned that risk may lead to an insufficient migration. In Xu's model of household migration, the relatively rich rural households tend to move to the cities whilst the relatively poor rural households migrate to more affluent rural locations (rural-rural migration), despite the presence of higher wage rates in the cities. It may also be optimal for a potential migrant to suspend the actual move whilst it is associated with large risks (Pindyck, 1991). The returns to migration at the critical point (where the present value of moving equals zero) characterize the 'Marshallian trigger' beyond which migration occurs. Greater uncertainty makes waiting for more favourable circumstances an increasingly attractive option (Ghatak et al., 1996). The NELM model is formulated as in the following figure.

Figure 3.1: Migration as a family decision



Source: Ghatak et al. (1996)

In an agricultural household model, the opportunity cost of migration is the loss of net income from production resulting from the allocation of a marginal unit of family time to migration (Taylor and Martin, 2001). Here, migrant selectivity matters to household welfare: the human capital embodied in migrants is likely to complement other family resources in production. Assuming decreasing returns to labour in farm production, the opportunity cost of migration increases with the amount of family time allocated to migration. Household migration models that do not explicitly address risk are treated as expected income-maximization models (Taylor, 1987). A model of household expected income-maximization subject to both labour and liquidity constraints is implied by Taylor and Wyatt's (1996) studies of marginal income and distributional effects of migration and remittances in rural Mexico.

In practice, the association of NELM effects with household models of migration is motivated by the observation that families in developing countries' rural areas typically engage in migration by sending one or more members out as migrants (frequently, sons and daughters of the household head), who then share part of their earnings with the rural household, through remittances. While some family members migrate, others stay on the farm. This observation raises the question of why migrants remit. Classical or neo-classical models of migration behaviour do not explain the remitting

of a share of migrants earnings back to the rural place of origin. However, remittances are cornerstone of the NELM, representing one of the most important mechanisms through which determinants and consequences of migration are linked.

The interesting implication, which can be underlined from the NELM, is that rural–urban migration can be seen not as a response to risk-taking or risk-loving properties of individuals but as a manifestation of their risk avoidance (Stark, 1993). Besides, the flow of information has been considered important for migration in such a way that family and friends who have previously migrated provide important information about their destination to subsequent migrants and help the new migrant by providing food and lodging until he/she finds a job, and make the social transition easy (Ghatak et al., 1996; Gallup, 1997). So, if migrants are more likely to migrate to places where they have more contacts, former migration will encourage successive migration. Because of personal contacts, there are 'increasing returns to scale' in migrating to a particular destination.

3.3 Macro and Micro Approaches to the Analysis of Migration Determinants

Each migration theory summarized above implies a distinctive objective function underlying migration decisions, a different set of potential variables shaping these decisions, and a separate set of possible outcomes of migration for the rural economy. The basic difference concerns the unit of analysis. The Lewis model, the classical two sector and the Todaro[8] models treat migration as the result of an individual decision making process and that of NELM considers migration as household decision. The objective function varies, but in all cases the individual or the household (for the NELM) is both decision maker and actor. On a micro-level, this sort of migration research treats migration as a discrete choice. On a macro-level analysis, the decisions of individuals are summed up into migration flows across space.

The availability of different sorts of data from different sources emphasizes in a practical way the distinction between micro and macro levels of investigation. It is, however, evident that neither level provides a complete picture of the migration process (Stillwell and Congdon, 1991). Micro-level models do not provide a comprehensive management of origin or destination area influences on

[8] For the Todaro model, the initial focus was on aggregate flows-mainly the rural-to-urban type and hence on the behavior of large segments of the population.

migration, while macro-level models can only allow relatively crudely for the influence of life-cycle characteristics or individual job skills. In this sense, all migration models are partial models (Ghatak, et al., 1996). The nature of the migration model depends on the context of its application and one always needs to answer the question which theory of migration behaviour should be used to strengthen the model and which statistical or modelling technique should be used to calibrate the model. Stillwell and Congdon (1991) further pointed out that there is no exclusive way to model a particular set of data of a given degree of complexity. There is no necessarily correct or incorrect method of modelling migration. Migration modelling goes much beyond the issues that relate to the way in which the whole process of migration is conceived. They further exemplified this by contrasting approaches of 'nested choice' and 'simultaneous choice models'. The nested choice approach assumes that the migrant's choice of destination follows the decision of whether or not to migrate at all, whereas the simultaneous choice approach assumes that both movers and stayers are involved in evaluating potential destinations with a view to possible migration.

The Macro Approach

The macro approach to migration models relates to aggregate moves and is more appropriate for setting migration in its labour market context in order to deal with questions such as whether people migrate into sub-national areas where new jobs are available or whether jobs result after an initial influx of population. Macro approaches are concerned with investigating the relationships between migration and objectively determined macro variables such as changing job provision, unemployment rates, wage rates or environmental conditions (Stillwell and Congdon, 1991). Classical models of migration which postulate a negative feedback role for migration have been challenged by arguments that both gross out-migration and in-migration flows are higher for growth regions.

The Micro Approach

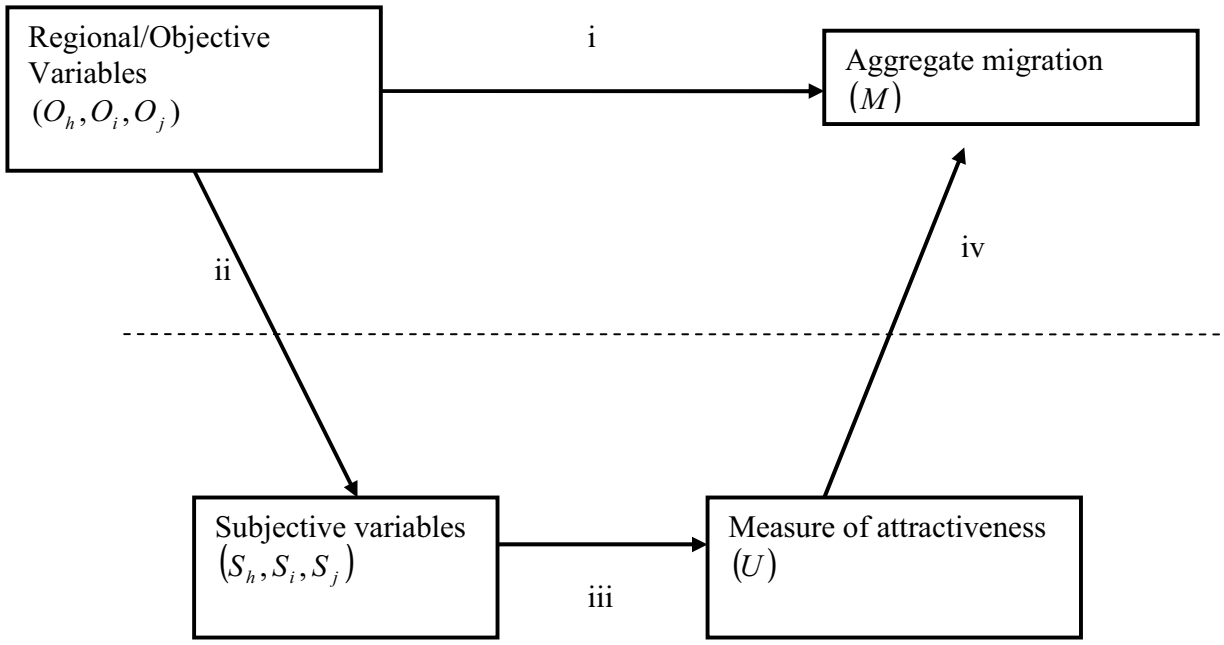
The micro theory essentially relates to the processes underlying the 'decision' by a potential migrant to remain in a current residence or to migrate to another one. A central theoretical issue underpinning much analysis of migration behaviour has been the distinction between the individual's decision to move and the nature and direction of the move itself, once the decision to migrate has been made. The factors bearing on these decisions include both the characteristics of individual persons such as

age, marital status, household status and the wider characteristics of areas and markets such as regional relatives of wages and house prices.

Macro and Micro Approaches Integrated

Woods (1982) cited in Cadwallader (1992) mentioned that many development theories suggested a synthesis of macro and micro approaches would most likely provide a unified, yet flexible, theoretical framework for investigating migration behaviour. Cadwallader (1992) formulated a conceptual framework that provides an example of how macro and micro-level work on migration might be most usefully integrated. The framework contains four major sets of relationships (Figure 3.2).

Figure 3.2: A conceptual framework for linking macro- and micro-level approaches to migration



Source: Cadwallader (1992)

First, there is a link between aggregate migration (M) and the set of regional or objective variables, (O_h, O_i, O_j) which represents the traditional macro or aggregated approach to modelling migration patterns. The exploration of this relationship has involved the estimation of single-equation regression models, whereby a set of regional characteristics, such as wage rates and unemployment levels are used to predict migration rates for various kinds of spatial units, such as states or districts.[9] Distance has tended to play a prominent role in such models. According to Cadwallader (1992), one of the most enduring single-equation regression models is the gravity model. Secondly, the regional (objective) variables are transformed, through the individual cognitions of potential migrants into their subjective counter parts. Thirdly, the subjective variables are combined to form an overall measure of attractiveness that allows potential migrants to choose between alternative destinations. Fourth, subject to certain constraints, the individual utility functions are translated into overt behaviour. Note that the links below the broken line represent the behavioural perspective, which attempts to shed light on the factors that intervene between the objective variables and migration behaviour (Figure 3.2). The top part of the diagram would represent a behaviourist view, in which a set of physical stimuli impinge on the individual to produce an overt response, thus generating a physical law that relates the observable response to the observable stimuli. A more cognitive conception is contained within the lower part of the individual where unobservable within the organism become a legitimate part of the conceptualization.

3.4 The Migration Flows Modelling

Different ways to classify the determinants of migration are observed from different schools of thought. As discussed earlier, the *neo-classical theory* of factor mobility suggests that labour moves in response to inter-regional wage differential meaning that people migrate from low-wage areas to high-wage areas (Clark and Gertler, 1983). *Behaviouralists*, however, reject the economic motives of migration. Attendant to the assumptions of profit maximization and perfect information, they suggest that more realistic model of human beings would combine the principles of satisfying behaviour and bounded rationality that migration decisions are often made in a context of incomplete knowledge and uncertainty (Cadwallader, 1992). On the other hand, the *Institutional* perspective emphasizes the

[9] This resembles the study relationship we have on chapter 5, which deals with the migration rate determinants for districts in the VB of Ghana.

effects of institutions such as governments, mortgage lending companies and real estate agents on patterns of inter-regional migration while the *Marxist* theorists are in favour of the combination between the economic circumstances and the behavioural responses (Cadwallader, 1992). Hence, there is diversity of observations, which justifies the position of theoretical pluralism on the determinants of migration. The complementarities of these different approaches show that these approaches can be informed by each other. Thus the theories have an inspired tension between each other while at the same time there is also area of overlap between them.

Human migration is the outcome of the desire to maximize utility subject to the specific constraints of income and prices for each possible destination. Kau and Sirmans (1977) assume that the information available to each type of migrant is different and each migrant forms his own subjective prediction regarding the costs and benefits of migrating from place to place. This explains why migration is not uniform in direction or magnitude. Individuals are more likely to migrate, the greater the net benefits which are accrued from such a movement. Net benefit from migration is a function of economic and non-economic factors and the influence of these factors.

In this sub-section, we construct a decision-theoretic framework for studying migration that focuses on the spatial flows of migration, the gravity model, the theoretical relationship between in- and out-migration flows and the impacts of such migration on the rural economy.

3.4.1 Economic Derivation of the Gravity Model

Gravity theory has primarily been centered in the fields where distance lays a significant role. Gravity theory has proven to be useful in describing social phenomena in space such as population migration, flow of goods, money, information, traffic movement and tourist travel.

Most micro models of migration described in section 3.2 above (for example, Harris-Todaro model and human capital models) relate to the behaviour of individuals or households. These micro-level models have their own theoretical and computational problems because it is difficult to obtain information of potential migrants' underlying search strategy - all that is generally observed is the final outcome (Molho, 1986). The analysis of tractable aspect of migration (the decision of whether to migrate or not) does not provide a complete picture of migration. Thus a possible solution to these

problems is aggregation. Gravity models have their role in order to facilitate a wide-ranging analysis of migration behaviour and to analyze aggregate data.

Economic theory suggests that individuals behave in ways that maximize their well-being. Potential migrants compare all feasible alternatives and choose a place which provides the best opportunities (Karemera et al., 2000). Thus we develop a gravity model of spatial interaction within the framework of utility theory.

Following Niedercorn and Bechdolt (1969), the derivation is presented in terms of number of trips made by persons from a single origin to many destinations. It is assumed that a defined region is composed of $n+1$ areas. The task is to study the trip making behaviour of an individual, h at origin area i $(i=0)$ with each destination area j $(j=1,2,...n)$. Then, an individual's total net utility of trip making from origin area i to destination area j provides a first approximation of the individual's utility of interaction with all destinations is as follows:

$$U_i^h = \sum_{j=1}^{n} f\left(M_{ij}^h\right) \tag{3.1}$$

Where: U_i^h = Utility of individual h at origin i of interacting with persons at all destinations per unit time; and

M_{ij}^h = Number of trips undertaken by individual h from origin area i to all destinations, j per unit time.

However, there is usually more than one individual at each destination with which the individual at origin i would like to interact. Assuming that an individual can make only one interaction per trip, and assuming that the number of such persons is roughly proportional to its population (P_j), an individual's utility function of interaction with persons at all destinations is given by:

$$U_i^h = \alpha \sum_{j=1}^{n} P_j f\left(M_{ij}^h\right) \tag{3.2}$$

Where: P_j is population at destination j.

Yet, the number of trips taken by an individual is constrained by the total amount of money that he is willing to spend on travel out of a limited income. The money constraint requires simply that the transportation cost to all destinations must be equal to or less than the total amount budgeted for travel:

$$Y_i^h \geq r\sum_{j=1}^{n} d_{ij} M_{ij}^h \tag{3.3}$$

Where: Y_i^h is the total amount of money individual h at origin i is willing to spend on travel, per unit of time

r = Cost per mile of distance travelled, and

d_{ij} = Distance between origin i and destination j

The total utility of individual h for interaction with persons at all destinations (U_i^{h*}) when constrained by money is obtained by maximizing:

$$U_i^{h*} = \alpha\sum_{j=1}^{n} P_j f\left(M_{ij}^h\right) - \lambda\left(r\sum_{j=1}^{n} d_{ij} M_{ij}^h - Y_i^h\right) \tag{3.4}$$

Where: λ = LaGrange multiplier with respect to the number of trips to each destination per unit time. The first order conditions for maximizing Equation 3.4 are:

$$\frac{\partial U_i^{h*}}{\partial M_{i1}^h} = \alpha P_1 \frac{\partial f\left(M_{i1}^h\right)}{\partial M_{i1}^h} - \lambda r d_{i1} = 0$$

$$\vdots \qquad \vdots \qquad \vdots \tag{3.5}$$

$$\frac{\partial U_i^{h*}}{\partial M_{in}^h} = \alpha P_n \frac{\partial f\left(M_{in}^h\right)}{\partial M_{in}^h} - \lambda r d_{in} = 0$$

$$\frac{\partial U_i^h}{\partial \lambda} = r\sum_{j=1}^{n} d_{ij} M_{ij}^h - Y_i^h = 0$$

Eliminating λr from the first n partial derivative in Equation 3.5 yields the following $n-1$ equations plus the partial derivative with respect to λ.

$$P_2 \frac{\partial f\left(M_{i2}^h\right)}{\partial M_{i2}^h} - \frac{d_{i2}}{d_{i1}} P_1 \frac{\partial f\left(M_{i1}^h\right)}{\partial M_{i1}^h} = 0$$

$$\vdots \qquad\qquad \vdots \qquad\qquad \vdots \qquad\qquad (3.6)$$

$$P_n \frac{\partial f\left(M_{in}^h\right)}{\partial M_{in}^h} - \frac{d_{in}}{d_{i1}} P_1 \frac{\partial f\left(M_{i1}^h\right)}{\partial M_{i1}^h} = 0$$

$$r\sum_{j=1}^{n} d_{ij} M_{ij}^h - Y_i^h = 0$$

The utility maximizing values of M_{ij}^h for all j can be found by solving Equations 3.6 simultaneously. However, an explicit solution can be found only after the utility of migration function, $f\left(M_{ij}^h\right)$ is specified. Here, we use the logarithmic function of migrating to derive a solution to Equation 3.6.

Let $f\left(M_{ij}^h\right) = \ln M_{ij}^h$ (3.7)

Then by substituting $\partial f\left(M_{ij}^h\right) \big/ \ln M_{ij}^h = 1 \big/ M_{ij}^h$ into Equations 3.6, we derive the following equation for the migration function:

$$M_{ij}^{h} = \left(\frac{Y_i^h}{r}\right)\left(\frac{P_j}{\sum_{j=1}^{n} P_j}\right)\left(\frac{1}{d_{ij}}\right) \tag{3.8}$$

The migration undertaken by all individuals from origin i to a particular destination j is obtained by summing the trips from origin i to destination j taken by the m individuals at origin i to obtain:

$$M_{ij} = \sum_{h=1}^{m} M_{ij}^{h}$$

$$= \left(\frac{1}{r}\right)\left(\frac{1}{d_{ij}}\right)\left(\frac{P_j}{\sum_{j=1}^{n} P_j}\right)\left(\sum_{h=1}^{m} Y_i^h\right) \tag{3.9}$$

$$= \left(\frac{Y_i}{r}\right)\left(\frac{P_j}{\sum_{j=1}^{n} P_j}\right)\left(\frac{1}{d_{ij}}\right)$$

Where: M_{ij} is the total number of trips taken by all individuals from origin i to destination j, per unit time, and Y_i is the total amount of money that all individuals at origin i are willing to spend for travel to all destinations, per unit time.

3.4.2 Theoretical Relationships between In- and Out-migration Flows

The purpose of this section is to analyze the theoretical relationships between in- and out-migration flows. We are doing this because, for modelling the inter-district migratory flows behaviour presented in chapter 7, we use the '*gross'* flow rather than the '*net'* flow approach.[10] Thus as a theoretical background of the '*gross'* flow approach, here we model in- and out-migration flows in a

[10] For modeling the inter-district migratory flows, we applied the *gross* flow approach rather the net flow approach. Details on the justification are given in chapter 7, section 7.4.1.

dynamic context and their relationship is elaborated. In this section it is shown theoretically, how in- and out-migrations flows in an area are correlated.

The existence of cross flows tends to render net migration data less meaningful than gross migration data (Kau and Sirmans, 1977). Hence, the *gross* (in- and out-migration) rather than the *net* migration is more appropriate dependent variable for modelling migration on aggregate data. After all, there is no such thing as a "net migrant" (Tabuchi, 1985). Bartel (1979) describes that the propensity to out-migrate is negatively related to the length of residence. This follows that the out-migration rate is a function of one's history; thus, more recent in-migrants are more likely to move out compared to past in-migrants who have stayed longer. For purposes of this theoretical modelling, we assume that only migration is responsible for population change which means we assume birth and death rates are the same in the region under consideration. This can then mathematically be put as follows (Tabuchi, 1985):

$$P(t) = P(0) + \sum_{\tau=0}^{t-1} \left[IM(\tau) - OM(\tau) \right] \tag{3.10}$$

Where: $P(t)$ is the population at time t; $IM(\tau)$ is the in-migration during the period τ and $OM(\tau)$ is the out-migration during the period τ. This equation means that current regional population is a function of the history of in-and out-migration to and from the region. Let us now consider a place populated with cohorts of in-migrants who arrived at time $t-k$ and then each cohort has a different propensity to out-migrate, that is

$$P(t) = \sum_{k=1}^{\infty} \alpha_k IM(t-k) \tag{3.11}$$

Where: k is the length of residence in years.

If we let α_k to be the ratio of in-migrants who still stay to the total number of in-migrants in a specific period of time (the survival rate) and q_k be the propensity to out-migrate, such that $q_k \geq q_{k+1}$, then,

$$OM(t) = \sum_{k=0}^{\infty} q_k \alpha_k IM(t-k) \tag{3.12}$$

α_0 is unity by definition. Since the survival rate α_k is determined by the previous rate, α_{k-1} times the probability of staying, then

$$\alpha_k = (1-q_{k-1})q_{k-1} = \prod_{m=0}^{k-1}(1-q_m) \tag{3.13}$$

Substituting Equation 3.13 into 3.12, the relationship between in- and out-migration for the propensities to move out can be put as follows:

$$OM(t) = \sum_{k=0}^{\infty} q_k \left[\prod_{m=0}^{k-i}(1-q_m)\right] IM(t-k) = \sum_{k=0}^{\infty} q_k \left[\prod_{m=0}^{k-1}(1-q_m)\right] B^k IM(t) \tag{3.14}$$

Where B is called the backward operator such that $B^k IM(t) = IM(t-k)$.

To understand the relationship between $OM(t)$ and $IM(t)$, one has to specify the functional form of q_k as $q_k = cq^k$, where c is the out-migration rate for current in-migrants. In other words, c is the propensity to migrate again within a year.

We finalize by assuming that q is very small such that q_o is larger than q_k, for $k > 0$. If q is small, the rate of decrease of out-migration propensity, $1-q$, is high, then q_k should decline quickly. This implies that most of the out-migrants from a region should consist of recent in-migrants $IM(t)$ to the region. In this case people who come to the region would come out of the region immediately, if at all. One interpretation is that vacancies created by the current out-migrants are immediately filled by the current in-migrants. In this case, the relationship between in- and out-migration is given by:

$$OM(t) = \lim_{q\to 0} \sum_{k=0}^{\infty} cq^k \left[\prod_{m=0}^{k-1}(1-cq^m)\right] B^k IM(t) \tag{3.15}$$

The above equation explains the reason for the cases where there is a positive correlation between in-migration and out-migration.[11]

[11] As we shall see in chapter 4, the migration flows preliminary result indicates that there is a positive correlation between in- and out-migration flows, which is supported by the theory in section 3.4.2.

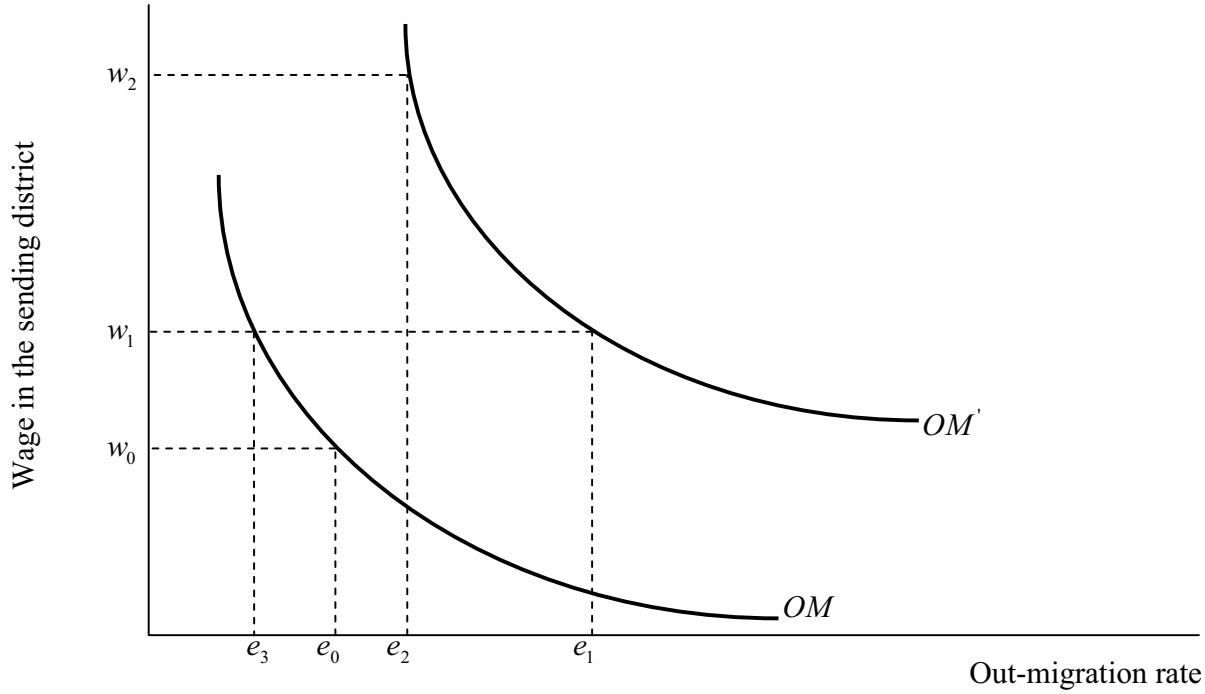
3.4.3 Migration Responses to Regional Wage Differences

Regional migration studies are concerned with investigating the relationship between migrations and objectively determined regional-level variables such as unemployment rates, wage rates, price levels and environmental conditions. Regional-level migration studies can be expediently grouped into two categories, those dealing with *gross* migration and those dealing with *net* migration. Distinguished from net migration, gross migration consists of a single flow (for example, migration from origin area i to destination area j), while the net migration is the difference between two gross flows. Empirically based studies that have examined place-to-place migration within this framework have almost universally adopted for estimation purposes a modified gravity-type model of gross migration (Tabuchi, 1985; Greenwood, 1975; Brown, 1997; Fields, 1979). The models are of gravity type in that migration is hypothesized to be directly related to the size of the relevant origin and destination populations, and inversely related to distance. These models are modified in that the variables of the basic gravity model are given behavioural content, and additional variables that are expected to importantly influence the decision to migrate are included in the estimated relationships. We examine the link between a region's wage level and out-migration rate of the region, a framework developed by Hatton and Williamson (1994). Originally developed for observing the stylized emigration responses to real wages in European countries, in this context it is modified to fit our inter-district migration flows. As shown in Figure 3.3, in low-income districts, we observe low out-migration rates (e_o) and low wages (w_o). Improved development of the district and other events then serve to raise the out-migration function to OM' and real wages to w_1. The former dominates in this example since out-migration rates have raised to e_1; in the absence of the shift in OM, out-migration rates would have fallen to e_3. According to Hatton and Williamson (1994), in later stages of development, OM is taken to be stable so further improvements in real wages at home, to w_2, cut back out-migration rates to e_2. The question here is then, what might account for the rightward shifts in OM during early development of the district and for its stability thereafter?

The primary reason for this shift is the cost of migration. The costs may be unaffordable for most workers, despite the strong incentive to escape underdeveloped areas (districts). After all, the potential migrant cannot get loans for the move, and his/her income is too close to subsistence to

accumulate the necessary savings. Thus enormous wage gaps between a relatively modern and high-income district and an underdeveloped low-income district can be consistent with low out-migration rates. As development in the home district proceeds, real wages rise and the supply constraint on out-migration is gradually released: more and more potential out-migrants can now finance the move, and, in contrast with conventional neo-classical theory, the home wage and out-migration are positively correlated. As development continues, the accumulation of potential migrants is slowly exhausted as more and more workers find it possible to finance the move. When the migration cost constraint is no longer binding, further increases in the real wage cause the out-migration rate to decline from the peak.

Figure 3.3: Out-migration responses to wages in the sending district



Source: Hatton and Williamson (1994)

Thus according to this view, out-migration histories should pass through two regimes, the first out-migrant-supply-constrained, and the second out-migrant-demand-constrained. The out-migrant-supply-constrained regime is consistent with downward–sloping *OM* function in Figure 3.3 by appealing to rightward shifts in that function induced by "chain migration". The idea is that rightward shifts in the *OM* function are driven by the remittances of previous (now prosperous) out-migrants who finance the moves of impoverished latecomers. As the supply of out-migrants increases so too

do their remittances, as shown by an increase in home wages. This rising influence continues as long as potential out-migrants find their move financially constrained, but the constraint diminishes as the real wage increases at home. At some point, the constraint is no longer binding, and further increases in the home wage reduce the out-migration rate as the economy moves up to a more stable *OM* function, which causes out-migration to enter regime two. While this explanation of regime switch is plausible, we should remember that it takes no account of changing employment conditions outside the area of origin. The framework explains that the underdeveloped area has to catch up with the more developed area, at some point after the regime switch, if the out-migration rate is to decline from its peak.

3.5 Summary

This chapter discussed the influential theories of migration starting from the very early models of Ravenstein (1885, 1889), Stoufer (1940), Lee (1966) and Lowry (1966). It also captured the Lewis dual sector model, the Fei and Ranis models followed by the expected income models of Harris and Todaro (1970). The chapter considered the human capital model and the NELM models as well. The theoretical relationship between in-migration and out-migration flows was also developed in a dynamic context. A gravity model of migration was developed and adjusted within the framework of utility theory.

It is shown that the gravity law of spatial interaction can be logically derived from the economic principle of utility maximization. The number of trips taken from a given origin to a particular destination per unit time is the sum of the number of trips per unit time that maximizes the utilities of spatial interaction of the individuals of the origin subject to some relevant constraints.

Generally, the movement of labour out of agriculture is both a classic feature of agricultural transformations and a requirement for efficient and balanced economic growth. However, as we have seen above, one of the motivations for migration research of Todaro (1969) has been to identify appropriate policy measures to reduce the rate of rural out-migration. His argument is that some market distortions exist and that these distortions result in too much rural out-migration as well as in various migration-induced externalities at migrant origins and destinations.

Social burdens or benefits of migration can arise from pecuniary externalities and from the impacts of migration on prices and through them on the derived demand for labour at migrant origins and destinations (Greenwood, 1975). However, there is little or no economic rationale for policies to reduce migration in a neo-classical world of complete and well-functioning markets (Taylor and Martin, 2001). Thus Todaro's policy prescriptions all focus on interventions in labour markets; that is combining urban wage subsidies with physical restrictions on migration is necessary to achieve economy wide production efficiency.

With the coming of NELM the focus of migration policy shifted from interventions in labour markets to interventions in other markets, especially those for capital, risk and information. In this model, market imperfections are the distortions that stimulate migration at levels that would not be optimal in a strictly neo-classical world. There is no reason to assume that disequilibrium in the labour market, reflected in migration, should be addressed by policy interventions in that market.

CHAPTER 4 THE STUDY AREA, THE CENSUS AND SURVEY DATA

4.1 Introduction

In this chapter, an overview of the environmental and socio-economic conditions of the VB of Ghana is presented. The study uses two separate data sets, namely, the Ghana 2000 census data and the household survey data collected by GLOWA-Volta research team. In this chapter, an explanation on the approaches of the data collection procedures and basic description of each data set is provided. Since the data description in this chapter is not exhaustive, additional descriptions of the data are given in each chapter whenever it is necessary. This chapter will help readers to comprehend the range of the data types and collection approaches and to get better insight into the study area, the VB of Ghana.

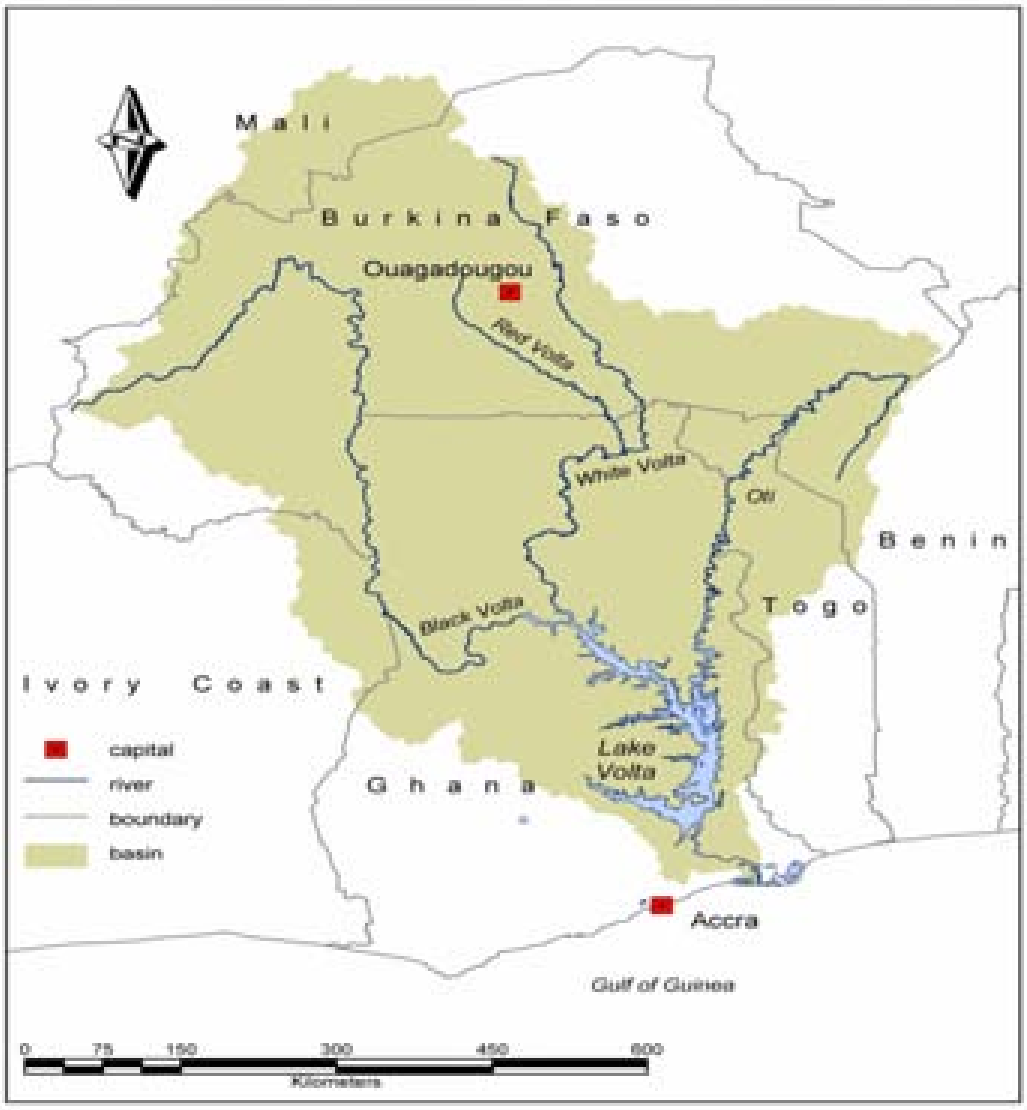
The rest of the chapter is organized as follows. In the next section, an overview of the Ghanaian part of the VB with respect to its environmental and socio-economic conditions is presented. The third section deals with description of the data sets including the set-up of the questionnaire survey and area of the data collection. The chapter ends with summary and conclusions.

4.2 Environmental and Socio-economic Conditions of the Volta Basin of Ghana: Overview

4.2.1 The Environmental Conditions

Located in West Africa, the VB lies within latitudes $5^{\circ}30$ N and $14^{\circ}30$ N and longitudes $2^{\circ}00$ E and $5^{\circ}30$ W (Figure 4.1). The main water way is 1400 km long and it drains 400,000 km^2 of the semi-arid and sub–humid Savannah area (Andreini et al., 2000; Andah et al., 2003). The climate, as the rest of tropical West Africa, is dominated by the movement of the Inter Tropical Convergence Zone (ITCZ), where the hot, dry and dust Harmattan air mass from the Sahara in the North meets the cool, moist monsoon air from the South Atlantic (Andah et al., 2003). The ITCZ is characterized by vigorous frontal activity and its movement controls the amount and duration of rainfall.

Figure 4.1: The Volta Basin shared by Burkina Faso, Ghana, Côte d'Ivoire, Togo, Benin, and Mali



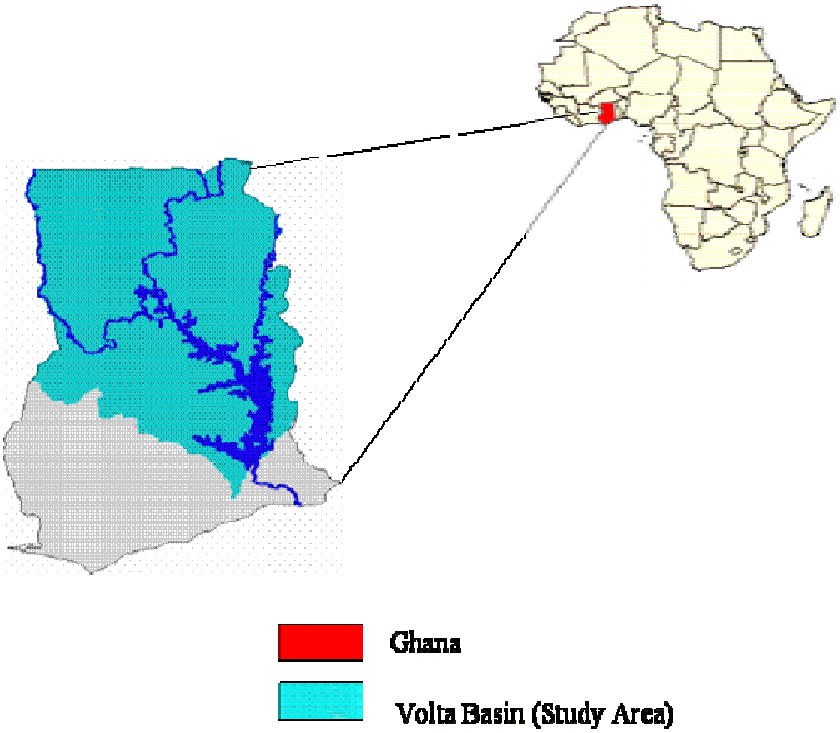
Source: GLOWA-Volta project (2001)

The VB, one of the poorest regions in Africa, occupies 28% of the west coast and it is shared by six riparian countries (Figure 4.1): Burkina Faso (42.07%), Ghana (40.21%), Togo (6.25%), Mali (4.57%), Benin (3.62%) and Côte d'Ivoire (3.24%) (Green Cross, 2001). The most upstream part of the VB is located in Mali, where it occupies less than 1% of the area of the country. A dominating

feature of the basin is that lake Volta is the world's largest artificial lake; the largest man-made in the world in terms of surface area (4% of total area of Ghana).

The basin is characterized by poor soil, generally of Voltaian sandstone. Annual rainfall averages between 1000 and 1140 millimetres. The most widespread vegetation type is Savannah, the woodlands of which, depending on local soil and climatic conditions, may contain such trees as Red Ironwood and Shea.

Figure 4.2: Map of the Volta Basin of Ghana (The Study Area)



The basin is of particular importance for Ghana, in which about 3/4th are drained by the Volta River and its main tributaries, namely, Black Volta, White Volta, Oti and Lower Volta (Andreini, et al., 2000). The VB of Ghana is under high demographic pressure, with a growth rate estimated at 2.9% per year (Green Cross, 2001) placing mounting pressure on land and water resources. Precipitation in the region is characterized by large variability, as expressed in periodic droughts. Unpredictable rainfall is a major factor in the economic feasibility of hydraulic development schemes, as witnessed by the power shortages which plagued Ghana in 1998. Recurrent drought in north severely affects

agricultural activities; deforestation; over grazing; soil erosion; poaching and habitat destruction threatens wild life populations; water pollution; inadequate supplies of potable water in the VB of Ghana (World Fact Book, 2003).

4.2.2 The Socio- economic Conditions

Despite the existence of some precious mineral resources, average annual income in the VB of Ghana is estimated at US $800 per year compared to the GDP-per capita of the country which is estimated at purchasing power parity - $2,200.00 (World Fact Book, 2003). Rain fed and irrigated agriculture is the backbone in the largely rural societies and the major source of income. Improved agricultural production in the West African Savannah depends on the development of surface water resources and their effective use.

In the VB of Ghana, the overall population with access to safe drinking water supply was estimated at 57% in a 1992 survey (Andah et al., 2003). However, the national access to safe water supplies was between 66% and 73% for the period between 1997 and 1999. Estimates of land use and land cover in 1989 showed that about 50% of the land in the North-east and northern parts of the basin were in the compound and bush fallow cultivation cycle (Andah et al., 2003). According to Food and Agricultural Organization (FAO) (2001), predominant land use of the White Volta is extensive land rotation cultivation with widespread grazing of large numbers of cattle and other livestock, while the major land use of the Black Volta is agriculture with extensive bush fallow cultivation under food crops. Grazing land in the VB is under annual bush burning and is known to be poor. In short, the main Volta land use is short bush fallow cultivation along the immediate banks of the river and less intensive bush fallow cultivation elsewhere. The major food crops include yam, cassava, maize, sorghum, millet, groundnut and beans. Animal numbers are large in the northern and middle parts of the basin and as a result, animal grazing is common while the lake shore is extensively settled by fishing families. Charcoal burning involving the cutting of wood is becoming an extensive economic activity in the southern dry forest.

Comparing the VB of Ghana with other riparian countries, the irrigation potential is the highest in the basin of Ghana with about 1.2 million hectares for potential irrigation (FAO, 1997). The total annual flow to the sea, 38 km^3, exceeds the total annual irrigation water requirements for the whole basin,

28.5 km³. Evaluating the water requirements in the different parts of the basin with water availability, the balance remains positive everywhere.

4.3 Census and Survey Data Description

This section is dedicated to describe the two main data sources for the study, namely: the Ghana 2000 census data and the data set of GLOWA-Volta.

4.3.1 Overview of Ghana 2000 Census Data

4.3.1.1 Population Distribution of Ghana

The last population census of the country taken in 2000 gave a total of 19.3 million people. The distribution of the population also showed that 30% of the population lived in urban areas of 5000 and above inhabitants. Migration, being both an additive and subtractive push in population dynamics, is mainly responsible for population redistribution in a nation. The spread of population in Ghana is known for its spatial imbalance showing pockets of over-concentration, while vast areas remain sparsely populated. The highest concentration of people is found in Accra (the national capital), Kumasi and Tema with $8300/km^2$, $4607/km^2$ and $1278/km^2$ population densities respectively (Computed from Ghana 2000 census data). Five main patterns of spatial population distribution have been observed (Kwankye, 1995; and Nabila, 1992). They are listed as follows:

(i) Concentration in the north-east and north-west corners of the country;

(ii) A sparsely populated middle belt covering greater parts of the northern region and parts of the Brong-Ahafo and upper regions;

(iii) Densely populated forest zone;

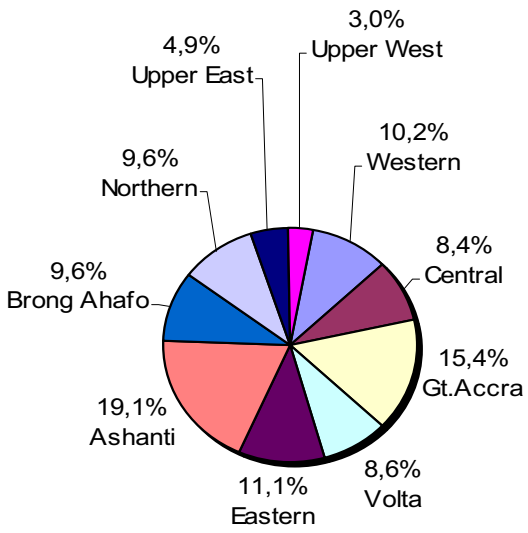
(iv) Moderate to densely populated coastal region;

(v) Densely populated urban centres scattered all over the country

The 2000 population figure for Ghana yields a density of 83.57 persons per sq. km. This may indicate no intense pressure of population on land and land resources. However, due to the existing traditional land ownership system in Ghana, migrants cannot own land; migrants may gain access to land for economic activities through tenure arrangements with land owners. Throughout the history of Ghana, land has been held in trust for the people by traditional heads and authorities.

The population distribution in Ghana is geographically uneven. As shown in Figure 4.3, the most populous region is Ashanti (19.1% of the country's population). Greater Accra, being the smallest region, accounts for 15.4% of the total population. Conversely, large areas of the country are sparsely populated. Northern region, for example, is the biggest region in Ghana; nevertheless, it has only 9.6% of the total population. Kwankye (1995) mentioned that over 96% of all settlements in Ghana have population less than 1000 persons. Since a threshold population is always required to justify the provision of certain development projects or infrastructure such as schools or hospitals, numerous small settlements remain without basic services.

Figure 4.3: Regional distribution of population in Ghana



Source: Computed from Ghana 2000 census data

The spatial distribution of the population has been influenced by a variety of factors like the availability and distribution of natural resources, incidence of diseases, and national development policies. A large part of the VB is sparsely populated because of the presence of tsetse flies, the relative infertility of the soil and above all the scarcity of water during the Harmattan season.

Low in density, especially in the central and north western areas of the VB of Ghana, the population in the basin is principally composed of farmers. However, archaeological findings reveal that the basin was once more heavily populated. Periodic burning evidently occurred over extensive areas for perhaps more than a millennium, exposing the soil to excessive drying and erosion, rendering the area less attractive to cultivators. Of crucial importance in the population distribution scenario has been the process of migration which is often a product of the above factors. Against this background, this chapter sheds some light on graphical representation of migratory flows using the census 2000 data.

4.3.1.2 Graphical Representation of Migratory Flows

An increasing body of empirical studies on migration decisions employs the 'movement from birth place' as the base of migration analysis (For example, Nabila, 1974; Kasanga and Avis, 1988; Kwankye, 1995). In this study, however, we employ the 'change of usual place of residence from one district to another' as the unit of migration analysis and a 5 years period (1995-2000) as the 'migration window'[12] to emphasize on the driving forces of the actual migration decisions.[13]

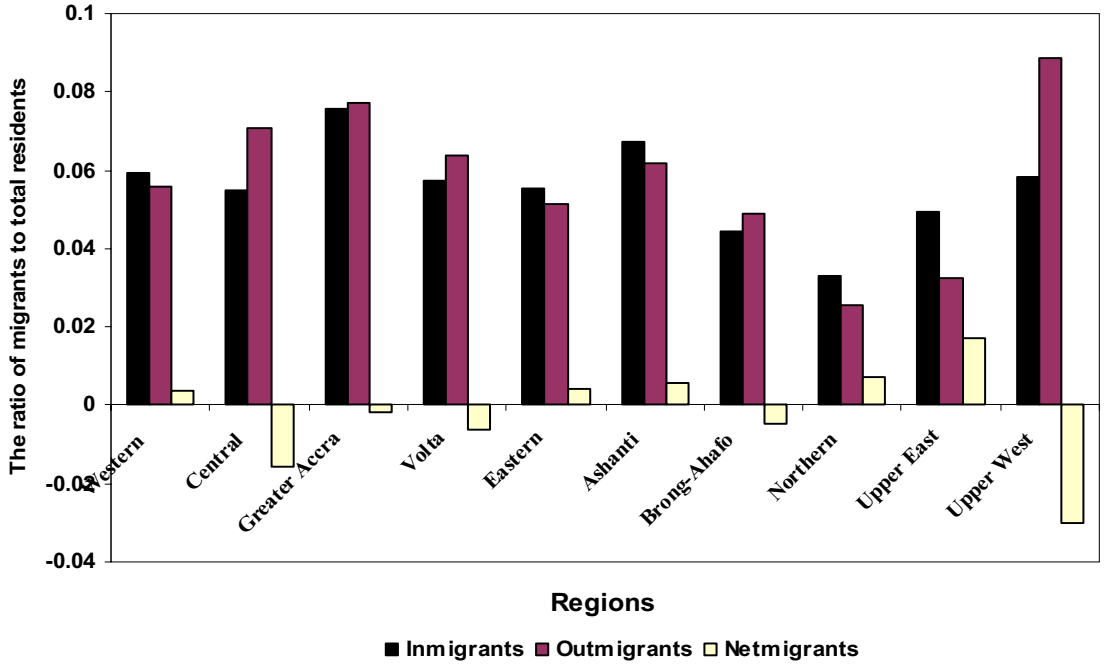
As a first step in the analysis, regional-level inflow, outflow and net flow records are analyzed. Greater Accra, Central and Ashanti regions have high records of people's movement (Figure 4.4). Relatively less mobility is shown in the Northern, Brong-Ahafo and Upper East regions, which are all in the northern part of Ghana (Figure 4.4). In Greater Accra, 7.5% and 7.7% of the total residents are in-migrants and out-migrants respectively; while for northern region the percentage of the in-migrants and out-migrants account for 3.2% and 2.5% respectively (Figure 4.4). The figure also shows that Upper West region has the largest outflow followed by central region. The big share of

[12]The 'migration window' means a specific time frame in which people are defined as the migrants, beyond which we don't consider them as migrants.

[13] As people may change their place many times before they finally reach the destination, taking "a movement from birth place" would not capture the actual reasons for migration. Besides, it is not appropriate for attaching specific place attributes and for employing econometric models as there is no specific 'migration window'.

outflow of people from the Upper West is evident. This may be because the Upper West has the highest poverty rate with 90% of the people living below the poverty line (World Bank, 2002). Thus partly, it might be that people from this region are moving out to escape poverty and improve their living standards. To have a closer look at the flows, the district-level migration flows are analyzed with the help of GIS maps, as shown below.

Figure 4.4: Comparison of the 'in', 'out' and 'net' migration flows in regions of Ghana



Source: Computed from Ghana 2000 census data

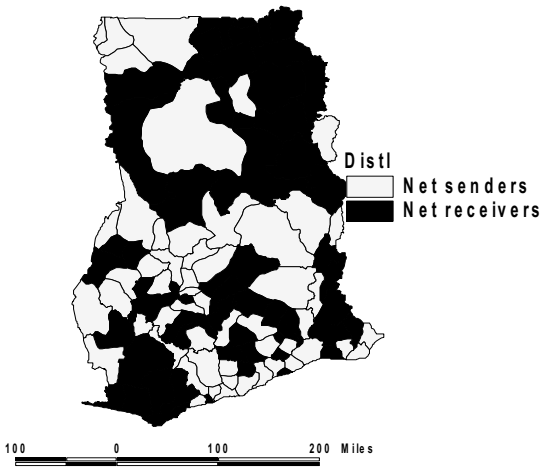
We further scale down the pictorial representation at district-level. The following pictorial representations will further help us get some overview on the spatial flows of migrants and to glimpse at the net-sending and net-receiving districts. The map was generated using the Arc View 3.2.

(1) Net migration Flows

Apart from the districts in northern region (West Gonja, Savelugu Nanton and Zabzugu Tatale) all districts in the Upper East and northern regions are net receivers (Figure 4.5). Districts in Upper West, except the capital Wa are net senders. It can be seen from Figure 4.5 that except Accra and

most of the districts in the Western region, the majority of districts in the southern part of Ghana are net senders. Most of the districts in the northern part of the country (excluding the Upper West region) are net receivers while net sending districts are located in the south of the country. This seems in contradiction to previous research results (For example, Caldwell, 1969; Nabila, 1974), which showed that most of Ghana's labour migration is from north to south of Ghana. However, the present results do not necessarily imply that the current movement of people is from south to north, because this study is based on "migrant to resident population ratio", while the previous studies (Caldwell, 1969; Nabila, 1974) are on absolute migrant basis. On the other hand, as demonstrated in Table 4.1, the intra-regional movement is by far bigger than the inter-regional movement which may imply that the present results are not necessarily a complete contradiction to previous research results of north-south flows.

Figure 4.5: Net migration rate of districts



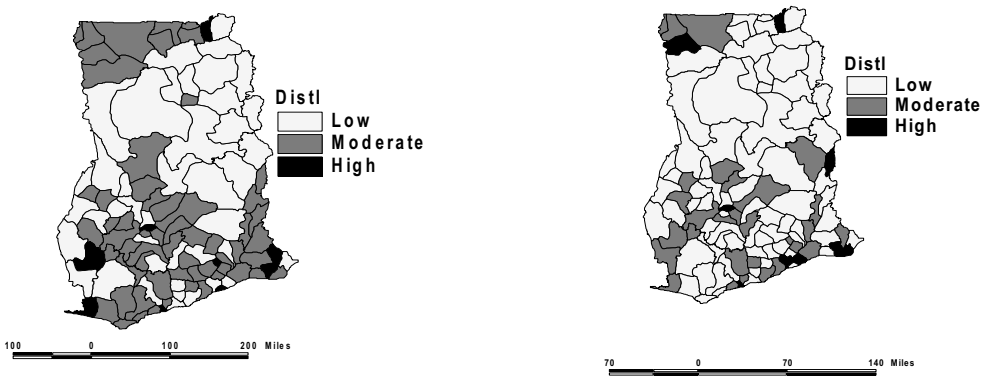
Source: Computed from Ghana 2000 census data

(2) In-migration Flows

Nationally, the percentage of migrants to total residents is 6.85%. The minimum being 2.8% in the northern region (district Sene), the maximum is 17.9% in Ashanti region (district Kwabre). Except that of Bawku West district in the Upper East region, all of the high receivers are found in the south of Ghana (Figure 4.6). The whole of the northern region (except Tamale) and parts of Volta and

Brong-Ahafo are among the low receivers. Amongst the very high receivers are the regional capitals, namely Accra metropolis (Greater Accra), Kumasi (Ashanti), and Koforidua (Eastern).

Figure 4.6: In-migration and Out-migration rate of districts



In-migration Out-migration

Source: Computed from Ghana 2000 census data

(3) Out-migration Flows

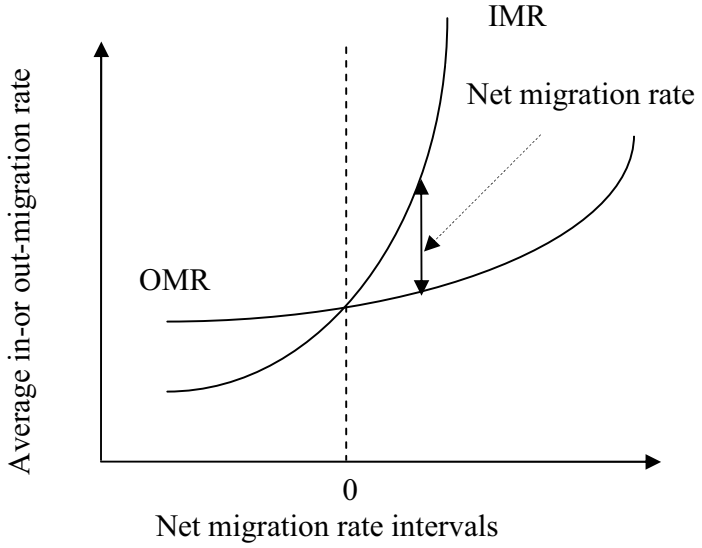
As shown in Figure 4.6, the out-migration is more prevalent especially in the Ga and Tema districts (Greater Accra region) and also in Kwabre (Ashanti region), Keta, Kadjebi and Sogakofe (Volta region) and Nadowli (Upper West region). All the districts in the Northern region and districts in the Upper East region (except Bawku West) have low rates of out-migration, while the moderate and high senders are mostly found in the south and Upper West region.

An important point to note from Figure 4.6 is the positive correlation of the places of In-migration and Out-migration. There is a considerably large over lap of the places of moderate/high in-migration rate (IMR) and moderate/high out-migration rate (OMR). Districts of net inflow are characterized not only by high rates of IMR but also by higher rates of OMR as shown in Figure 4.7, to the right of zero-line on the x-axis (Table A1, row 3 in Appendix A). On the other hand, districts of net outflow (most of the districts in the Northern region and Upper East region) have lower than average rates of both IMR and OMR as shown in Figure 4.7, to the left of zero-line on the- x-axis (or Table A1, row 4 in Appendix A). The correlation coefficient between gross in- and out- migration rates were found to

be as high as +0.55. This implies the need to distinguish between the driving forces of IMR and OMR separately.

It is normally expected that the relationship between IMR and OMR for an area to be negative; that is, places with the highest IMR to be shown as having the lowest OMR. However, many actual cases (Plane, 1981; Lowry, 1966; Codey-Hayes, 1975 cited in Plane and Rogerson, 1994; Ravenstein, 1880 cited in Gallup, 1997), including this study found a positive relationship between IMR and OMR. This relationship can be represented as in the following diagram.

Figure 4.7: The relationship between in-, out and net migration rates



Source: Plane and Rogerson (1994)

Plane and Rogerson (1994) discuss three primary explanations that have been advanced in the literature to explain the many situations where positive correlation has been found.

1. Labour market turnover[14]: As there are usually more total jobs "turning over" in relatively well off places; in such places people are more willing to change jobs and thus to consider migration. The job

[14] As we shall see in chapter 7, the migration of labour in the VB of Ghana is between successful districts. Thus, this labour market turn over applies to VB of Ghana, in which people move between places where there are more total jobs "turning over".

openings not only attract many in-migrants but also encourage people to move up into better positions - including positions out side the area.

2. Age composition: According to the human capital investment theory, the young are more likely to migrate. So places that have had high in-migration in recent times, therefore, have larger proportions of their total populations in the highly mobile early labour force ages, whereas places of net out-movement have typically had their stock of such persons drained. Districts of previous in-migration, thus, have populations in those age groups in which people are always more likely to consider out-migrating.

Table 4.1: Movements within and outside the home regions

Regions	Intra-regional migration (a)	Total inter-regional migration (b)	Average inter-regional migration (c= b/9)	The ratio of Intra to the average Inter-regional migration (d= a/c)
Western	29010	77979	8664	3.35
Central	29665	82723	9191	3.28
Greater Accra	94100	129925	14436	6.52
Volta	34385	69837	7760	4.43
Eastern	41405	66540	7393	5.60
Ashanti	123202	99640	11071	11.13
Brong-Ahafo	22573	63523	7058	3.20
Northern	20338	26073	2897	7.02
Upper East	8894	34035	3782	2.35
Upper West	7279	43830	4870	1.50
Total	410851	694105	77123	5.33

Source: Computed from Ghana 2000 census data

3. Migrant stock: Migration, once done, it is more likely that one considers doing it again. Thus places of net in-migration tend to have a disproportionate share of hyper-mobile, footloose people. These places may find it difficult to hold onto their population as conditions change.

Inter versus Intra-region Migratory Behaviour

Migration in Ghana is largely short distance; many people tend to move within their home region and a relatively smaller number move to places outside their region (Table 4.1). The number of individuals who moved within their home region is by far bigger than those who moved outside their region. On the average, the number of people who moved within a region is 5.3 times the number of people migrating outside their home region. This figure ranges from 1.5 fold (in Upper West) to about 11 fold (in the Ashanti region).

4.3.2 The Data Set of GLOWA-Volta

4.3.2.1 Sampling Frame and Survey Communities

Within the GLOWA-Volta project, a comprehensive multi-topic household survey was conducted in the Ghanaian part of the basin between May and September 2001. The survey aimed at building a common primary database within the project for different research teams including migration. The Common Sampling Frame (CSF) approach, where different units of observation are hierarchically linked, is employed for the selection of survey sites and data collection. The advantage of CSF[15] is that it can make use of a priori information for stratification and therefore tends to increase precision and reliability as compared to pure random sampling. This hierarchical sampling frame permits the extrapolation ("grossing-up") of sample measurements to the universe.

The sampling procedure benefited from the GLSS IV conducted in 1998/99. This survey used the list of 1984 population census Enumeration Areas (EAs) that considered population and household information as important factors in the selection criteria as their sampling frame. Their sampling design involved stratification according to the three ecological zones, namely, Savannah, forest and coastal zones. Further stratification was made in each zone to categorise it as either rural or urban,

[15] This CSF approach provided advantages for the interdisciplinary research teams by providing a maximum overlap of biophysical and socio-economic field observations.

based on the size of the locality. Then in each stratum, EAs were selected based on systematic sampling with probability proportional-to-size criterion. The number of EAs selected in each stratum is proportional to the size of that stratum. This first stage of sampling resulted in the selection of 300 EAs.

The 300 GLSS IV EAs were used as sampling units for the GLOWA-Volta survey. Of these 300 EAs that were drawn from the Ghana 2000 population census, 112 of them fall within the basin and 84 EAs were selected purposively from the 112 EAs as they captured the research interests of all sub-projects of the GLOWA-Volta project. After compiling a list of operational selection criteria that captured the research interests of all sub-projects involved, Principal Component Analysis (PCA) was used. Eight factors were identified as principal components that explain 70% of the variation in the data. Based on the results of the PCA, finally 10 clusters (or strata) were identified in a subsequent cluster analysis (Berger et al., 2002). The EAs closest to the cluster centroid were then selected as representative communities according to the proportional-to-size rule. To ensure an overlap with other GLOWA-Volta sub-projects researching at locations, which are not contained in the original GLSS sampling frame, additional sites were added to the sample (Berger et al., 2002).

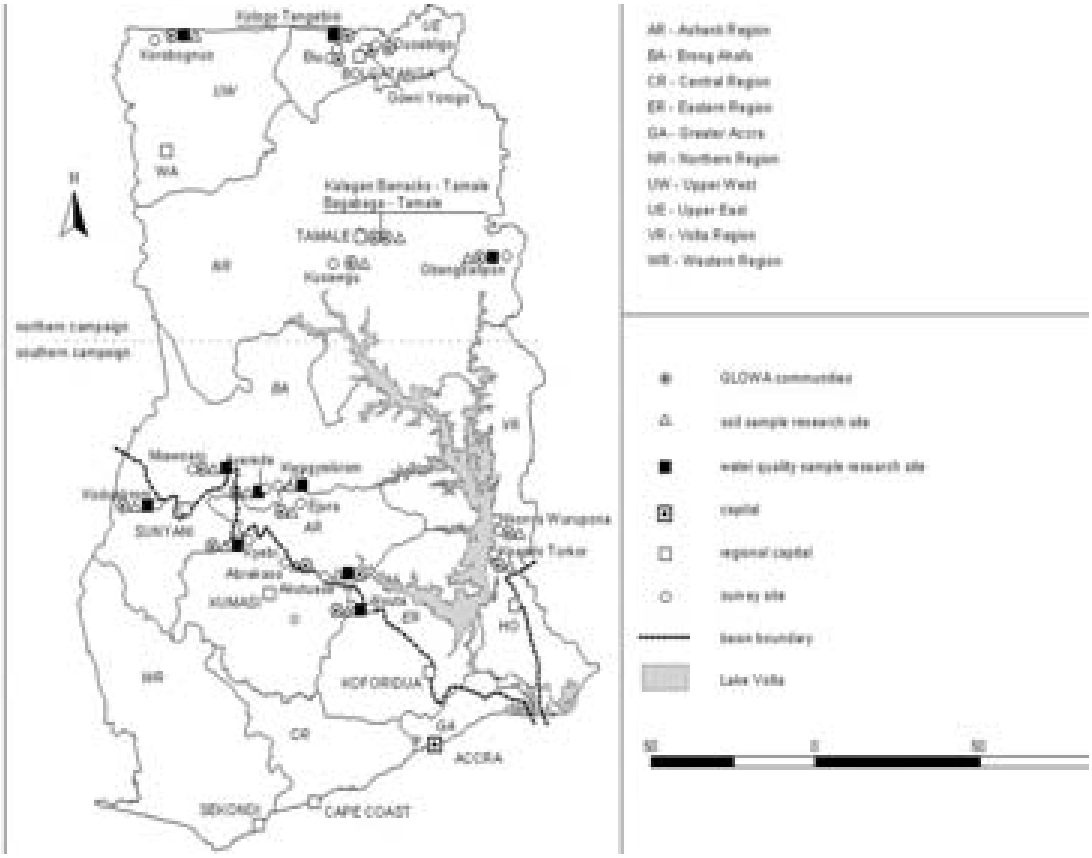
As a result of the sampling procedure a list of 20 rural communities was selected spanning 2 ecological zones. Two separate surveys were conducted in the 20 selected survey communities. The first was a socio-economic household survey, which gathered information on issues of interest to the interdisciplinary research team while the second was a household water quality survey in the 10 of the 20 selected communities. In each of the 20 survey communities, 23-27 households were randomly selected making a total of 501 households. Hundred ninety-six were located in the forest zone across 8 communities and 305 households in 12 communities in the Savannah zone. The reason behind selecting more households in the forest zone was due to the probability proportional-to-size principle inherent in the GLSS IV sampling frame used for the survey. The household survey covered 7 of the 10 administrative regions of Ghana (Table 4.2). On a district-level, 16 of the 110 districts were covered. The regions excluded were, namely Greater Accra, Central and Western regions.

Table 4.2: Survey communities in the Volta Basin of Ghana

Region	District	Agro-ecological zone	Community	Households
Upper East	Bolgatanga	Savannah	Dusabligo	27
	Bolgatanga	Savannah	Gowrie	27
	Kassena Nankani	Savannah	Kologo Tangabisi	27
	Kassena Nankani	Savannah	Biu	26
Upper West	Jirapa-Lambussie	Savannah	Korobognuo	27
Northern	Saboba-Chereponi	Savannah	Gbangbanpon	26
	Tamale	Savannah	Bagabaga	24
	Tamale	Savannah	Kaladan Barracks	24
	West Gonja	Savannah	Kusawgu	24
Volta	Jasikan	Forest	Nkonya Wurupong	24
	Kpando	Forest	Kpando Torkor	23
Brong-Ahafo	Nkoranza	Savannah	Ayerede	24
	Nkoranza	Savannah	Kwagyeikrom/Bredi	24
	Sunyani	Forest	Koduakrom	24
	Wenchi	Savannah	Miawoani	25
Ashanti	Afigya Sekyere	Forest	Abrakaso	26
	Asante Akim North	Forest	Akutuasi	25
	Ejura	Forest	Ejura	24
	Offinso	Forest	Kyebi	24
Eastern	Kwahu South	Forest	Nsuta	26

Source: GLOWA-Volta survey (2001)

Figure 4.8: Communities selected for the household survey in the Volta Basin of Ghana



Source: GLOWA-Volta field project (2001)

4.3.2.2 Descriptive Statistics of the Household Data Set

This section explains the sample households with the aim of emphasizing the general perspective of the econometric analysis in the subsequent chapters. In this study, *migration status* is defined as follows: the household is classified as migrant if at least one of its members has moved away from home; otherwise the household is a non-migrant. The descriptive statistics focus on sending out a migrant, which is the main point of concern for the econometric modelling of the household models in the empirical chapters 5 and 6. The descriptive statistics also draws attention to the household head and the spouse on their migration experience and other related aspects.

Characteristics of the surveyed households: A contrast between migrant and non–migrant households: As shown in Table 4.3, the average age of adults in a household is very similar between migrant and non-migrant households. Migrant households are relatively more female-headed than their non-migrant counter parts (Table 4.3). In addition, migrant households are more educated, with bigger household size and are relatively better off (with higher household income).

Table 4.3: Characteristics of migrant and non-migrant households

Characteristics	Migration Status	N	Mean	Std. Deviation
(Mean age of adults (>15) in the household	Migrant	221	35.43	8.08
	Non-migrant	280	35.08	8.51
Sex:1=female, 0= male)	Migrant	221	0.24	0.43
	Non-migrant	279	0.17	0.38
Household size	Migrant	221	10.31	4.74
	Non-migrant	279	8.82	4.17
Education (household head)	Migrant	220	3.23	2.54
	Non-migrant	275	2.59	2.33
Dependency ratio	Migrant	221	0.64	0.65
	Non-migrant	279	0.75	0.62
Household income (in thousands Cedis)[16]	Migrant	221	6,916	7,866
	Non-migrant	280	5,953	5,276

Source: Computed from GLOWA-Volta survey (2001)

The household income of those who have sent at least one member of their household for migration seems to be higher. Regarding household size, it is expected that a higher tendency for bigger households to have out migrants than the small ones. The evidence is that migrant households have, on average, bigger household size than non-migrant households. This would mean a higher tendency for bigger households to send members of their households for migration than smaller households.

[16] *Cedi* is the Ghanaian national currency and its official exchange rate is 1 Euro=9000cedis (March 2003)

Also with respect to education, it is more likely for relatively educated household head to send members out than their uneducated counter parts. The average dependency ratio of the migrant households is computed to be 64% and non-migrant households constitute 75% dependency ratio.

The statistical significance of the mean difference between migrant and non-migrant households was carried out and tested through 'Independent samples t-test'. The results are explained in the Table 4.4. From the table it is illustrated that except for the 'age', the mean difference of all others is found to be statistically significant.

Table 4.4: Statistical test for the difference in means of the migrant and non-migrant households

	t-test for equality of means					
	T-value	**Significance**	**Mean difference**	**Std error difference**	**95% Confidence interval of the difference**	
Adult's age	0.47	0.64	0.36	0.75	-1.12	1.83
Sex	1.76	0.08	0.06	0.04	-0.01	0.13
Household size	3.75	0.00	1.50	0.39	0.71	2.28
Household income (in thousands Cedis)	1.67	0.10	963	589	-194	2,119
Education of head	2.93	0.004	0.64	0.22	0.21	1.07

Source: Computed from GLOWA-Volta survey (2001)

Considering the division of households between literate and illiterate from the sample households, 48% of the heads of households have attended school (Table 4.5). This figure is slightly more for the migrant households (49%), while for the non-migrant households 43% of them attended school. Considering the group of people above 15 years old, households have on average 3 children under the age of 15 years. The 3 main ethnic groups represented by the sample households are mainly Akans (40%) followed by Dagbani (6.0%) and Ewe (5.8%).

Table 4.5: Age, education and ethnic group characteristics of households

Household group	Age		Education		Ethnic (in %)			
	<15	≥15	illiterate	literate	Akans	Dagbani	Ewe	Others
Total sample	3.10	5.49	51.72	48.28	40	6.0	5.8	48.2
Migrant households	3.06	6.25	50.23	49.77	46	6.0	6.0	48.0
Non-migrant households	3.14	4.88	46.74	43.26	35	5.0	0.4	59.6

Source: Computed from GLOWA-Volta survey (2001)

Participation in farm and non-farm activities: The farm and non-farm activities of the sample households were also considered. The migrant households on average possess bigger number of plots than the non-migrant households (Table 4.6). However, with less number of plots, the non-migrant households are observed to get better average farm revenue. This may be because of extra labour available with non-migrant households.

Table 4.6: Farm and non-farm activities

Household group	**Farm activity**			**Non-farm self - employment activity (in million Cedis)**
	Average number of plots	**Farm revenue (in million Cedis)**	**Fertilizer application (Kg/acre)**	
Total sample	2.42 (1.16)[#]	5.52	10.55 (28.32)	0.78 (2.27)
Migrant households	2.59 (1.25)	5.20	8.33 (23.92)	0.61 (1.97)
Non-migrant households	2.28 (1.06)	5.76	12.30 (31.30)	0.91 (2.47)

Source: Computed from GLOWA-Volta survey (2001)

[#] The numbers in parentheses are standard deviations

It can further be explained with the fertilizer application. Observations indicate that on average the non-migrant households apply 4 more kilograms (i.e. 12.3-8.3: Table 4.6 column 4, rows 4 and 5) of fertilizer per acre than migrant households. Regarding the non-farm self-employment, a higher income is observed with the non-migrant households indicative of the fact that the migrant households have less labour available for non-farm employment as they already sent at least one away for migration.

Reasons for out-migration: About 50% of the sample had job-related reasons for out-migrating and actually most of them were looking for work. Marriage and schooling are also other reasons for migration (Table 4.7).

Table 4.7: Reasons for out-migration

Reasons for out-migration	Number of households	Percent
Look for work	81	37
Start new job	51	23
Schooling	30	14
Marriage	43	19
Other	16	7

Source: Computed from GLOWA-Volta survey (2001)

The effects of the out-migration to the source household: Asked if the labour out-migration of a household member had affected them positively or negatively, about 60% reported that they had benefited from sending a migrant out (Table 4.8). The most influential benefit mentioned is remittance (Table 4.9). Some also reported that they expect higher return from the migrants after schooling and return migration. Only few reported better network to other places and more space on compound.

Table 4.8: Attitudinal response on the effect of migration on sending households

Effects	Number of households	Percent
Benefits	132	60
Problems	27	12
No change	57	26
Other	5	2
Total	221	100

Source: Computed from GLOWA-Volta survey (2001)

Conversely, 12% reported that the out-migration of their members had posed problems to their life. The most out-standing reason was a reduced labour effect on the farm, while some also mentioned the out-migration has reduced the labour availability on non-farm income like paid wage employment (Table 4.9).

Table 4.9: Kinds of benefits and problems of migration

Benefits and Problems	**Number of households**	**Percent**
Benefits		
Sending of remittances	81	59
Better network to other places	5	4
Expected future high income after schooling & return of migration	28	21
More space on the compound	7	6
Other	17	12
Total	138	100
Problems		
Less labour on the farm	13	52
Less household income from employment wage	3	12
Other	9	36
Total	25	100

Source: Computed from GLOWA-Volta survey (2001)

Migration experience of the household: To observe the migration history/experience of the household, a household head and the spouse were asked if they have ever been to another place for 6 or more months at one time. So a household is migration experienced if the household head or the spouse has ever lived in another place, such as another village, another town or abroad for 6 or more months at one time or another. Based on this definition, the respondent households are categorized as *never migrated* (no migration experience) and *migration experienced* households. For the households with migration experience, a distinction was further made between *return* and *in-migrants*. In-migrants are those who were born outside the current place of residence, while return migrants are those with the same place of current residence and place of birth. The frequency distribution of all is shown in the table below.

Table 4.10: Migration experience of households

Migration experience	**Household head**	**Spouse**
Never migrated	227 (45%)	226 (45%)
Migration experienced	260 (52%)	182 (36%)
Return migrants	104 (21%)	65 (13%)
In-migrants	156 (31%)	117 (23%)
Missing system	14 (3%)	99 (19%)
Total	501	501

Source: Computed from GLOWA-Volta survey (2001)

More than half (52%) of the respondent household heads and 36% of the spouses are migrants who have lived elsewhere other than their current place of residence. Of the migrants more (31% of the household heads and 23% of the spouses) are in-migrants in comparison to the 21% and 13% return migrants of the household heads and spouses respectively (Table 4.10).

Incidence of step migration: Information was also gathered, if households lived else where except the place of birth and current place of residence for identifying if they undertake a step migration. As illustrated in Table 4.11, 66% of the household heads and 59% of the spouses in this group have lived

elsewhere before they finally moved to their current place of residence. This shows that step migration is an ordinary practice as far as the surveyed households are concerned.

Table 4.11: Incidence of step migration

Kind of migrants	Household head	Spouse
Direct migrants	52 (34%)	47 (41%)
Step migrants	102 (66%)	67 (59%)
Total	154 (100%)	114 (100%)

Source: Computed from GLOWA-Volta survey (2001)

Facilities versus Migration: Access to better facilities like schools, health, transport, and water were not as such important reasons for the migrants' decision to move (Table 4.12). It is only 5% of the household head migrants (even lesser of the spouses, that is 4%) who moved because of these facilities.

Table 4.12: Facilities versus migration

Was access to better facilities important for the decision to move?	Household head	Spouse
Yes	13 (5%)	7 (4%)
No	249 (95%)	184 (96%)

Source: Computed from GLOWA-Volta survey (2001)

The role of network for moving: Asked if there were relatives or friends in the place of destination before they moved, about 78% agreed that they had either relatives or friends who moved before. This obviously points out that the network of migration is important in the context of the surveyed households. People tend to follow relatives or friends who moved first.

Table 4.13: Social ties versus migration

Did you have relatives or friends in place of destination before you moved to this place?	Household head	Spouse
Yes	211 (78.7%)	140 (71.1%)
No	57 (21.3%)	57 (28.9%)

Source: Computed from GLOWA-Volta survey (2001)

Principal activity of the head of the household when you left: In this regard, respondents were asked of the principal activity of the heads of the household and the spouse before they move. Table 4.14 shows that most of them were working on-farm. The second important activity is working for wages/salary for the household head while own business (self-employment) is for the spouse.

Table 4.14: Principal activity of household head versus migration

Activity	Household head	Spouse
Working on farm	127 (48%)	87 (45%)
Working for wages/Salary	76 (29%)	28 (14.5%)
Self-employed/own business	36 (13.6%)	47 (24%)
Unemployed	9 (3%)	14 (7%)
Retired/Sick/Disabled	1 (0.4%)	1 (0.5%)
Other	16 (6%)	17 (9%)
Total	265	194

Source: Computed from GLOWA-Volta survey (2001)

The main means of support between arrival and finding first job: Migration has its own cost. Apart from the adjustment and psychic cost, it also has transport and initial living cost. As shown in Table 4.15, the main means of support for newly arrived migrants are own saving. The family or friends whom they lived with have also helped.

Table 4.15: Main means of support for migration

Main means of support	Household head	Spouse
Own saving	138 (54%)	73 (40%)
Family/friends lived with	80 (31%)	74 (41%)
Other family/friends	6 (2%)	5 (3%)
Menial work/begging	8 (3%)	3 (2%)
Other	24 (5%)	25 (14%)
Total	256	180

Source: Computed from GLOWA-Volta survey (2001)

4.4. Summary

The VB of Ghana is one of the poorest places of Africa, even when compared within the context of Ghana. The basin's population, principally comprised of farmers, is low in density. The basin is known for its unpredictable rainfall responsible for recurring drought in the region. The access to safe drinking water for the population of the VB of Ghana is also low even when compared to the national access.

Preliminary results indicate that the Upper West region is a net sending region, while Upper East region is found to be a net receiving region. Most importantly, the pictorial representation of the migratory flows shows that there is an overlap of places of moderate/high in-migration and out-migration rates. This positive correlation was a clear indication of the need to distinguish between the driving forces of in-migration and out-migration separately. Theoretically, labour market turn over, age composition and migrant stock are found to be important reasons explaining this positive relationship. Indicative of the incidence of short distance migration behaviour, the intra-region migration is found to be greater than the inter-region migration as well.

At the household-level, the data set of GLOWA-Volta was collected for observing the household migration behaviour. Migrant households tend to be female-headed, educated, with bigger household size, better income, and with lower dependency ratio than their non-migrant counterparts. The ethnic

composition is dominated by Akans constituting about 40% of the sample households. More than 50% of the out-migrants had job-related reasons for moving and most (60%) of the source households reported that they benefited from the out-migration of members. The benefit comes for most (58%) through remittances. For some (12%) of the respondent households, out-migration posed problem, in which less labour was available for farming activities of the household. Regarding the migration experience, 52% of the household heads and 36% of the spouses of the households have migration experience, and most are step migrants. The majority are from farm households. The main means of support is own saving. Families or friends whom they lived first with are also important sources of finance for migrants.

Generally, the intention of this chapter was to give an introduction into the study area and the data set. In the next chapter, we conduct a deeper analysis of the household survey with the aim of finding the determinants of household migration decisions.

CHAPTER 5 MIGRATION AND HOUSEHOLD INCOME DIFFERENTIALS

5.1 Introduction

One of the most significant demographic phenomena facing many of the developing economies is the dramatic acceleration of population growth in the urban areas, largely triggered by the incidence of rural-urban migration (Agesa, 2001). Current rates of urban population growth reach up to over 6 percent in many African cities including Nairobi, Lagos, and Accra (Dao, 2002). As migration increases, this phenomenon promises to loom even larger in the future.

Population migration has had enormous social, political, and economic significance (Beals, et al., 1970). In Ghana, as in other developing countries, migratory movements have multiplied greatly in volume in recent years, as transport and communications have improved and employment and output have expanded (Mensah-Bonsu, 2003). The issue of migration is particularly important to Ghana, a country with long tradition of population mobility and high rates of rural-urban migration. Moving to towns has been an important part of the farm households' livelihood strategies for many years (Kasanga, et al., 1988). To many Ghanaians, urban life represents new possibilities, modernity, the possibility of work indoors, and being less tied with family duties as opposed to the traditional life with relatively onerous family duties, mainly working on farming in the rural areas (Caldwell, 1969). Consequently, Ghana has witnessed a great deal of population mobility historically and at present.

Migrants are part of larger economies, such as communities, regions, and nations. Economic interfaces within these larger spheres affects migration beyond just the households that send out-migrants (de Brauw, et al., 1999). Hence, an understanding of the returns to migration from rural areas, the effects of income differences on migration decisions and the relationship between migration and the selective behaviour of migrant households is vital to the analysis of the nature and determinants of migration.

Based on a household survey conducted within the GLOWA-Volta project in summer 2001, this chapter attempts to get a closer look at the complex behaviour of the migrant and non-migrant

households in the VB of Ghana and to understand the motives behind the migration process by placing a special focus on the income disparity between migrant and non-migrant households. As mentioned in chapter 4, in our study, migrant households are those who sent at least one member away for migration.

The objective of this chapter is to consider the determinants of household migration decisions, analyse the determinants of migrants' and non-migrants' income, thus evaluating the role of income differences between migrant and non-migrant households on the decision to migrate. Besides, the chapter explains and estimates a model of returns to migration which explicitly accounts for the self-selection of migrant households from the sample.

The rest of the chapter is organized as follows. Section 2 describes the theoretical framework, which outlines basic assumptions and theory behind the study. Section 3 provides the details of the model specification and estimation. The estimation sample and the explanation of variables are explained in Section 4. Section 5 deals with presentation of results and discussion. Conclusions and policy implications are presented in Section 6.

5.2 Theoretical Framework

The human capital theory has had a long history in economics. It has been used to explain the decision to obtain more education or training through a comparison of the private and social benefits and costs; to undertake job search by both employers and potential employees, and has even been applied to decisions regarding child bearing (Milne, 1991). Therefore, the human capital framework suggests determinants of the households' decision to invest in human resources that can be used in empirical analysis. The human capital model involves the idea that people invest in them selves for the sake of future returns (Taylor, 1986). In particular, they may acquire additional education, purchase health care, and **migrate** in the hope of obtaining better job opportunities and financial rewards.

The theoretical framework for migration is usually based on the assumption that migration is an investment which entails costs as well as benefits (Kau and Sirmans, 1977). Thus most of the recent studies dealing with the mobility/earnings issue start with a human capital model of migration.

Migration is regarded as an investment because the benefits can only accrue over a period of time, and as the investment is in the individual or family, it represents an investment in human capital (Cadwallader, 1992). According to this approach, a utility maximising household would invest (in this case, decide to migrate) whenever the benefits of migration exceed the costs, after properly discounting both to their present values (Navratil, 1977). In this chapter, a consideration of the determinants in the case of household labour migration is undertaken.

Following Schultz (1961) and Becker (1962), Sjaastad has applied the notion of investment in human capital to the decision to migrate (Sjaastad, 1962). In this model, migration is viewed as an investment through which income can be augmented. The framework of Sjaastad also treats migration as an instrument of promoting efficient resource allocation and as one means of investing in human capital. His work has found wide application in migration literature (Bowels, 1970; Nabila, 1974; Kau and Sirmans, 1977; Cebula, 1979; Nakosteen and Zimmer, 1980; Taylor and Martin, 2001). The strength of this framework lies in the fact that there exists a possibility of meaningful comparisons between migration and alternative methods of promoting better resource allocation.

Migrants are a restricted, non-random part of an entire population. The propensity to migrate varies by migrant's attributes, such as age, income, education, and length of residence, although these attributes tend to be highly correlated with each other (Tabuchi, 1985). Thus differences in the returns to migration may be explained by differences in skill-related attributes across the migrants, including experience and schooling. For instance, Agesa (2001) remarked from his research in Kenya that individuals sort themselves into migratory and non-migratory persons, given their characteristics. His findings illustrate that skilled workers self-select to migrate to urban areas. Thus an attempt to investigate migrant households' behaviour from a population leads to incidental truncation problems (Greene, 2000). With such a distortion, results from a standard Ordinary Least Squares (OLS) procedure are simply not consistent.

Ghatak et al. (1996) also explained that migrants are self-selected in that they decide to leave their source community rather than stay and because they choose one particular destination from a number of possibilities. Following this line of thought, people that migrate choose to do so because they perceive a benefit, compared to those that do not choose to migrate. This implies that persons selecting a particular course of action tend to be non-randomly distributed within the population as a

whole. Accordingly, there is an inherent "selectivity bias" in data which reports relative returns to competing alternatives (Heckman, 1979; Nakosteen and Zimmer, 1980). The fact that one migrates while the other does not suggests an essential difference does exist between individuals.[17] Ghatak et al. (1996), for example, mentioned that it is unlikely for households who would have negative benefit of migrating to choose to migrate, as their reservation income at home would be greater than the income obtained by migrating. The same applies to the households that deliver 'migrant labour,' as these households may possess unobserved characteristics that are generally positively related to the income causing a sample selection bias. Thus in the framework of this study, the selectivity bias is inherent to the fact that some households consider sending migrants out while others do not.

In the context of econometric models, a number of empirical studies have explicitly taken selectivity bias in wage comparisons and migration activities into account. Heckman (1979), for example, mentioned that the reason for the self-selection bias in relation to migrants is because the wages of migrants do not afford a reliable estimate of what non-migrants would have earned had they not migrated. The effect of job search strategy on wage levels by Gronau (1974); the importance of education on migration by Agesa (2001); the effect of job location on migrant's wages by Hare (2002); the impacts of income differential on migration decisions in China by Zhu (2002); and, a study on the question of selective migration and its effect on income of immigrants to Germany by Constant and Massey (2003) are some of the many empirical studies which considered selectivity bias in their econometric models.

In this chapter, it is assumed that there is a persistent communication between migrants and sending households, which suggests that a household model would be more suitable than an individual model of migration decisions. This new perspective, which stresses the complexity of migration as an economic institution, the relationships between migration's determinants and impacts, and the household's role in migration decision making, emerged with the shift of emphasis of development economics towards the study of market imperfections (Taylor et al., 2003). Stark (1993) hypothesizes that migrants play the role of financial intermediaries, enabling rural households to overcome credit and risk constraints on their ability to achieve the transition from domestic to commercial production.

[17] Empirical evidence from Ghana (Caldwell, 1969; Nabila, 1974; Tutu, 1995; Litchfield and Waddington, 2003) shows that migrants tend to be disproportionately young, better educated, less adverse to risk, more achievement oriented and they also have better personal contacts in destination areas than the non-migrants from the same area.

The underlying view of this NELM, as presented in Stark and Bloom (1985) and Stark (1993) is that migration decisions are not taken by isolated actors but by larger units of related people, typically households or families. People act collectively not only to maximize income, but also to minimize imperfections, including missing or incomplete capital, insurance, labour markets and to satisfy changing demands for location-specific goods (Graves and Linneman, 1979). The chapter builds up on this framework to consider that migration decisions are taking place at household-level, instead of being the domain of individuals.

5.3 Model Specification

The model used in this chapter fits within the framework of maximization of Net Present Value (NPV) of the household resulting from sending out a migrant. The general form of the Harris and Todaro model is used; it is however extended to include migration decision at household-level in contrast to the individual model of Harris and Todaro (1970). By examining the incomes of migrant and non-migrant households and by controlling the selection problem, it becomes apparent what the earning of a household would have been had it not sent out any migrant. In the human capital theory of Sjaastad (1962), the migrants' objective function is to maximize the present value of net gains resulting from migration. The objective function designates an income differential and the direct costs of moving (Nakosteen and Zimmer, 1980; Ghatak et al., 1996):

$$PV(t) = \int_0^T \left[pW_{bt} - W_{at}\right] e^{-rt} dt - C_{ab} = \frac{1}{r}\left[pW_{bt} - W_{at}\right] \qquad (5.1)$$

W_{at} and W_{bt} stand for household wage in origin and destination areas respectively, at time *t*, C_{ab} is the cost of moving (migration cost from area a to b), r is the implicit discount rate while p is the probability to find employment and *T* represents the time during which the individual will remain in the labour force. The objective function, $PV(t)$ represented by Equation 5.1 should have a positive value; otherwise no migration occurs (Cebula, 1979).

Household variables that influence individuals' income creation as migrants or non-migrants (e.g., the household composition and demographic characteristics) often are found to significantly affect

migration, as well. To capture the effects of these variables on a households' participation in migration, we analyzed the determinants of income for migrant households and non-migrant households separately. An equation describing the decision to migrate is also considered as well. Thus the sample observations may be thought of as falling into one of two mutually exclusive categories, with the decision equation serving as an endogenous selectivity criterion which determines the appropriate group. If consistent estimates of the income equations can be obtained, then fitted values from the income equations may be used to estimate the parameters of the migration decision function.

The underlying assumption here is that an individual migrates, if the net benefit for moving is greater than 0, that is, if:

$$(pW_{bt} - W_{at}) - rC_{ab} > 0 \tag{5.2}$$

The equilibrium migration condition is thus:

$$pW_{bt} - W_{at} = rC_{ab} \tag{5.3}$$

The probability of finding a job in the destination areas, p, is equal to the number of available jobs in destination areas L_b, divided by the total active population size in the area of destination after migration takes place, namely $L_b + MN_a$, where M is the rate of migration and N_a is the population size in the origin area (Ghatak et al., 1996). N_a and N_b are exogenous variables, which are independent of migration and M is sufficiently small compared with N_a, so that it does not influence the origin population size, thus $L_b = \bar{L}_b, N_a = \bar{N}_a$. Thus the probability of obtaining employment p is given by:

$$p = \frac{\bar{L}_b}{\bar{L}_b + MN_a} \tag{5.4}$$

The equilibrium migration rate can then be deduced by re-writing Equation 5.4 as follows:

$$M = \left[\frac{(W_b - W_a) - rC_{ab}}{rC_{ab} + W_a} \right] \frac{\bar{L}_b}{\bar{N}_a} \tag{5.5}$$

From Equation 5.5, we get the following familiar results (Ghatak et al., 1996):

$$\frac{\partial M}{\partial W_b} > 0; \frac{\partial M}{\partial W_a} < 0; \frac{\partial M}{\partial \bar{L}_b} > 0; \frac{\partial M}{\partial C_{ab}} < 0 \tag{5.6}$$

The simple expressions in Equation 5.6 show that the Todaro model has important policy inference in that any marginal increase in the wages of the destination area or a decrease in wages of the origin areas would enhance migration. Paradoxically, any policy to increase employment in the destination areas will raise the migration rate and may increase unemployment in the destination area. Migration flows are determined by job opportunities. This simple explanation of migration phenomena suggests that to reduce the flows of migrations, it is necessary to raise the opportunity cost of migration, $W_a + rC_{ab}$. As suggested by Todaro, the net difference between income in origin area and destination areas play a dominant role in the migration behaviour. Analyzing the impact of income gap requires us to introduce the difference in origin and destination income into the equation of migration decision.

However, recently an alternative theory on migration, the NELM view that the migration decision is not the only a response to wage differential but families also spread their labour assets over geographically dispersed and structurally different markets to reduce risks. Stark (1993) argues that if future earnings are uncertain and imperfectly but positively related in a geographically specific area, the migration policy of a member of the income pooling family diversifies risk. Ghatak et al., (1996) formalized the idea of NELM by the Harris and Todaro model.

Let the utility of a representative family be $U(Y)$, where Y is income and U is a concave utility function with $U' > 0,\ U'' < 0$. Let the family choose a proportion M of the family to migrate. As

before, let N_a be the labour force in the origin area so that $M.\bar{N}_a$ is total migration. The family then must choose a proportion M of its members to migrate at a cost rC_{ab} per period who obtain employment with probability p at the destination wage W_b. The proportion that remains, $1-M$ receives a certain domestic (origin) wage W_a.

Let $\bar{W}_b = W_b - rC_{ab}$ be the net wage at the destination after paying for migration costs. Then the family maximizes its expected per period utility as follows:

$$E(u(Y)) = pU\left(M\bar{W}_b + (1-M)W_a\right) + (1-p)U\left((1-M)W_a\right) \tag{5.7}$$

To further proceed with the utility function, we choose a logarithmic function $U(Y) = \log Y$. Then solving for M, we arrive at the following equilibrium condition:

$$M = \left[\frac{p\left(\bar{W}_b - W_a\right) - (1-p)W_a}{W_a\left(\bar{W}_b - W_a\right)}\right]W_a \tag{5.8}$$

Provided that the right hand side of Equation 5.8 lies in the interval $[0,1]$, when $\bar{W}_b > W_a$ then migration takes place $(i.e., M \geq 0)$ if and only if $p\left(\bar{W}_b - W_a\right) \geq (1-p)W_a$. Thus, $W_a \leq pW_b - rC_{ab}$ is the condition for any migration.

On the other hand, as mentioned earlier in this chapter, analyzing the behaviour of migrant households from a population leads to self-selection problem. To correct the selection problem, we use a two-step Heckman procedure. Following Nakosteen and Zimmer (1980), the Heckman two-step self-selection model is specified as follows:

$$I_i^* = \beta_0 + \beta_1 z_i + \beta_2 x_i + \in_i \quad (5.9)$$

The above equation explains the migration decision. I_i^* is an unobserved variable. What we observe is the dummy variable I which equals one when the household is a migrant household and equals zero, otherwise. That is, $I = 1$, if $I_i^* > 0$. And $I = 0$, otherwise. Z_i and X_i represent the independent variables of the selection equation and those of the income equation respectively.

On the basis of the observed dummy variable I, the β parameters can be estimated by the probit method only up to a proportionality factor. Hence, to normalize, we need to impose the restriction that the variance of $\in_i$ be unity (Lee et al., 1980).

The model[18] is completed by specifying income equations[19] for non-migrant households (5.10) and migrant households (5.11), as follows:

$$W_{ai} = \gamma_{a0} + \gamma_{a1} x_i + \in_{ai} \quad (5.10)$$

$$W_{bi} = \gamma_{b0} + \gamma_{b1} x_i + \in_{bi} \quad (5.11)$$

The appropriate measure of income in the study is the natural logarithm of annual incomes, thus, we insert $\log W_b - \log W_a$ into Equation 5.9. The final model[20] to be estimated is presented in Equation 5.12:

$$I_i^* = \beta_0 + \beta_1 Z_i + \beta_2 [\log W_{bi} - \log W_{ai}] + \in_i \quad (5.12)$$

$$\log W_{ai} = \gamma_{a0} + \gamma_{a1} x_{ai} + \in_{ai} \quad (5.13)$$

[18] See Agesa (2001) for a similar model, which allows for different earning structures for migrant and non-migrant individuals by estimating separate log earning equations for the migrants and non-migrants.

[19] Income differences between households can be because of differences in households' characteristics. Thus, the first estimate should be between the difference in earnings of migrants and non-migrants. This is the rationale behind specifying the income equations for the migrant and non-migrant households.

[20] The vectors of explanatory variables in (5.13) and (5.14) do not necessarily consist of the same elements as those appearing in (5.12).

$$\log W_{bi} = \gamma_{b0} + \gamma_{b1} x_{bi} + \in_{bi} \quad (5.14)$$

We estimate the parameters of Equation 5.12 by the maximum likelihood probit technique, as the observed migration decision (the dependent variable) has a binary nature. Because it fails to reflect the presence of self-selection in migration, OLS is inappropriate for the income equations. This can be observed by noting that the conditional means of the income disturbance terms are non-zero and not constant for all observations (Maddala, 1983):

$$\mathrm{E}(\in_{bi} | I_i = 1) = \sigma_{b\in *}\left[-f(\psi_i)/F(\psi_i)\right] \quad (5.15)$$

$$\mathrm{E}(\in_{ai} | I_i = 0) = \sigma_{a\in *}\left[f(\psi_i)/1-F(\psi_i)\right] \quad (5.16)$$

$$\lambda_i = \frac{f(\psi_i)}{1-F(\psi_i)} = \frac{f(\psi_i)}{F(-\psi_i)} \quad (5.17)$$

Where $\sigma_{b\in *}$, $\sigma_{a\in *}$ and ψ are elements of the covariance matrix of disturbances; λ is the 'inverse Mill's ratio'; while f (·) and F (·) are the standard normal density and distribution functions respectively. Heckman (1979) remarked that the function λ is a monotone decreasing function of the probability that an observation is selected into the sample. Substituting (5.13) and (5.14) into (5.12), gives the reduced form of the migration decision equation as follows:

$$I_i^* = \beta_0 + \beta_1 x_i' + \in_i^* \quad (5.18)$$

In Equation 5.18, x_i' consists of all exogenous variables in the model. This leads to Equation 5.19, which is the empirically estimated model.

$$\xi = \beta_0 + \beta_1 X_i' \quad (5.19)$$

The probit estimation of Equation 5.19 yields the fitted values, $\hat{\xi}$ which will then be used as estimates in Equations 5.15 and 5.16. The selectivity bias is captured by Equations 5.15 and 5.16. Our model

recognizes the endogenous nature of the migration decision and thus formally accounts for the problem of migrant self-selection.

The procedures of estimating the parameters are as follows: first, we estimate by probit model the reduced form of the decision equation, Equation 5.19. This probit model explains whether a household is a migrant or not and estimates β parameters. Secondly, we estimate the inverse Mill's ratio for each observation using the results of the probit estimation. Thirdly, we insert the 'inverse Mill's ratio' into the income equations and estimate the income equations using the Heckman selection model including the 'inverse Mill's ratio'. Finally, the fitted values from the income equations, $\log w_b$ and $\log w_a$, are inserted into the appropriate structural migration model and these are estimated by the probit model.

Following the estimation of the Heckman procedure, the marginal effects of the variables are also estimated. Parameter estimates from discrete choice models, such as probit, must be transformed to yield estimates of the marginal coefficients - that is, the change in the predicted probability associated with changes in the explanatory variables must be taken into account (Greene, 2003). Marginal effects are nonlinear functions of the parameter estimates and the levels of the explanatory variables, so they cannot generally be inferred directly from the parameter estimates (Anderson, et al. 2003).

The marginal effects of the migration decisions are different from the estimated coefficient in the migration model and can be specified by Equation 5.20 as follows:

The predicted probability from a binary choice model is given by:

$$E[Y \mid I = 1] = E[Y_b] = F(\beta' X) \tag{5.20}$$

Where Y is a choice variable (participation in migration); X is a vector of explanatory variables, β' is a vector of parameter estimates, and F is an assumed cumulative distribution. Thus the marginal coefficients are equal to:

$$\partial E[Y_b] / \partial X = f(\beta' X)\beta \tag{5.21}$$

5.4 Estimation Samples and Explanatory Variables

5.4.1 Estimation Samples

The survey to obtain estimation samples is interdisciplinary in nature and migration is a part in the wide ranging survey that covers topics such as agricultural and non-agricultural activities, on and off-farm labour, household water supply, irrigation activities, and basic household characteristics. As shown in Table B1 (Appendix B), the survey involves 221 migrant households and 280 non-migrant households. For each household in this model, the data furnish information on household variables such as income, age, gender, education, household size, dependency ratio, local association participation (social capital), migration experience, irrigation activities and ethnic group.

5.4.2 Variables

The structural form of the model consists of a migration decision equation and income equations for migrant and non-migrant households. The model is specified by asserting the exogenous variables and the dependent variable included in each equation.

Household size (HHSIZE1) is included in the migration equation to observe the impact of household size on migration decisions. It is expected that larger households would send migrants out, and thus a positive relationship is expected. With respect to the average education years of the adult household members (EDUADULT), a positive relationship is expected owing to the importance of education in migration activities. The dummy (IRRIG), the soil quality index (SOILQ), the application of fertilizer per acre of land (FERPERAC), and farm size (FARMSZPE) are considered in the migration model to indicate the relevance of the agricultural activities in the migration decision of households. For the dummy off-farm activity (OFF), a negative sign is expected as households with less off-farm activity seek migration activity as a means of income diversification. Besides, households with off-farm activity would require more labour at home, which in turn means less labour supply for migration.

Table 5.1: Labels and mean value of variables

Variables	Definition	Migrant Households	Non-migrant Households
HHSIZE1	Household Size	10.22	8.10
DEPRATIO	Dependency ratio	0.50	0.75
HEADSEX	Sex of the household head (1 = female, 0 = male)	0.24	0.10
ETHNIC	Ethnic group (1 = Akan[21], 0 = Otherwise)	0.47	0.36
MEAGE	Mean age of adults in a household (≥ 15 years)	35.43	35.08
PARTICIP1	HH members' participation in local associations (1 = Yes, 0 = Otherwise)	0.51	0.48
MIGEXP	Migration experience of the household (1 = with experience, 0 = otherwise)	0.48	0.39
EDUADULT	Average adult education years in a household	3.23	2.59
FERPERAC	Fertilizer spending (Kgs per acre)	8.33	12.30
OFF	If any household member performs off-farm activity (1= Yes, 0 = Otherwise)	0.71	0.80
CROPS	The number of types of crops grown in 2 seasons	1.56	1.57
IRRIG	If any member of the household irrigates (1=Yes, 0= Otherwise)	0.20	0.13
FARMSZPE	Farm size in acres per person	1.33	1.30
SOILQ	The soil quality index[22]	2.12	2.06

Source: Computed from GLOWA-Volta survey (2001)

[21] Akan is a major ethnic group in Ghana, which comprises about 40% of the total sample households (Table B4 in Appendix B)

[22] The indicators for the soil quality index of the farm household are the amount of stone, the water absorption, water holding capacity, and the easiness for cultivation, ranging from 1 to 3; 3 being the best quality (This is self-reported data from the respondent households).

The variable household head sex (HEADSEX) is included to reflect the widely held notion that the probability of migration is higher for males than females. Its coefficient is expected to be negative to indicate the consequence of family ties on the migratory behaviour of females. There is a considerable ambiguity in the literature concerning the effect of gender on migration. Mincer (1978), for example, reports that family ties tend to deter migration by reducing the employment and incomes of migrating wives. On the other hand, studies by Caldwell (1969), Nabila (1974), Yang (1992) and recently Litchfield and Waddington (2003) found out that females are more mobile than males. Yet, as an apparent paradox, Gbortsu (1995) found out that males are more mobile than females.[23]

The coefficient on the ratio of dependents to adults in a household variable (DEPRATIO) is expected to be negative as more dependents in a household means more responsibility and higher reservation wage for a potential migration which would deter migration. The migration experience (MIGEXP) explains if the household head or the spouse had been somewhere else except the place of birth and their current place of residence. It is expected that households with migration experience are more likely to carry out another series of migration by sending out their household members.[24] For the dummy variable, ethnic group (ETHNIC), it is assumed the value of one for those belonging to *Akan* and zero otherwise. It is included in this model to observe if networks represented by ethnic enclaves play a role and whether households belonging to a certain ethnic group are more inclined to migration than others. For household members' participation in local associations, self-help groups or community developments (PARTICIP1), the coefficient is expected to be negative, since households with higher local participation have strong social ties, which ultimately would discourage out-migration. The MEAGE variable which explains the mean age of the adult members of the household is included in the migration equation to appreciate the role of age in the intra-family migration decision making. It is expected the more senior (the higher the average age) the household is the higher the probability of sending out a migrant.

[23] The results are in a clear contradiction especially when viewed in terms of the fact that the studies by Gbortsu (1995), Litchfield and Waddington (2003), Caldwell (1969) and Nabila (1974) are all on Ghana.

[24] Plane and Rogerson (1994), for example, remarked that "migration is a lot like sinning - if you have done it once, you are more likely to consider doing it again." Additionally, Yang (1992) revealed that high mobility is often associated with high frequency of repeat migration.

In the income equation, the average education level of the household (EDUCADULT) is important in determining the income of households and its coefficient is expected to be positive, showing the positive role of education on income. Since the survey is essentially done in the rural areas, the total farm size cultivated per person (FARMSZPE) and the fertilizer spending per acre (FERPERAC) are considered to illustrate the influence of agricultural inputs on income and their respective signs are expected to be positive. The expected effect of the off-farm activity (OFF) is positive reflecting the positive role of off-farm activity on the income of households.

5.5 Results and Discussion

The income model evaluates the determinants of income for the migrant and non-migrant households independently, while the migration model, corrected for selectivity bias, examines the influence of the income differential and other factors for the household migration decisions.

The probit model

The first step is to estimate a reduced form decision equation, which includes as explanatory variables all the exogenous variables in Equation 5.19. The Maximum-likelihood probit estimates of this equation are presented in Table 5.2 (column 2). Estimation results show that the signs of the parameter estimates generally conform to a priori expectations. The probability of migrating is statistically significantly dependent on education, migration experience, household size, dependency ratio, off-farm activity, irrigation access, ethnic network, and social capital.

Consistent with a priori expectations, the probability of migrating increases with the increase in education (EDUADULT). The statistical significance of this human capital coefficient suggests that households with more education are more likely to send out migrants. As expected the participation variable (PARTICIP1) returned a negative and statistically significant coefficient. This shows that households are genuinely reluctant to leave their source communities when they actively participate in local associations, self-help groups or community development groups. The positive and statistically significant coefficient on migration experience (MIGEXP) lends credence to the fact that households with migration experience are more likely to consider participating in migration than households with no migration experience. An interesting finding is the negative and statistically

significant coefficient on the dummy variable, the off-farm activity (OFF). This finding suggests that as households' possibility for off-farm activity increases, the likelihood of participation in migration activity decreases. A possible explanation for this phenomenon may be that the off-farm activity creates a source of employment and livelihood for the members of the household who would potentially migrate and thus decreases likelihood of migration.

The significant coefficient on the ethnic dummy variable (ETHNIC) indicates that network created by ethnic enclaves acts strongly in migration activities. The positive sign of the coefficient of irrigation variable (IRRIG) also implies that households with access to irrigation are more likely to migrate. The positive coefficient of the household size suggests that a large family size (HHSIZE1) may be viewed as a risk-pooling strategy that may encourage migration. This result is consistent with the underlying migration theory of Stark (1993), who argues that it is plausible for a household with a large family size to encourage migration by providing a diversified source of income and hence controlling for the level of risk. The negative and significant coefficient of the dependency ratio variable (DEPRATIO) can have two interpretations. First, this result could show that the presence of dependents in a household is expected to increase the reservation wage of the potential migrant, hence deterring migration. The second possible interpretation of this result is that there may be an agglomeration effect to household size in the source community. This may be particularly important in rural areas where additional family members may lend extra help on family land. Children often contribute to domestic activities and hence are a valuable source of labour. Indeed, this result is consistent with that of another finding in the literature, which suggests that a large family size (including the presence of other dependents) may act as a deterrent to migration (Agesa, 2001; Agesa and Kim, 2001).

However, some of the variables returned a statistically not significant impact. The positive coefficient of the mean age (MEAGE) is as expected but not significant. The negative coefficient of household head sex (HEADSEX) is unexpected and insignificant. The coefficient on the number of crops grown in two seasons (CROPS) also returned an insignificant coefficient.

Table 5.2: Probit estimation of the reduced form Migration Decision Equation, and the Heckman selection model results

Explanatory variables	Migration	Migrant income	Non-migrant income
Average education years for adults in a household	0.092 (3.25)	-0.030 (-2.30)***	-0.008 (-0.59)
Off-farm activity	-0.479 (-3.17)***	0.386 (5.25)***	0.226 (3.11)***
Farm size in acres (per person)		0.047 (2.94)***	0.017 (1.74)**
Fertilizer application (Kgs per acre)	-0.005 (-2.32)***	0.003 (2.21)**	0.000 (0.04)
Having irrigation fields	0.588 (3.25)***	0.034 (0.42)	0.111 (1.26)
Crop types grown in 2 seasons	-0.122 (-1.24)	0.013 (0.31)	-0.038 (-0.87)
Soil quality	0.434 (1.80)**	-0.003 (-0.02)	0.067 (0.64)
Sex of household head	0.201 (1.26)		
Mean age of adult members of the household	0.008 (1.11)		
Household size	0.123 (7.23)***		
Migration experience	0.436 (3.05)***		
Dependency ratio	-0.243 (-2.55)***		
Household's participation in local association	-0.435 (-3.26)***		
Ethnic group	0.351 (2.33)***		
Intercept	-2.162 (-3.45)***	-2.162 (-3.45)***	6.270 (27.62)***
Inverse Mill's ratio (λ)		-0.259 (-2.62)***	0.059 (0.57)
Observations	467		

Source: Computed from GLOWA-Volta survey (2001)

Value of z statistics in parentheses
*** Significant at 1 %; ** significant at 5%,
prob > chi2 = 0.0000

The Income Equations

The next step is to model the determinants of income for the migrant and non-migrant households. To counter any estimation problems of the model with sample selection bias, Heckman's two-step selection model is employed. The estimates of the income model for the migrant and non-migrant households are presented in Table 5.2, columns 3 and 4 respectively. Inclusion of all exogenous variables in both the decision and income equation yields a collinearity problem in the second stage of the estimation procedure[25] (Nakosteen and Zimmer, 1980). Thus the income model variables are specified in such a way to include those variables which are thought to influence incomes in a manner different from their impact on the decision to migrate.

Although the income estimates are only used for obtaining consistent estimates of the migration status equation, they are of interest and deserve discussion as well. As shown in Table 5.2 (column 3), parameter estimates of the regression indicate that the cultivated farm size (FARMSZPE) and off-farm activity (OFF) positively affect income of migrant households, as expected. Consistent with a priori expectation, the income of migrant households decreases with the increase of the fertilizer application (FERPERAC). On the other hand, contrary to the prior expectation, the coefficient for adults' education in the household (EDUADULT) turned out to be negative. Of special importance is the estimated coefficient of the inverse mill's ratio, λ (LAMBDA). What is more important is that this is a statistically significant estimate. This result lends support to the hypothesis of self-selection at least as far as the migrants from the population are concerned. This can be interpreted in support of the view that migrant households in the population choose to send a migrant out because they find it to be more favourable than not sending one.

With respect to the income for non-migrant households, the farm size cultivated (FARMSZPE) positively affects income of the non-migrants (Table 5.2, column 4), as expected. The parameter estimate on the dummy variable off-farm activity (OFF) is statistically significant and the sign is positive as expected. Absence of statistical significance for the coefficients of education and fertilizer suggests that non-migrant household income is insensitive to these two variables. The inverse mill's

[25] To avoid identification problem, in the Heckman two-step selection model, there needs to be at least one variable in the selection model which is not included in the main model (Greene, 2000; Web information from STATA website).

ratio, λ (LAMBDA), also turned out to have an insignificant impact, indicating that the self-selection procedure pertains only to the migrants from the population.

It is also interesting to note the combined effect of the inverse mill's ratios on unconditional incomes. In essence, the combined truncation effect should be positive so that the process of self-selection serves to enhance unconditional expected incomes. Following Nakosteen and Zimmer (1980), the unconditional expected income is specified as follows:

$$E(Y_i) = E(Y_i \setminus I_i = 1).P(I_i = 1) + E(Y_i \setminus I_i = 0).P(I_i = 0) \qquad (5.22)$$

Thus, $E(Y_i) = (\theta_b^{'} X_{bi} - \delta_{b\in} \cdot (f(\psi_i)/F(\psi_i))).F(\psi_i) + (\theta_a^{'} X_{ai} + \delta_{a\in}(f(\psi_i)/1 - F(\psi_i))) \cdot (1 - F(\psi_i))$

(5.23)

Where X_{bi} and X_{ai} refer to all exogenous variables in the migrant and non-migrant income equations, respectively. Rewritten:

$$E(Y_i) = (\theta_b^{'} X_{bi}) \cdot F(\psi_i) + \theta_a^{'} X_{ai}) \cdot [1 - F(\psi_i)] + (\delta_{a\in} - \delta_{b\in}) \cdot f(\psi_i) \qquad (5.24)$$

The term $\delta_{a\in} - \delta_{b\in}$ (which is the difference in the inverse mill's ratios) in Equation 5.24 represents the combined effect of self-selection on expected incomes. Based on the estimates from Table 5.2 (column 3 and 4), we have:

$\hat{\delta}_{a\in} - \hat{\delta}_{b\in} = 0.318$. This indicates that the combined effect on income is positive.

For the estimation procedure, the final step entails a probit estimation of the structural form of the migration decision equation (Table 5.3). We computed the predicted values of the log incomes for both the migrant and non-migrant equations and further computed the difference. These are then inserted into the structural decision equation. Results of the parameter estimates are presented in Table 5.3. Perhaps the most important finding is the positive and statistically significant estimated coefficient on the income differential (LGINCDIFFER) variable. The estimates reveal that the

leading factor determining household migration decisions is the migrant/non-migrant income difference. Its relatively large positive value lends strong support to the essential hypothesis of the conventional human capital model of migration.

Table 5.3: Structural Model of the Migration Decision Equation

Variables	Coefficient
Education of adults in a household	0.126 (3.69)***
Off-farm activity	-0.756 (-3.51)***
Fertilizer application (per acre)	-0.009 (-2.94)***
Gender of household head	0.239 (1.49)
Migration experience	0.456 (3.16)***
Dependency ratio	-0.234 (-2.45)***
Household size	0.128 (7.39)***
Household's participation in local association	-0.442 (-3.30)***
Ethnic group	0.327 (2.15)**
Irrigation activity	0.586 (3.23)***
The number of crop types grown in 2 seasons	-0.121 (-1.22)
Soil quality	0.439 (1.82)**
Mean age of adults in the household	0.006 (0.436)
Log of income differential	1.713 (1.85)**
Constant	-2.591 (-3.87)***
Observations	467

Source: Computed from GLOWA-Volta survey (2001)

Value of z statistics in parentheses
*** Significant at 1%; ** significant at 5%
prob > chi2 = 0.0000
LR chi2 (14) = 107.57

Specifically, the effect of expected monetary gains is to significantly increase the probability of migration. This result is consistent with underlying migration theory (Todaro, 1976) and is also consistent with previous research findings (Konseiga, 2004; Agesa, 2001) in the literature which suggest that observed levels of migrant incomes are higher than those of non-migrants' and the incidence of migration is relatively higher for those with positive earning differences. An additional

point of interest is that the magnitudes and standard errors of the other coefficients are very close to their counterparts in the reduced form of the decision equation.

The marginal coefficients for the parameter estimates can be different from the Heckman estimates in both magnitude and sign (Greene, 2000). It is thus important to investigate the marginal coefficients of the variables. The marginal effect shows that the income differential has by far the strongest marginal impact (Table 5.4). As the income differential between the migrant and non-migrant household increases by 10%, the probability to migrate will increase by 6.75%. Households with migration experience are 18% more likely to migrate than their non-migrant household's counterparts. In other words, having migration experience increases the probability for participation in migration by 18%. The increase of a household member results in a 5% increase in the probability of migration, *ceteris paribus*. Households with off-farm activity are likely to have a 29% reduced probability of migration than those with no off-farm activity.

Table 5.4: Marginal effects of the explanatory variables of the structural migration model

Variables	**Coefficient**
Education of adults in a household	0.050 (3.69)***
Off-farm activity[#]	-0.294 (-3.72)***
Fertilizer application (per acre)	-0.004 (-2.94)***
Gender of household head[#]	0.952 (1.49)
Migration experience	0.179 (3.20)***
Dependency ratio	-0.092 (-2.45)***
Household size	0.051 (7.38)***
Household's participation in local association*	-0.174 (-3.34)***
Ethnic group[#]	0.129 (2.16)**
Irrigation activity[#]	0.230 (3.35)***
The number of crop types grown in 2 seasons	-0.476 (-1.22)
Soil quality	0.173 (1.82)**
Mean age of adults	0.002 (0.78)
Log of income differential	0.675 (1.85)**

Source: Computed from GLOWA-Volta survey (2001)

[#] dy/dx is for discrete change of dummy variable from 0 to 1

5.6 Conclusions and Policy Implications

The human investment approach to migration is a sound behavioural model and the empirical findings presented here further support it. Unlike previous studies, this chapter attempts to establish links among the NELM theory, which regards migration as a household decision (Stark, 1993), sample-selection bias, and the theory of migration as investment decision together with the Todaro model of migration. By doing so, this chapter provides a possible explanation for the increase in migration as ordinary effect of the rising income differential between the migrant and non-migrant households. This chapter additionally attempts to incorporate the endogenous selectivity into a model of migration and income.

The result from this chapter confirms that migrant households earn more income than their non-migrant counter parts: *ceteris paribus*. A study on the pattern of inter-regional labour migration in Ghana by Beals, et al. (1967) also found a similar result on the positive income effects of migration. The positive income difference between migrant and non-migrant households supports the theory of Sjaastad (1962) in such a way that migration is viewed as one means of resource allocation. Choosing to have a family member migrate from a household is mainly a reaction to economic incentives arising from imbalance across spatially separated labour markets, which has also received considerable attention in the theoretical literature on investment in human beings (Sjaastad, 1962; Bowman, 1967). Estimation results demonstrate great indication of self-selection in the incomes of migrant households. It is also shown that the outcome of the self-selection process on unconditional, expected incomes is positive. Other factors also affect migration status of households. Among these factors are household size, education, migration experience, ethnic networks, and social capital.

When there is the lack of smooth functioning credit markets, rural households try to diversify incomes by re-organizing the utilization of their own resources. Such macro-level factors affect the household's migration decision (Stark, 1993). The fact that migrant households have more earnings than non-migrant households also lends support to this view. This would implicitly indicate to the non-migrant households that a promising channel of diversifying/increasing income, pooling risk, and increasing household farm production is sending out a migrant. Thus important policy implication facing national planners is that, if the government wants to decelerate the flow of migrants out of rural areas, it may need to intervene in credit markets by reforming the formal rural credit system or

encouraging development of informal credit institutions. Such measures would increase households´ production efficiency and lessen migration pressures. In general, investment in rural development is expected to reduce incentives to migrate.

CHAPTER 6 IMPACTS OF MIGRATION AND REMITTANCES ON SENDING HOUSEHOLDS

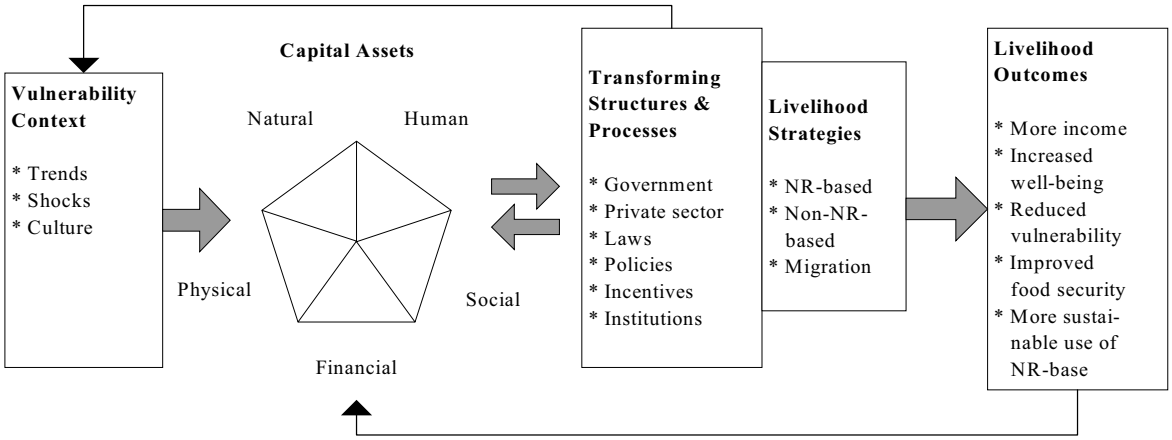
6.1 Introduction

According to the framework of sustainable rural livelihoods developed by the U.K. Department for International Development (DFID), migration is one of the livelihood strategies open to rural households. Carney (1998) defines sustainable rural livelihood as "the capabilities, assets (including both material and social resources) and activities required for a means of living". A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. Therefore, migration is one of the ways the household can improve its livelihood in the context of vulnerability, when its livelihood is threatened. This is especially so in the sub-Saharan African countries where farming on its own rarely provides a means of sustenance and where many rural households are found to depend on diverse portfolio of activities and income sources including migration. In this chapter, we investigate the set of issues connected with migration being an instrument for maintaining a household's livelihood, in particular the effect of migration on the income of the household that sends out a migrant.

The framework classifies the households' asset base into natural, human, social, physical, and financial capital which helps one get a wider view on the people's livelihoods. The financial and natural assets of the households are relevant in our study. The 'livelihood outcome' of migration and the natural and non-natural resource based strategies flows back into the 'capital assets' of households, which in turn fuels the livelihood strategies in a new cycle. This part of the framework analyses the effects of migration on the migrant household's livelihoods. The framework also shows that households operate in a structure with vulnerability context. However they have the capacity to influence these vulnerable context structures by transforming structures through the government, private sectors, laws etc. (Goss and Lindquist, 1995). Such that the extreme right box includes only positive livelihood outcomes, the framework is normative and thus unsuitable for academic research. Nevertheless, by leaving the livelihood outcomes open for real-life situations, the framework

becomes appropriate for use in academic research (van der Geest, 2002). Figure 6.1 shows the framework of sustainable rural livelihoods, in which migration is one of the three livelihood strategies open to rural households.

Figure 6.1: Sustainable Rural Livelihoods Framework



Source: Carney (1998)

The literature on migration traditionally regards migration decisions as outcomes of individual decision-making (Harris and Todaro, 1970). In recent times, however, the focus of migration decisions as a 'household decision' has gained much attention especially in the developing country context. A large body of empirical literature on migration (McElroy, 1985; Stark, 1993; Taylor and Wyatt, 1996; Zhao, 1999; Azam and Gubert, 2002; De la Brière et al., 2002; Taylor et al., 2003; Mensah-Bonsu, 2003; etc.) indicated that migration decisions are often jointly made by the potential migrant and the rest of the household members. In this view, migration by one person is undertaken in pursuit of rational optimizing behaviour by another person or a group of persons such as the family (Stark, 1993; Hammar et al., 1997). In the context of developing countries' migration (especially more so with internal migration), family members expect migrants to send home remittances and gifts, to visit home regularly, and to remain in contact. This necessitates the study of the complex effects of migration upon the migrant sending households taking into account income sources and alternative activities of the households in the source community.

This chapter is inspired by the New Economics of Labour Migration (NELM), a growing body of work attempting to analyze migration as a household decision rather than an individual decision (Gallup, 1997). The NELM proposes that households facing imperfect markets decide whether or not to participate in migration as part of a set of interwoven economic choices (Taylor et al., 2003). The underlying assumption here is that when a household decides to send a migrant out, it makes simultaneous decisions about its production in both the short- and long-term.

In this chapter, we consider the following research questions.

i. How does sending out a migrant from the household, which implies reduction in available labour, affect the farm production or farm income?

ii. What are the effects of remittances on income generated by the rural household in both its farm and non-farm self-employment enterprises?

To answer these questions, we investigate the direct and indirect effects of migration from the rural areas on the income sources of the households that send out-migrants.

The rest of this chapter is organized as follows. The next section reviews the literature on the effect of migration on the place of origin focusing on the case of Ghana. Furthermore, this second section portrays the theoretical model followed by the empirical model specification. The third section presents the sampling procedure, variables and hypotheses. The fourth section describes the main results and subsequent discussions. The paper ends with conclusions and policy implications.

6.2 State of research

6.2.1 The Literature

A considerable number of studies has already been undertaken on the effect of migration on those residing in the country of origin (in the case of international migrations) or those left behind in the rural areas (in the case of internal migrations). Examples include those of Rempel and Lobdell (1978); Rivera-Batiz (1982); Lucas and Stark (1985); Lucas (1987); Stark et al. (1988); Gustafsson

and Makonnen (1993); Taylor and Wyatt (1996); Wang and Zuo (1999); Zhao (1999); Azam and Gubert (2002); Taylor et al. (2003); Konseiga (2004); etc. There is, however, a wide diversity of results in this literature with respect to the effects of migration and remittances on the migrant's economy of origin.

Rempel and Lobdell (1978) concluded that remittances from the migrants to the city had very little impact on the development of the region of origin, based on econometric analysis of rural household data from Kenya. Gustafsson and Makonnen (1993) analyzed the effects of the transfers sent by the migrants working in the mines in South Africa on poverty in Lesotho. From their findings they concluded that the incidence of poverty would go up by about 15% if these transfers stopped, and this would affect many social and demographic groups that are not currently affected by poverty. Taylor et al. (2003), in their study on rural-urban migration in China, found that participating in migration increases household per capita income for those left behind, though the findings also included that the loss of labour to migration has a negative effect on household cropping income in source areas. They also provided evidence that remittance sent home by migrants partially compensates for this lost-labour effect, contributing to household incomes directly and also indirectly by stimulating crop production. In their work in rural Mexico, Taylor and Wyatt (1996) offered econometric evidence that remittances sent home by family migrants stimulate household-farm income indirectly by relieving credit and risk constraints on household farm production. They added that remittances appear to reinforce an equalizing direct effect on the income distribution across their sample farm-households. This supports the earlier findings of the work done by Stark et al. (1988) who showed that remittances sent from the USA tend to reduce income inequality in Mexico; however the authors note that the poorest are excluded from migrating.

Findings from Botswana (Lucas and Stark, 1985) and southern Africa (Lucas, 1987) also suggested that labour migration by one or more family members can be an effective mechanism to self-finance local production activities and self-insure against local income risks. According to Azam and Gubert (2002), the issue of remittances' impacts is important in both international migrations and internal (rural-urban) migration. With respect to internal migration, Taylor and Wyatt (1996) observed that much of the migration that generates these remittances originates in rural areas. They argued that the impact of migrant remittances upon household-farm economies in sub-Saharan African countries has

become an important research and policy question as migration increasingly links household farms with distant labour markets, both at home and abroad. Contemporary increases in migration have also created concern among policy makers regarding potential negative impacts on the livelihood of the source community.

6.2.2 Migration in rural Ghana

The research on migration from rural areas in Ghana started as early as 1969 by Caldwell in his book *Movement to Ghana's Towns*, followed by Nabila (1974), Kasanga (1988), and Mensah-Bonsu (2003), etc. But the literature has not yet given an insightful consideration on many of the important aspects of migration, such as the effects of migration on the source communities.

Ghana is witnessing one of the largest flows of labour both within and outside the country, especially when compared to neighbouring countries (Twum-Baah et al., 1995)[26]. As Ghana's economy continues to grow, the internal and international flow of labour can be expected to persist (Beals and Menzes, 1970). Most studies on Ghana's migration have focused on determining the size and composition of migration flows (Nabila, 1974; Addo, 1980), seasonal migrations during the slack seasons in the Savannah zone to the cocoa and coffee regions of the forest zones (Beals and Menzes, 1970). Migration research on rural-to-urban migration investigates the effects of migration on the destination (mostly urban areas) and urbanization (Caldwell, 1969; Abdulai, 1996; Kasanga, 1988; Litchfield and Waddington, 2003). Even though evidence shows that the rural household in the village of origin is typically the central concern of both those who leave and those who stay behind, less emphasis has been placed on exploring the effects of migration on the rural households and on the communities the migrants leave.

Like in many developing countries, the economic growth in Ghana is accompanied by the shift of labour out of farming. Moreover, the development of the economy has led to the creation of more off-farm enterprises, which has facilitated growing numbers of rural workers to find jobs outside of

[26] The annual net migration rate for Ghana is -0.83 migrants per 1000 population (Twum-Baah et al., 1995). Though reduced from -0.94 migrants per 1000 population in 1995, Ghana is a net sender country especially when compared to the neighbouring countries like Nigeria, Benin, Togo and Côte d'Ivoire which have a net migration rate of 0.26, 0.00, 0.00, and -0.08 per 1000 population respectively (Twum-Baah et al., 1995).

agriculture through rural-urban migration. However, the migrants are strongly attached to their source communities. Caldwell (1969), for example, demonstrates that internal migration in north Ghana is more of temporary and seasonal, which indicates that they return to their source community very often.

In Ghana, as in many regions of sub-Saharan Africa, the farm household is predominantly a production-consumption unit, producing farm products mainly for home use. This high dependency on farmland for rural households coupled with the high population growth (Boadu, 1999) increases the pressure on the available farmland affecting the ability of the farm household to undertake production decisions that are environmentally sustainable under the traditional production strategy. Consequently, households either choose an alternative farm production strategy based on modern production technology which requires an intensive cultivation of farm land; or, in most cases, households choose to allocate labour to various self-employment activities, wage labour within or near village, or to migration (Taylor et al., 2003).

These non-farm activities reduce households' dependence on land and help them to achieve production–consumption goals. On average, 36% of household income in the household survey data used in this chapter is from the non-farm activity (See Table B3 in the Appendix). While agricultural production in migrant households may fall due to a decrease in the family labour force, the remittance that migrants send home can have positive effects on household production and income. In the absence of credit markets, remittances can be used by households to expand their off-farm production or to expand their purchases of inputs and services that lead to higher on-farm productivity such as purchases of fertilizer, more effective pesticides, and custom services for their crops.

Reardon (1997) suggests that the motivation to diversify income sources into off-farm activities is higher for the poor than for rich farm households. However, household participation in non-agricultural activities is constrained by several factors. Taking the case of rural China, Taylor et al. (2003) explains that in rural areas, rental markets for land are scarce and agricultural labour markets are frequently non-existent. Therefore, most households are not able to hire labour or rent out their land. Consequently, they choose not to leave agriculture, and household labour availability for off-farm activities is restricted. According to Taylor et al., (2003), in an economy without formal institutions and complete markets, the decision to send out-migrants may have significant effects on

other household economic activities. While migrants are away, households have less labour to allocate to local production activities. Households can send out more than one migrant but face a tightening household labour constraint when they do so. Thus, households with sufficient available labour tend to send out more than one migrant. For instance, among households in our sample that participated in migration, nearly 22% sent out several migrants (See Table C3 in the Appendix).

6.2.3 Theoretical model

As it is mentioned in the introduction section, this empirical study draws from the insights of the New Economics of Labour Migration. The New Economics of Labour Migration (NELM) theory presents the hypothesis that migration decisions are often made jointly by the migrant and by some group of non-migrants, generally the remaining household members (Stark, 1993). NELM, pioneered by Stark (1982), offers some compelling hypotheses about the impacts of remittances on development (Taylor and Wyatt, 1996). Stark hypothesizes that household farms participate in migration as a strategy to overcome constraints on production and investment activities as a result of missing or incomplete credit and insurance markets in rural areas. Migrants provide financial help to the rural household by enabling them to overcome credit and risk constraints. Costs and returns are shared, and the distribution of both is outlined in an implicit contractual arrangement between the two parties. Empirical evidence seems to support that the patterns of remittances are better explained as an inter-temporal contractual arrangement between the migrant and the sending family rather than as the result of purely altruistic considerations (Stark, 1993; Azam and Gubert, 2002). Risk handling also provides an illustration in which a wider social entity is collectively responsible for individual migration.

The NELM hypothesis has been tested in the migration literature. Typical examples are that of Lucas (1987) in his work on the emigration to South African mines and Taylor and Wyatt (1996) in their work on the shadow value of migrant remittances, income and inequality in household farm economy in rural Mexico. Lucas (1987) examines the effects of temporary labour migration taking the case of the emigration from five countries (Botswana, Lesotho, Mozambique, Malawi and the South African

"homelands"[27]) to South Africa's mines. His results show that emigration diminishes domestic crop production in the short run but again enhances crop productivity and cattle accumulation through invested remittances in the long run. Emigration is also shown to increase domestic plantation wages. Benjamin and Brandt (2002) also find that off-farm labour market participation loosens risk constraints on household-farm investments. Taylor et al. (2003) suggested that if migrants play a major role in financing a household, the motivation to participate in migration could be big. However, the household's propensity to encourage members to migrate may be mitigated when there are other ways to finance household production investments or if the loss of labour to migration carries significant costs in terms of forgone revenues (or yields) from the higher-return of agricultural or self-employment activity.

To investigate the behaviour of agricultural households, we will now motivate the theoretical model along the lines of discussion by Singh et al. (1986) in which for any production cycle, the household is assumed to maximize a utility function:

$$U = U(Z_a, Z_m, Z_l) \tag{6.1}$$

Where, the commodities are an agricultural staple(Z_a), a market-purchased good(Z_m), and leisure(Z_l). However, utility is maximized subject to a cash income constraint:

$$P_m Z_m = P_a(Q - Z_a) - w(L - F) \tag{6.2}$$

Where, P_m and Z_m are the prices of the market purchased commodity and the staple, respectively, Q is the household's production of the staple (so that $Q - Z_a$ is its marketed surplus), w is the market wage, L is the total labour input and F is family labour input (so that $L - F$, if positive, is hired labour and, if negative, off-farm labour supply or migration in our case).

The household also faces time constraint and production constraint or production technology:

27 Since 1960, and predominantly since 1970, some 3.5 million black South Africans affected by apartheid have been forcibly relocated in an archipelago of exceedingly poor "homelands" or Black States. It is this group combined with prior homeland dwellers, which are of concern to the study of Lucas (1987).

$$Z_l + F = T \tag{6.3}$$

$$Q = Q(L, A) \tag{6.4}$$

Where T is the total stock of the household time and A is the household's fixed quantity of land.

Now we take two cases of constraints in which migration (sending a household member away) affects household's production activity as reflected in equation (6.4).

Case 1: Cash income constraint

A farm household wishing to invest in his/her farm land may face a cash income constraint, limiting him/her to invest only a part of the land allocated for production. In such a case,

$$Q = Q(L, \overline{A}), \text{ where } \overline{A} < A \tag{6.5}$$

This cash income constraint may be in the form of the lack of a formal credit market that prevents the household from borrowing to increase the purchase of inputs and the like. In such a situation the household, as one of its survival strategies may send H migrants out of the farmstead to work on a wage-earning job. Migrants could thus help loosen the household's cash income constraint by sending back remittances, Y.

Case 2: Labour constraint

Unlike the first case where the household may face cash income constraint and would relax this constraint by getting remittances from the sent-out migrant, in this case the assumption is that the household may face labour constraint or may get his farm production reduced because of migration (because a negative $(L - F)$ indicates that the household has lost some of its members out of the household because of migration). Therefore, in the case of missing or imperfect labour market, the household must rely on the family labour and thus sending a household member may stop the household from maximizing the farm production.

Thus,

$$Q = Q(\overline{L}, A) \tag{6.6}$$

Where, $\bar{L} = L - F$ (a negative number) as a result of migration

From the above two cases, we can see that the overall effects of migration on total household production income is undetermined, since the relative magnitudes of the derivatives $\frac{\partial Q}{\partial \bar{L}} < 0$, $\frac{\partial Q}{\partial \bar{A}} < 0$ and $\frac{\partial H}{\partial Y} > 0$ are unknown.

This simple example illustrates the complexity of the linkages between migration and farm production in the migrant sending areas. To this end, one must point out that the simplifying assumptions used in the literature on modelling farm behaviour may not necessarily reflect this complexity. For example, static, recursive farm-household models (Lau et al., 1978; Barnum and Squire, 1979; Singh et al., 1986) assume a unitary correspondence between migrant remittances and household-farm income.

We will now proceed to the empirical model motivated by the NELM with the hypothesis that migration and/or remittances affect any non-migrant source of income in the migrant-sending and remittance receiving household.

6.2.4 The Empirical Model specification

As we have seen above, production is affected by migration and remittances. Through production, migration and remittances may have different effects on different income sources (Taylor, et al., 2003). The household income sources for this study are remittances, farm income, non-farm self-employment income, and other income. The vector of migration-constrained income sources depends on migration and remittances as well as on a vector of individual and household characteristics. Following Taylor et al. (2003), the main equation of our model explains the income earned by the household from each source:

$$Q_i = Q(H, Y, X_i) + \varepsilon_i; \qquad i = f, nf, o \tag{6.7}$$

Where, Q_i is the vector of constrained household production income sources, H is the number of migrants, Y is the amount of remittance, X_i is the vector of individual and household characteristics, ε_i is the normally and independently distributed with mean of zero and variance σ_i^2 error term. The subscript *i* denotes income source type, farm *f*, non-farm *nf* and other *o*.

As remittances are obtained by sending a family member out, migration affects remittances. This is in addition to the household characteristics affecting migrants' success and motivations to remit, thus the function of remittance is represented as follows:

$$Y = Y(H, X_R) + \varepsilon_R \tag{6.8}$$

Where, Y is the amount of remittance, H is the number of migrants, X_R is the vector of household characteristics and ε_R are normally and independently distributed with mean of zero and variance σ_i^2 .

Migration and remittances are endogenously determined together with income sources. To control for the problem of endogeneity instrumental variables that identify migration and remittances are needed (Taylor et al., 2003). Because not all households participate in the non-farm self-employment, the problem of self-selection arises. Thus, a need comes up to correct for this selectivity bias. Remittances and other income sources may be subject to the same stochastic shocks, which could cause contemporaneous correlation across equations. To account for the contemporaneous correlation across income sources, we estimate the remittance and income equations as a system using Iterated Three-Stage Least-Squares (3 SLS).

Migration is also a function of household characteristics. It can be represented by

$$H = f(\phi; X_M) + \varepsilon_M \tag{6.9}$$

X_M is the vector of household characteristics and ε_M is an independently and identically distributed error term.

The functional form in Equation 6.9 should reflect that the number of migrants from a household will always be a non-negative integer. Following Taylor et al. (2003), for the migration Equation (6.9), we

use the count data model because about 22% of our sample households, who send out-migrants, send more than one migrant out (Table 6.2). Taylor et al (2003) explain that the count regression model has several advantages over other specifications. Unlike a linear specification, it does not lead to negative predictions (Cameron and Trivedi, 1998; Long and Freese, 2001). We use the Zero Inflated Poisson (ZIP) model to account for the zeros by the non-migrant households. Lambert (1992) introduced the Zero Inflated Poisson (ZIP) model in which $\mu_i = \mu_i(X_i, \beta)$ and the probability φ_i is parameterized as a logistic function of the observable vector of covariates z_i, thereby ensuring non-negativity of φ_i. That is,

$y_i = 0$ with probability φ_i

$y_i \sim \mathrm{P}[\mu_i]$ with probability (1- φ_i)

$$\varphi_i = \frac{\exp(z_i'\gamma)}{1+\exp(z_i'\gamma)} \qquad (6.10)$$

To statistically control for the endogeneity bias when estimating the system of Equations 6.7-6.9, we postulate that in addition to household characteristic variables, migration is a function of migration experience of the household proxied by the migration experience of the household head and/or the spouse. Furthermore, in both theoretical and empirical work, migration networks have been shown to be among the most important variables driving migration. Members of a village who have already out-migrated help drive down some of the highest costs of out-migration, as migrants share information about jobs in other areas with their relatives and neighbours. Thus, households in communities with histories of migration have better opportunities to send out-migrants. To measure this, we constructed a proxy for migration network, in which the indicator variable is equal to one if a village had more out-migration than in-migration in 1988 (which was the year the Ghana Living Standards Survey was taken) and zero otherwise.

6.3 Data and Variables

Table 6.1 shows the relevant basic characteristics of the surveyed households[28]. This survey shows that households are predominantly male-headed. As shown in Table 6.1, the female-headed households are only 10% and 24% for the non-migrants and migrant households, respectively. A higher share of female headed households in the migrant group can be explained by male who would otherwise be reported as household heads being sent out as migrants. An interesting result is lower use of fertilizer for migrant households which suggest that these households choose migration and income from remittances as income diversification strategy rather than intensification of production as evidenced by higher mean fertilizer application (8.3 versus 12.3 kg per acre) to same sized land plots.

Table 6.1: Mean of variables by migration status of households

Variables	**Migrant households (n=221)**	**Non-migrant households (n=280)**
Number of out-migrants (per household)	1.24	-
Sex of the household head (1 = female, 0 = male)	0.24	0.10
Education of adult household members	3.23	2.59
Migration experience of head	0.48	0.39
Household size	10.22	8.10
Number of dependents per household	3.44	3.34
Mean age of the adult household members	35.43	35.08
Fertilizer per Acre (Kgs per Acre)	8.33	12.30

Source: Computed from GLOWA-Volta survey (2001)

[28] A more comprehensive household characteristics is shown in Table 5.1.

Almost all (98.6%) of the households farmed (see Table 6.2) and this is the biggest source of income for both migrant and non-migrant households. While about 52% of the surveyed households had generated income through non-farm self-employment activities, 56% of the households had generated income through other channels, which is categorized as "other income" in this study.

Table 6.2: Activity involvement

Activity	Number of households	%
Farm	494	98.6
Non-farm self-employment	263	52.5
Other	284	56.7

Source: Computed from GLOWA-Volta survey (2001)

Migrants were identified from the household survey as either children of the household head or household members who left the household to work outside the community within 5 years prior to the survey. Of the 501 households in the survey, 221 sent at least one household member into the migrant labour force. Village level variables were constructed using data from the GLSS (Ghana Living Standards Survey). They include the population of the community, and the public transportation access proxied by the dummy of whether public transport passes through the village. These village level variables are included in the income sources regression equations. The household income was attributed to four possible income sources as follows: farm income, which includes the proceeds from all annual crop sales; non-farm self-employment income, which includes all income businesses run by households which are not purely farm activity; remittances, which include all gifts that could be identified as being sent by migrants; and finally most of the households had some other form of income, such as pensions, rental properties, sales of firewood, poles, trees, charcoal or handicrafts, hunting, petty trade, mining/quarrying stones, etc. These incomes were classified as "other" for purposes of this chapter.

Demographic variables hypothesized to affect the model include the total number of family members, including the number of dependents. The X_i variables in Equations 6.7-6.9 control for several demographic characteristics across households as well as for discrepancy in economic conditions

across communities. It is hypothesized that, with imperfect labour markets, household size should increase the potential for migration, as well as income, since larger households have more labour to allocate across activities. To consider for differing human capital characteristics across households, we include measures of education in all equations. An extensive body of literature finds evidence of returns from schooling and other human capital in farm production and in migration (Jamison and Lau, 1982; Taylor and Martin, 2001). The educational level of household head was taken as a proxy for education of the household. Also, in our sample households, the number of young dependents (age 15 or less) can be expected to affect household income sources, thus it is included in all of the income and remittance equations.

6.4 Results and Discussion

6.4.1 Prediction of the number of migrants

Recall that we use the predicted values of the number of migrants in the migration equation (equation 6.9) in order to fit them in the income source equation to avoid the endogeneity problem. For the specification of the migration equation, the Poison Regression Model (PRM), the Negative Binomial Regression Model (NBRM), the Zero Inflated Poisson Model (ZIP) and the Zero Inflated Negative Binomial (ZINB) were compared for their performance to explain the data using the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) (Long and Freese, 2001). After comparing, the Zero Inflated Poisson Model (ZINP) was preferred as it had a lower AIC and BIC[29]. Following the procedure by Vuong (1989), which enables one to compare among models, we computed a Vuong statistic and it was significant. The predictions from the Poisson migration equation that enter the income source equations can be interpreted as the expected or predicted number of migrants from the household. As we can see from Table 6.3, the household size affects migration positively while the number of dependents affects it negatively.

[29] All else being equal, the model with the smaller AIC and BIC is considered a better fitting model (Long and Freese, 2001: 86).

Table 6.3: The ZIP estimates of the effects of household and community characteristics on migration

Explanatory variables	Coefficient	Standard error
Household size	0.6143 (3.65)***	0.0168
Dependency ratio	-0.2342 (-1.77)*	0.1321
Education of adult members in a household	0.0735 (2.46)**	0.0299
Mean age of adult households	0.0159 (1.84)**	0.0087
Sex of the household head (dummy, 0=male, 1=female)	0.2571 (1.63)*	0.1580
Migration experience of the household head	-0.0135 (-0.09)	0.1586
Farm size per person	0.0540 (1.62)*	0.0333
Population of the community	0.0001 (1.16)	0.0000
Migration experience of the village	-0.0604 (-0.36)	0.1669
Age of community	-0.0000 (-0.03)	0.0007
Public transport for the community	0.1086 (0.66)	0.1656
Intercept	-1.9944 (-3.20)***	0.6230
Vuong test of ZIP versus the PRM	5.27***	
AIC (Akaike Information Criterion)	1.815	
BIC (Bayesian Information Criterion)	-1477.48	
/lnalpha	-66.85	
alpha	9.24e-30	
Inflate		
Household size	-42.1832 (-1.33)	
Dependency ratio	48.6426 (1.29)	
Mean age of adult households	1.3833 (1.29)	
Migration experience	-86.7698 (-1.31)	
Sex of household head	-87.0783 (-1.30)	
Farm size per person	-9.1075 (-1.36)	
Intercept	168.464 (1.33)	

Source: Computed from GLOWA-Volta survey (2001)

Value of z statistics are in parentheses
*** Significant at 1 %; ** significant at 5%, * significant at 10%

6.4.2 Migration versus Income Sources

In the income source equations, statistically significant effects of migration and remittances were found, which supports the key hypothesis of NELM theory. As expected, remittances are positive effects of migration (Table 6.4, column 2, row 1). Each additional migrant contributes on average about 3.2 million *Cedis*[30] of increase in remittance income per annum. While the remittances that migrants send back raise rural household income, our results, additionally, show that remittances come at a cost to the sending households. Farm income, for example, falls significantly when migrants leave the household, by about 13.7 million *Cedis* per annum (Table 6.4, column 3, row 1) from a mean farm income in our sample households of around 36 million *Cedis*. This result implies that households lose around 37% of their farm income when a migrant leaves. One explanation for the negative effect on farm income that accompanies migration is that when a labourer leaves the household, the family's on-farm labour force falls and income decreases. Indeed, without easily accessible on-farm labour markets, it is not surprising that farm income falls so sharply in the short-run.

While migration itself has a negative effect on farm income, through remittances migration also has a positive, indirect effect on household income (Table 6.4, column 3, row 3). Each 1000 *Cedi* remitted results in an increase of 3,940 *Cedis* of additional farm income. However, given the large percentage decrease in household labour that accompanies migration in rural Ghana, the strong positive effect of remittances may not be surprising. In developing countries, there is often considerable scope for substituting capital for labour (Taylor et al., 2003). Evidently, this is also the case in Ghana's rural economy.

[30] Cedi is the Ghanaian national currency and its official exchange rate is 1 Euro=11,736 Cedis (Feb 2004).

Table 6.4: Effects of migration and remittances on income sources

Independent Variables	Dependent Variables[#]			
	Remittances (in 1000's)	**Farm income (in 1000's)**	**Non-farm self-employment income (in 1000's)**	**Other income (in 1000's)**
Remittances (in 1000's)		3.94 (1.96)**	1.86 (5.23)***	0.77 (3.98)***
Number of migrants, predicted	3,177.6 (2.68)***	-13,662.6 (2.19)**	-5,836.5 (-3.24)***	-2,072.4 (-2.24)*
Sex of household head (female =1, male =0)	1,029.8 (2.05)**	-5,536.3 (-1.96)**	-1,962.6 (-2.80)***	-690.9 (-1.95)**
Mean age	30.3 (1.29)	-148.8 (-1.89)**	-59.3 (-1.98)**	-39.1 (-2.62)***
Household size	-95.1 (-0.91)	568.7 (2.02)**	-132.4 (1.03)	-36.6 (-0.58)
Adult education	-204.4 (-2.0)**	824.9 (1.83)**	394.4 (2.79)***	173.6 (2.43)***
Farm size per person		150.8 (0.53)		
Number of crop types grown in 2 seasons		-18.7 (-0.05)		
Soil quality		-1870.6 (-0.89)		
Fertilizer applied per acre		-23.9 (-1.15)		
Number of dependents in a household	209.2 (1.53)	-753.9 (-1.42)	-256.0 (-1.44)	-3.3 (-0.04)
Population of the village	0.92 (3.68)***	-4.6 (-2.21)**	-1.08 (-2.44)***	-0.49 (-2.15)**
Public transport	-404.3 (-0.89)	-446.9 (-0.40)	875.6 (1.58)	75.9 (0.28)
Age of the community	-0.76 (-0.37)	-4.0 (-0.83)	2.4 (0.99)	0.79 (0.66)
Migration history of the community	-263.7 (-0.60)	-490.6 (-0.47)	127.9 (0.24)	-37.2 (-0.14)
Inverse Mills Ratio			-65.4 (-0.33)	

Source: Computed from GLOWA-Volta survey (2001)

[#] Z-statistics are in parentheses. The predicted migration variable is a fitted value from the Poisson regression of the number of migrants sent out from a household. The inverse Mills ratio is calculated by taking all exogenous variables that might affect self-employment income and regressing them against a 0-1 no participation-participation variable, by the Probit method, for self-employment activities (Results reported in the Appendix, Table C3).

Like farming income, the non-farm self-employment income also falls when migrants leave (Table 6.3, column 4, row 2). The coefficient on the migration variable in the non-farm self-employment income is statistically significant and negative. Though hard evidence is beyond the scope of the

analysis, the pattern of this result is consistent with a scenario in which households that send out-migrants respond to the reduction in their household labour force not only by reducing labour to farming but also to the non-farm self-employment activities. The indirect effect of migration upon non-farm self-employment through remittances is also positive. Each 1000 *Cedi* remitted is associated with an increase of 1,860 *Cedis* of additional non-farm self-employment income. The inverse Mill's ratio is not statistically significant indicating that the non-farm self-employed households are not self-selected. In the case of 'other income' we can see that there is a significant decrease of income when a migrant leaves, but the remittance also increases the households' income significantly. Since different sources of income are included under the category of "other income", it is difficult to distinguish the immediate effect of migration and remittance on these sources. As would be expected, education level affects all sources of income positively and significantly. It is also evidenced that male-headed households are likely to have more farm and non-farm incomes than their female-headed counter parts.

Because migration has multiple effects on household income sources, the net effect of migration on total household income is a sum of direct and indirect effects of migration on income sources, where indirect effects occur through remittances. Thus the net effect of migration on total household income is the sum of the effect of migration on remittances and the total effect of migration on each income source. This can be formulated as follows:

$$\frac{dQ}{dH} = \frac{\partial Y}{\partial H} + \sum_i \left(\frac{\partial Q}{\partial H} + \frac{\partial Q}{\partial Y} \cdot \frac{\partial Y}{\partial H} \right); i = f, nf, o. \qquad (6.11)$$

To calculate the net effect of migration on rural households' income, we use a bootstrap procedure to create a confidence interval around the estimates for an income component (Taylor et al., 2003) (Table 6.5). Using bootstrapping, we can produce confidence intervals around the expressions that measure the net effect of migration on income in Equation (6.11).

Bootstrapping is a technique which replaces theoretical assumptions and complex algebraic calculations with a large number of stochastic simulations and it is used to obtain a description of the sampling properties of empirical estimators using the sample data themselves, rather than broad theoretical results (Veall, 1987; Greene, 2000). Developed by Efron (1979), the technique of

bootstrapping is appearing with increasing frequency in the applied econometrics literature. Veall (1987) has, for example, used this technique for bootstrapping the probability distribution of peak electricity demand. The heart of the idea is to use a computerized pseudo-random number generator in artificial re-sampling, and then to use these artificial samples to calculate an empirical probability distribution for the target statistic.

Table 6.5: Net effects of migration on income sources of households

Effects	Computation (in 1000's)	Bias-corrected 95% confidence interval (in 1000's)
$\partial Y/\partial H$	3,178 (1,185)*	[1,577, 5,545]
dQ_f/dH	-1,149 (667)	[-6,377, 4,078]
dQ_{nf}/dH	86 (1481)	[-2,818, 2,989]
dQ_o/dH	363 (232)	[-994, 1,720]
dQ/dH	2,477 (1532)	[-7,955, 12,908]

Source: Computed from GLOWA-Volta survey (2001)

* = Numbers in brackets are standard errors

Results show that as migrants leave, thus taking their labour with them, but send back capital in the form of remittances, farm income in our sample decreases by a net of about 1.2 million *Cedis* (Table 6.5, row 2). From Table 6.5 it is made evident that the remittances compensate for the lost labour. This result is interesting because in the context of developing countries, farm income tends to be labour intensive and has the lowest marginal product of labour for the household. The confidence interval for the net effect of migration on farm income is negatively skewed while that of other income is positively skewed. The entire confidence interval for the remittances is positive, which shows the categorical positive effect of migration on remittances. When the total derivative of rural household income with respect to migration is considered, we find that the point estimate is positive (2.5 million Cedis or about 33% of average household income; Table 6.5, row 4). A positive point

estimate would suggest that the income of household members left in the source community is higher after migration than before migration.

6.5 Conclusions and Policy Implications

Smallholder agriculture is prone to risks that may endanger the mere survival of the farm household (Schrieder and Knerr, 2000). In the Volta basin of Ghana, a typical income diversification strategy involves one or more household members moving away for cash employment while the remaining members engage in agriculture. In this chapter, the impacts of migration and remittances on income sources of the household are investigated. Our econometric findings using household survey data show that the loss of labour to migration has a statistically significant negative effect on household farming income in the source areas. However, we also provide evidence that the remittances sent home by migrants fully compensate for this lost-labour effect, by providing a significant positive contribution to household income. This finding offers evidence in support of the NELM hypothesis that participation in migration via remittances loosens constraints on production in the imperfect market environments characterizing rural areas in the Volta basin of Ghana. In view of the multiple effects of migration, we find that participating in migration at the household level increases household income for those left behind. Thus migrants play a major role in financing the source household making the *ex ante* incentive to participate in migration large. Given the imperfection or absence of the formal institutions for managing risk in rural Ghana (Jones et al., 2000), this result implies that rural households are induced to self-insurance through the geographical dispersion of their members. In the event of transitory income shocks due to unforeseen negative local conditions (for example rainfall variation, incidence of disease of household members, pests and fire of their cropping activities, variations in the price of marketed output, etc), families can rely on the migrants for financial support.

Based on the results of this chapter, we can further say that at least in the case of farming activity, migration and remittances have complex effects on household incomes in rural Ghana. Our results support the NELM hypothesis that migrant remittances loosen constraints on different types of household production, in this case stimulating agricultural productivity, non-farm self-employment and other activities. The results are consistent with previous findings from China (Taylor et al., 2003;

and Rozelle et al., 1999) that the positive impact of remittances on maize yields nearly offsets the negative lost-labour effect.

In Ghana like in other developing countries, imperfect credit and insurance markets place a high premium on migrant remittances as a means to overcome liquidity and risk constraints on household-farm production. Thus, if government wants to lessen the increasing rural-urban migration, it would be helpful to find the sources of labour-market imperfections and rectify them where possible. Providing households with credit systems or encouraging informal credit institutions could increase households' production efficiency and would keep them from sending migrants out to finance the farm and non-farm activities or to insure against on-farm income shocks.

The limitation of this chapter is that although we have identified multiple ways that migration and remittances affect rural incomes in Ghana, migration may have more complex effects on household outcomes than we can cover in the scope of this chapter. In our data set, there is mild evidence that households invest remittances in farming or self-employment activities. Thus, future research in the area would focus on analyzing where the remittances exactly go. As imperfections in capital and insurance markets certainly exist in rural Ghana, the remittances could provide households with a motivation to migrate as part of a dynamic strategy to invest in new agricultural and non-agricultural ventures. Additional longitudinal data are necessary to explicitly test this hypothesis.

CHAPTER 7 DETERMINANTS OF INTER-DISTRICT MIGRATION FLOWS

7.1 Introduction

"Migration is an experience with which most of us are familiar. For some it is associated with excitement and challenge; for others, sadness and failure. It has a special relevance in the current economic climate when individual solutions to economic problems, such as 'getting on your bike', are stressed, and when a classless society is defined in terms of unhindered social and geographic mobility" (Stillwell and Congdon, 1991: 1).

Migration, an essential determinant of a nation's population dynamics, involves a change of usual place of residence by an individual, group of persons, family or household. Thus the concept of migration is essentially a geographic issue since a change of residence necessitates movement from one location to another. This geographical interface may take place over very small distances (e.g. to a different residence in the same village or community) or across much longer distances (e.g. between continents). However, whether internal or international, migration is much more than just a geographic change in location and its consequences can be either encouraging or discouraging for the migrants, the migrant's family or the communities they leave as well as those they settle in. Climatic zones in West Africa are so ordered that the slack season in the Savannah zone is the busy season along the southern coast; the period of inactivity in the Savannah regions corresponds to the time of peak agricultural demands in the cocoa and coffee regions of the forest zones (Berg, 1965 cited in Kasanga and Avis, 1988). Thus migration is a vital element of the contemporary scene in most West Africa (Kasanga and Avis, 1988; Dao, 2002).

It is a repetition but still important to mention that in Ghana migration has been an important component of the people's livelihoods since ancient times. Studies indicate that Ghana loses people as a result of migration. The annual net migration rate for Ghana is -0.83 migrants per 1000 population (World Fact Book, 2003). Though reduced from -0.94 migrants per 1000 population in 1995, Ghana is a net sender country especially when compared to the neighbouring countries like Nigeria, Benin, Togo and Côte d'Ivoire which have a net migration rate of 0.26, 0.00, 0.00, and -0.08

per 1000 population respectively (World Fact Book, 2003). Nationally, in the period between 1995 and 2000, about 1.4 million people have changed their usual place (in our case, district) of residence (Computed from Ghana 2000 census data). This translates to a 71:1000, migrant to population ratio.

Empirical results from earlier works on the migration causes in Ghana show that the "search for wealth"[31] represented 80% of the dynamics in Ghana followed by employment and income levels (Kasanga and Avis, 1988). Kasanga and Avis categorized the migration determinants into micro and macro levels. At the micro-level, the presence of relatives, educational characteristics, exploring new places, starting an independent life and family conflicts are found to be the primary reasons. At the macro-level, however, colonial policies, the southern contribution to the colonial economy, urban bias, urban industrial and business promotion and agricultural stagnation are identified as migration determinants. On the other hand, Addo (1980) mentioned that the existing internal migration in Ghana is the effect of a collective process of social and economic change and the growing modernization, which is triggered by economic activities like the modern mining and cocoa industries.

Literature pertaining to migration in Ghana, such as Caldwell (1969), David et al. (1972), Nabila (1974), Udo (1974), Addo (1980), Kasanga and Avis (1988), Tutu (1995) and Litchfield and Waddington (2003), attempted to explain the rapid rural-urban migration and most of these studies lay emphasis on the migrants from the north to the central and coastal areas. These studies, however, are all at the household-level. No such attempt is made to characterize the migration behaviour at the district-level by distinguishing district characteristics as determining factors for migration. Thus there are major knowledge gaps about the level, pattern and differentials of district-level migration flows and their determinants in Ghana. This chapter bridges this gap and identifies the important district characteristics that are behind the migration phenomenon.

Since migration flows are important in determining the demographic and socio-economic composition of regions and/or districts, an understanding of inter-district migration flows is necessary for any one attempting to analyze the general process of regional change. Explaining the dynamics of

[31] The "search for wealth" includes the primary conditions for a satisfactory and reasonable life, such as, the acquisition of durably productive resources necessary to sustain improved quality of life. In general, this is defined by, the quality of employment and earning potential (Kasanga and Avis, 1988).

migratory flows is advantageous because it has far reaching implications for setting up policy and socio-economic change; additionally, migration has widespread consequences, both for the individuals involved and for the society within which it takes place (Cadwallader, 1992). Accordingly, this chapter aims at identifying the main factors shaping migration flows at the district-level and to consider the spatial flows of people by examining the net-sending and net-receiving districts in the VB of Ghana.

Policy makers have become increasingly aware of the role of migration flows in the context of such issues as economic growth and social well-being. Thus research results from this chapter will support government policy makers and planners to be better aware of the district characteristics that underlie the processes by which migration occurs in the VB of Ghana.

The remainder of this chapter is organized as follows. The second section describes the theoretical background of the model. The third section deals with the model specification and explanation of variables. The fourth section is devoted to the analysis of results and subsequent discussions. Section five concludes and mentions main policy implications.

7.2 Theoretical Background

The chapter uses the gravity model developed within the framework of utility theory in chapter 3. In this sub-chapter, we reconcile the economic derivation of the gravity model in chapter 3 with the traditional gravity model and the model is modified to include important socio-economic and environmental factors including distance.

In its most general form, the traditional gravity model is specified as follows:

$$M_{ij} = G \frac{P_i^{\delta} P_j^{\beta}}{d_{ij}^{\gamma}} \tag{7.1}$$

Where: M_{ij} = Migration from region i to region j

P_i = Population in place i

P_j = Population in place j

d_{ij} = Physical distance between places i and j

G = Constant

δ, β and γ are parameters to be estimated.

Equation 3.9 (in chapter 3) is a derived solution for utility maximization of spatial interaction of all individuals at origin i, subject to the monetary budget constraint. This equation can be reconciled with the traditional gravity model (Equation 7.1) by assuming that Y_i (the total amount of money that all individuals at origin i are willing to spend for travel to all destinations, per unit time) in Equation 3.9 is proportional to the population of the origin, P_i raised to β. A realistic alternative reconciliation is to express Y_i as follows:

$$Y_i = uZ_i = (uP_i)\left(\frac{Z_i}{P_i}\right) \tag{7.2}$$

Where: Z_i = Aggregate money income at origin i and,

u = Fraction of total money income at the origin that is budgeted for travel

Here per capita income at origin i, Z_i / P_i is a constant, and Y_i is proportional to the population of the origin times its per capita income.

Generally, migratory flows depend on a set of factors pertinent to the place of origin, destination and migrant characteristics. For building an inter-regional gravity model of migration in Russia, Andrienko and Guriev (2004) included variables representing characteristics of the origin and destination regions which influence the determinants of the flows. They argued that economic factors at both origin and destination places played a role in directing migration flows in Russia. Similar to Sjaastad (1962) and Greenwood (1975; 1985), Andrienko and Guriev (2004) assumed that a decision to migrate is made if the expected benefits from migration are higher than the foreseeable migration costs.

Several studies (Weber and Sen, 1985; Brown, 1997; Maré and Timmins, 2000; Andrienko and Guriev, 2004) have used the gravity model for the formulation of their respective migration theories. Including migration, the gravity model has been applied to international trade flows, tourism, and foreign direct investment. The gravity model is named that way because it uses a similar formulation with Newton's gravity model in the physical science, which implies that the attraction between two objects is proportional to their mass and inversely proportional to their respective distance. Likewise, the gravity model in the migration literature offers a good application of the spatial interaction method. It takes into account the population size of two places and the physical distance between them. Since larger places attract more people than smaller places and places close to each other have a greater attraction, the original gravity model incorporates these two features (Cadwallader, 1992; Gallup, 1997; Maré and Timmins, 2000; Andrienko and Guriev, 2004).

Karemera, et al. (2000) explained that a gravity model is a reduced form equation derived from a system of demand and supply relationships. Referring to Borjas (1989), Karemera et al. (2000) mentioned that since the economic theory of migration is not yet fully developed, complete derivation of the theory of demand and supply of migrants is unachievable. However, supply and demand for migrants can be systematically linked to the size of populations and the size of income/per capita income respectively (Greenwood, 1975).

Let, $OM_i = f(O_i)$ (7.3)

Where: OM_i is the out-migration flow from origin place i; and

O_i is potential supply factors of migration, in which

$$O_i = f(y_i, p_i) \quad (7.4)$$

Where: y_i is income in the origin place i; and

p_i is population at origin place i

Potential demand factors for migration (I_j) are likewise a function of income (y_j) and population of the destination place (p_j), representing the pull factors of the destination place. Thus,

$$I_j = f(y_j, p_j) \tag{7.5}$$

Combining Equations 7.1, 7.4 and 7.5 yields an equation of a migrant flow (F_{ij}) from origin place i to destination place j, specified as follows:

$$F_{ij} = \frac{\lambda_o O_i^{\lambda_1} I_j^{\lambda_2}}{d_{ij}^{\lambda_3}} \tag{7.6}$$

The exponents represent migration elasticities and d_{ij} represents factors curbing migrant flows from i to j, such as transportation costs. Transportation costs depend on factors like the cost of travel from source to destination place and cost of information. Furthermore, distance influences migration decisions through costs of moving that include transportation costs, costs of search and information acquisition, psychological costs of leaving the place of birth and close relatives and friends. Apparently, these costs increase with distance. Taking into account modern information and transportation technologies, λ_3 can not be expected to be very large. Since all these costs increase slower than linearly, the coefficient should be below one. Greenwood (1997) found out that distance elasticity of migration declines over time.

Taking logs of both sides of Equation 7.6 and replacing the log terms by their equivalents yields the basic migration model as follows:

$$M_{ij} = \alpha_o + \alpha_1 p_i + \alpha_2 p_j + \alpha_3 y_i + \alpha_4 y_j - \alpha_5 d_{ij} + e_{ij} \tag{7.7}$$

M_{ij} is the migration flow between places i and j; $p_i (p_j)$ is the population of the origin place i (the destination place j); $y_i (y_j)$ is the income level of the origin place i (the destination place j) and d_{ij} denotes distance/travel costs. The α's are estimable parameters. Equation 7.7 in its simplest form, where e_{ij} is just an error function, is similar to a gravity model of migration proposed by Greenwood (1975). A migration flow from place i to place j is a negative (positive) function of income in origin (destination) place, a positive (negative) function of population size of the origin (destination) place,

and a negative function of monetary and psychic costs of moving to the destination place (Karemera, et al., 2000). Greenwood (1975) describes possible argument of the function by focusing on indicators of domestic economic activities such as price rises and unemployment rates.

A properly specified extended gravity model of migration contains variables representing economic, climatic, and natural factor characteristics of origin and destination. These characteristics are included on theoretical and empirical grounds. Natural factors include distance, and transport, information and psychic costs. Expanding Equation 7.7 to include place characteristics yields an empirical specification of the migrant flow equation of the form:

$$m_{ij} = \lambda_o + \lambda_1 d_{ij} + \lambda_2 p_i + \lambda_3 p_j + \lambda_4 y_i + \lambda_5 y_j + \lambda_6 r_i + \lambda_7 r_j + \lambda_8 u_i + \lambda_9 u_j + \lambda_{10} f_i + \lambda_{11} f_j + e_{ij} \quad (7.8)$$

In Equation 7.8, we have several collections of variables that can explain the migration flows from i to j. The gravitational demographic variables include distance (d_{ij}), population (p_i, p_j) and income (y_i, y_j). Since transport costs are not readily available, a common practice in empirical gravity model studies is to use the shortest air distance (d_{ij}) between origin and destination places as proxy for transportation costs. The second set of explanatory variables is included to identify the effects of domestic economic activities such as price indexes (r_i, r_j) and unemployment rates (u_i, u_j) on migration flows. The last set of explanatory variables includes rainfall rates (f_i, f_j). The hypothesis is that the higher the rate of prices in the receiving place *j*, the less economically attractive it is to potential in-migrants. The unemployment rate identifies the relative impact of labour unemployment on the size and composition of migrant flows. It is expected that rising unemployment rate in the source place leads to an increase in out-migration, while increasing unemployment rate in the receiving place discourages inflow of migrants.

This simple relationship performs well in modelling general patterns of mobility. The gravity model serves to factor out patterns in the data that arise primarily because of the scale and spatial configuration of regions (Maré and Timmins, 2000). Essentially, most micro-economic models of migration clearly generate some form of gravity formulation, when aggregated over homogeneous

population groups (Molho, 1986). Classical view of 'migration as responding to wage differentials' is, for example, consistent with an aggregate gravity type by including wage rate as principal push and pull factor. The human capital model (Sjaastad, 1962) also suggests a broader variety of social, economic, and environmental push and pull factors and includes distance function in order to take into account the transportation and psychic costs of moving. The relative significance of such variables raises questions which may be tested within the gravity model formulation. The important merit of the gravity model lies not in any fundamental contribution to migration theory, but rather in its capability to cover several theoretical perspectives within a readily estimable framework and thus provides evidence for or against various alternative underlying theories.

However, critics of the gravity model have suggested that the underlying micro-economic relationships may not aggregate linearly (Gallup, 1997) leading to distortion of the estimated parameters. The main problem with using aggregation is that of lumping together heterogeneous groups of migrants, which may involve considerable loss of information. The gravity model has been criticized for its lack of economic, behavioural and theoretical foundations (Niedercorn and Bechdolt, 1969; Maré and Timmins, 2000; Anderson and van Wincoop, 2003). The other limitation of the gravity model is that it constrains the form of the distance deterrence function to be everywhere the same, though this constraint is empirically invalid (Fotheringham, 1981 cited in Molho, 1986) when applied to a variety of different forms of spatial interaction and that its removal results in a general pattern of steeper distance decay in more remote areas. These empirical findings relate to the possibility of spatial variations in the marginal utility of money and the consequent effect on the distance/cost function as well as the potential for economies of scale bearing on costs of overcoming distances. Despite these limitations, however, the gravity model was found in practice to be remarkably successful in explaining a wide variety of different forms of spatial interactions.

7.3 Empirical Model Specification

We examine the patterns of internal migration dynamics in the VB[32] of Ghana in order to determine the driving forces of the migration process at the district-level. We employ the gravity model because this chapter using aggregate data attempts to explain gross inter-district migration without the explicit

[32] From the total of 110 districts in Ghana, 57 districts lie within the VB of Ghana.

introduction of an individual decision function but more readily relating migration to certain aggregate proxy variables. In this chapter, the gravity model is modified to include basic district characteristics. The model is specified considering the 'gross' *in-* and *out-* flows rather than the difference between them, which is the 'net' flow, so as to precisely differentiate the determinants of IMR and OMR.[33] Greenwood (1975) argues that although theoretical foundations of net and gross migration models are similar, the theoretical implications are different. It has been argued that based upon theoretical grounds, gross migration models are to be preferred to net migration models (Kau and Sirmans, 1977; Tabuchi, 1985), because net models do not clearly demonstrate whether a selection of district characteristics primarily affect IMR or OMR (Lowry, 1966; Rogers, 1990 cited in Cadwallader, 1992; Brown, 1997). The other rationale behind employing the 'gross' migration model as opposed to the 'net' migration model is that some variables may have similar forecasted effect on both the IMR and OMR, which may then counterbalance the estimates of net migration. In addition to that, the pictorial representations (Figure 4.6 in chapter 4) of migratory flows coupled with the high positive correlation coefficient (+0.55) demonstrate that there is much overlap between the districts of high IMR and OMR. Consequently, the estimates using the 'net' approach would underrate the overt and covert inter-district migrant exchanges. To control these setbacks, the "gross" migration flow approach is used. This distinction is not only important for understanding economic relationships, but it is also vital for informing policy making related to labour mobility. This model motivates an exploration of origin-destination pairs, the aggregate level driving forces for internal migration flows and a mode of migration analysis that provides a firmer base for policy inference.

A comprehensive analysis of migration decisions involves the determination of individual migration probabilities from each area of origin to all possible destination zones, incorporating a distance deterrence function to capture the implicit relationship between migration costs and length of move (Molho, 1987). Nevertheless, implementing this analysis involves a number of difficulties. First, the number of options facing individuals is so large, that such an approach is computationally unfeasible from the point of view of the potential migrant. Second, it is highly probable that individuals operate with acute limitations on information, and as there are costs involved in gathering information, it would not be optimal to collect all information to maximize utility over all possible alternatives.

[33] The theoretical relationships between in-migration and out-migration flow models are explained in detail in chapter 3 (Section 3.4.2).

The possible solution to these problems is to break up individual's choice into a sequence of decisions, the outcomes of which form a decision tree, along similar lines to the two-stage budgeting models of consumer theory (Deaton and Muellbauer, 1980). Thus the model specification follows the implicit behavioural assumption underlying gross flow specifications that migration decisions go through two decision stages (Brown, 1997; Molho, 1987; Gbortsu, 1995): first, the decision to leave (the out-migration model) and second, the choice between competing destinations (the in-migration model). The former decision involves comparing migration as an activity against all other possible activities, while the latter represents a choice among competing destinations. Molho (1987) provides some empirical evidence in support of the separation of these decisions. Such a model emphasizes that determinants for choosing between competing districts can be different from the driving forces of the decision to leave. Gbortsu (1995) mentions that migration should be seen as a two-stage phenomenon, whereby the migrant is initially influenced directly by socio-economic conditions in the area of origin, while the eventual decision to move is largely a function of the migrant's perception of the conditions at the place of destination.

7.3.1 Variables

Gross migration models estimate the principal determinants of aggregate migration flows from place to place, calculate their relative importance, assess possible trade-offs and predict migration flows based on the estimated elasticities (Brown, 1997; Todaro, 1976). The propensity to migrate is also empirically a function of place attributes: origin, destination, interaction, and regional competitive characteristics (Alonso, 1980). Different factors explain migration at the district-level. For purposes of this chapter, we categorized the factors into four groups: the infrastructure, environmental, economic and human capital factors, as shown below:

1. Infrastructure

- Health facilities (Number of clinics per population)
- Urbanization rate
- House holding/tenure arrangement
- Distance in kilometres between origin and destination districts

2. Environment

- Population density (1995)
- Average rainfall amount
- Rainfall variability/Coefficient of variation of rainfall

3. Economic factors

- Income levels
- Food Price Index
- Unemployment rate
- Employment sector (Formal versus Informal)

4. Human capital

- Literacy rate

The main data source is the Ghana 2000 census data taken from the Ghana Statistical Service (GSS). The complete matrix of migration flows together with data on the house holding/tenure arrangement, urbanization rate, unemployment rate and literacy rate are extracted from the census data. Data on rainfall, health facilities, and distance variables are collected from concerned ministries. The economic variables which include income levels and food price index are extracted from the GLSS IV data. Table 7.1 explains the variables and their expected signs.

Unemployment rate is the proportion of the unemployed population to the economically active population, and literacy rate stands for the percentage of individuals above the age of 15 who are literate. The average income per adult members of a household (>15 years), computed from GLSS IV, is used as a proxy for income levels of the districts. The number of available operating clinics per 1000 people represents the health index of the districts. This is to make the comparison plausible as other health facilities (number of doctors, hospitals, etc.) were not existent for every district. The distance in kilometres between capital cities of districts was taken as proxy for distance between districts. As shown in the census, the house holding/tenure arrangement for the households is mainly owning, renting, rent-free, and perching. For our purpose, the share of the households who own their

house as a proportion of the total household population is employed. The proportion of workers in the formal sector per total number of workers is used as a variable indicating the employment sector. The public and private formal sectors are combined to make up the formal sectors and weighted by the remaining components. The average rainfall and the coefficient of variation of rainfall for 5 years (1993-1997) were considered in the regression to observe the effect of rainfall on migration.

In the GLSS IV, the food price index is computed at household-level. Thus we estimated an average food price index[34] that a household faces for every district and this is taken as the average food price for the households in the districts. Similarly, the income levels are taken from the GLSS IV. In this chapter, the income variable refers to the average annual money income per adult in the district in 1999. However, individuals are not likely to base their decision to migrate on a comparison of average wage rates. Rather, given their occupation and training, they will consider the income that they are likely to earn at alternative destinations. Nevertheless, since wage structures are generally similar regardless of their level across the destinations, a higher average wage rate in region j than in region i may well indicate that all or most of the occupations making up the structure in j have higher returns than comparable occupations in i. Therefore, the direction of migration should, *ceteris paribus*, be away from those regions with low average wage rates and toward those regions with high average wage rates. Additionally, in order to reduce the possibility of simultaneous equations bias owing to the fact that migration affects contemporary economic conditions as well as being influenced by them, the data on independent variables are largely dated 1995, the base year of the migration flow.

[34] When computing the Index, the GLSS used the January 1999 Price in Accra as the base price.

Table 7.1: The description of variables and the expected signs

Variables	**Expected sign**	
	Out-migration	In-migration
Infrastructure		
Number of clinics	-	+
Urbanization rate	-	+
Share of house owners	-	
Distance	-	-
Distance square	+/-	+/-
Environmental stress		
Population density (1995)	+	-
Average rainfall	-	+
Coefficient of variation of rainfall	+	-
Economic Factors		
Food price index		-
Income levels	-	+
Unemployment rate	+	-
Share of workers in formal sector		+
Human capital		
Literacy rate	-	+

7.3.2 The Out-migration Model Specification: The Decision to Leave

Normally, the migration variable used in a multivariate regression is represented as a rate of the flow from i to j over the population in the origin i, thus the denominator should be the appropriate population at risk (Beals et al., 1967; Yap, 1977; Kau and Sirmans, 1977; Cebula, 1979; Milne, 1991; Cadwallader, 1992; Taylor and Martin, 2001). Following these empirical models, in this chapter, the

migration rate is defined as the number of migrants over the population at origin, $\frac{OM_i}{P_i}$ (in Equation 7.9). Out-migration from an area is determined by the first decision that migrants make, that is, the decision to leave. In making this decision, individuals compare the characteristics of their origin i to the total of possibilities outside. In the specification employed here, the mean characteristics over all districts represent a blend of outside opportunities. Individuals considering out-migration view their origin characteristics relative to these outside opportunities. These characteristics are designated as $\frac{Y_{hi}}{\sum_i Y_{hi} \Big/ N}$ in Equation 7.9 below. The variables in their relative forms are mainly the income level, population density, urbanization rate, number of clinics per population, average rainfall amount and the coefficient of variation of rainfall. In addition, there are also characteristics $\left(\sum_c \gamma_c S_{ci}\right)$ that influence flows that are not compared across areas but instead determine the ability or propensity of people within the area to move out. These are basically unemployment rate, literacy rate and the proportion of households who live in their own house. The other explanatory variable used is the distance between the districts. We sum over these distances to get composite characteristics reflecting the possible effects of distance. Previous empirical studies have found distance to be the most important factor in explaining the spatial allocation of migrants (Greenwood, 1969).[35]

As mentioned earlier, we model the determinants of out-migration by weighting each district's number of out-migrants as a rate of total population in the district. Thus, following Brown (1997), the model is specified as follows:

[35] The justification for using distance as an explanatory variable is not difficult to explain. An important determinant of migration is the cost of moving (money and non-money cost). The money component is equivalent to the transportation costs incurred in making the move; transportation cost consists of opportunity cost for moving and actual transportation expense. Since there exist no reliable estimate of the transportation costs (incurred in inter-district migration flows in Ghana), and since such costs are surely fairly closely related to the distance moved, distance has been chosen as a proxy for transportation costs. The argument for the use of distance as an explanatory variable is further strengthened when it is realized that information and distance are also likely to be closely correlated, and thus uncertainty is likely to increase with distance. The non-money costs of migration are psychic costs which involve the reluctance of an individual to leave his family and friends and venture to unfamiliar surroundings. These psychic costs are likely to increase with increased distance from a person's home. Thus, distance serves as proxy for non-economic as well as for economic variables.

$$\frac{OM_i}{P_i} = \alpha_1 + \alpha_2 \sum_{i \neq j} \frac{1}{d_{ij}} + \alpha_3 \sum_{i \neq j} \frac{1}{d_{ij}^2} + \sum_c \alpha_c S_{ci} + \sum_h \alpha_h \frac{Y_{hi}}{\sum_i Y_{hi} / N} + \varepsilon \qquad (7.9)$$

Where: OM_i is the total number of out-migrants from origin district i;

P_i is the total population in district i;

d_{ij} is the sum of distance between the origin district and other districts;

S_{ci} and Y_{hi} are the vectors of district characteristics at absolute and relative levels respectively;

$\alpha' s$ are parameters to be estimated;

N is the total number of districts; and

ε is the error term.

7.3.3 The In-migration Model Specification: The Destination Choice

We model the determinants of in-migration also by taking a district's in-migration as a rate of total population in the destination district. Specifying the model of in-migration, however, required a slightly different approach. The important difference lies in the fact that, in this model, for all the variables, the origin characteristics are compared with the composite average characteristics of all districts in the basin. This is because it is no longer appropriate to use the origin characteristics independently for modelling the destination choice. The model is specified as follows (Brown, 1997):

$$\frac{IM_j}{P_j} = \beta_o + \beta_1 \sum_{i \neq j} \frac{z_{ij}}{d_{ij}} + \beta_2 \sum_{i \neq j} \frac{z_{ij}}{d_{ij}^2} + \sum_h \beta_h \frac{Y_{hi}}{\sum_i Y_{hi} / N} + \varepsilon \qquad (7.10)$$

Where: IM_j is the total in-migrants to district j;

z_{ij} is the out-migrants over all districts i except the destination district j;

P_j is the total population in the destination district j;

d_{ij} is the distance in kilometres between origin district, i and destination district j;

y_{hi} is the vector of district characteristics at their relative value;

$\beta's$ are parameters to be estimated;

N is the total number of districts; and

ε is the error term.

The dependent variables in the models (Equations 7.9 and 7.10) are proportions that fall between zero and one. With such dependent variables, it is not proper to run OLS regression model. The common solution to this problem is to perform a logit transformation on the data. The logit transformation for a dependent variable *y* is equal to *ln (y/1-y)*. Thus we performed this logit transformation procedure for the dependent variables before we applied OLS. This makes the formulation of the dependent variables to be in unbounded continuous form and appropriate to use it in an OLS regression model.

7.4 Results and Discussion

7.4.1 The Out-migration Flow and its Determinants

One of the major implications of the gravity model approach has been that distance acts as a serious deterrent to migration (Greenwood, 1975). In this chapter, the parameter estimates of distance show a statistically significant coefficient (Table 7.2). The positive coefficient for $1/d_{ij}$ is interpreted in such a way that migration decreases with the increase in distance. This means that people are more likely to move short distances. This is comparable to the results in Table 4.1 (chapter 4) on 'people's movements within and outside their home regions' which shows that more people are observed moving within their home region than those outside supporting the findings of this model. This negative relationship has been characterized by the fact that distance serves as a proxy for both the transportation and psychic costs of movement, as well as for the availability of information.[36] However, as Greenwood (1975) argues to a large extent, distance reflects the importance of psychic and information costs since most estimates of the income gains associated with dominant migration streams suggest that these gains are substantial enough to more than offset any reasonable direct transport costs associated with distance. This means that people are more likely to move short distance. This result also substantiates the concept of the gravity model, which states that migration is inversely proportional to distance.

[36] In the place-to-place migration of Fields (1979), distance is treated as a proxy for migration costs.

The average income level in a district also returns a statistically significant estimate and a positive coefficient, a result that apparently contradicts theories about labour migration equating wage differentials. This estimate could result, however, from the greater ability of those in high-income districts to incur the costs of migration. High income districts could also be associated with greater access to information about the rest of the country, which could additionally facilitate out-migration.

An interesting finding is the statistical significance and positive coefficient estimate of the unemployment rate. This finding suggests that the incidence of out-migration is highly sensitive to changes in the unemployment rate. Similar findings are that of Lowry (1966), Sommers and Suits (1973), and Pissarides and Wadsworth (1989) which found a positive correlation of unemployment rate and out-migration rate from an area. This positive correlation challenges the postulate in the seminal Harris and Todaro model, which suggests that a high unemployment rate in many areas of Africa had limited impact on the deterrence of migration (Bigsten, 1996). Many other studies (Gallaway et al., 1967; Fabricant, 1970; and Miller, 1972) also found the unemployment rate to be not statistically significant as an explanatory variable.

As expected the parameter estimate for literacy rate shows that it negatively influences the out-migration rate. This means it is more likely to exercise out-migration for districts with low literacy rate than their literate counter parts. Assuming that low literacy rate in an area is comparable to poor educational facility, people may be going in search of education. It is only surprising that the coefficient estimates of clinics has unexpected sign, in which it affects out-migration positively.

The rest of the variables in the out-migration model returned statistically not significant estimates. The negative estimated coefficient for the variables of average rain fall, house ownership and urbanization rate are as expected but statistically not significant. The negative estimated of coefficient of variation of rainfall is unexpected and statistically not significant.

Table 7.2: The determinants of out-migration flows in the Volta Basin of Ghana[37]

Variables	Logit transformed co-efficient[1]	Marginal co-efficients
[a] Income level	0.045 (1.78)*	0.0010
Unemployment rate	0.659 (1.84)*	0.014
[a] Urbanization rate	-0.095 (-0.96)	-0.0022
[a] The number of clinics per 1000 population	0.095 (2.33)**	0.0022
The proportion of those who live in their own house	-0.198 (-0.43)	-0.0045
1/Distance	1.327 (4.07)***	0.0301
1/Distance square	-0.723 (-1.55)	-0.0164
[a] Population density (1995)	-0.047 (-1.55)	-0.0011
[a] Average rainfall records for 5 years (1993-1997)	-0.148 (0.54)	-0.0033
[a] Coefficient of variation of rainfall	-0.091 (-1.51)	-0.0021
Literacy rate	-0.366 (-2.09)**	-0.0083
Intercept	-3.584 (-5.94)***	
Observation	48 districts	
Prob >F	0.0000	
R^2 (Adjusted R^2)	0.76 (0.69)	

Source: Computed from Ghana 2000 census data

The numbers in brackets are t-ratios *** Significant at 1%; ** significant at 5%; * significant at 10% [a]. The variables are in their relative values. The dependent Variable is the logit-transformed out-migration rate (The number of out-migrants over the total number of population of the district)

[37] The explanations on the Procedure of getting the marginal coefficients from the logit-transformed dependent Variable (migration rate) are on Appendix D. The coefficients are very small and interpretation is accordingly difficult. Thus to make comparison possible and for easier interpretation, *protab* estimates for both out and in-migration model are conducted (Appendix E).

As the coefficients from the logit-transformed data are not directly interpretable, the marginal coefficients are computed by reversing the logit transformation back into the actual dependent variable.[38] The interpretation of the marginal coefficients proceeds as follows: the marginal coefficient estimate of 0.001 of the income levels indicates that a relative increase of income by 1 unit in a district brings about an increase of out-migration rate by 0.001. Similarly, the marginal coefficient estimate of the unemployment rate also shows that as the unemployment rate in a district increases by 1 unit, the out-migration rate increases by 0.014 units. Similar interpretation applies to other variables.

Table 7.3: Elasticity for a 10% change in explanatory variables (the out-migration model)

Variables	Elasticities (in %)
Unemployment rate	6.89
Number of clinics	11.04
Income level	9.14
Literacy rate	-14.42
1/Distance	44.89

Source: Computed from Ghana 2000 census data

Regarding the elasticity, it is computed to show the responsiveness of out-migration rate in response to changing district attributes. For example, a 10% increase in unemployment rate (keeping other variables at their mean values) increases the out-migration rate by about 7% (Table 7.3). Thus though there is positive relationship between unemployment rate and out-migration rate, the change in unemployment rate is followed by a less than proportional change in out-migration rate. This means out-migration rate is employment inelastic. On the other hand, a 10% decrease in distance brings about an increase of about 45% in out-migration rate. Thus, as migration is distance elastic, the effect of the geography on the inter-district labour reallocation should not be underestimated.

[38] The procedure is explained in Appendix D

7.4.2 The In-migration Flow and its Determinants

The parameter estimate for the number of clinics shows a statistically significant coefficient. As expected, the coefficient has a positive relationship with the in-migration rate. This illustrates that districts with relatively higher number of clinics experience higher rates of in-migration, which demonstrates the positive effect of health facilities on people's choice of destination, once they decide to migrate.

Table 7.4: The determinants of in-migration flows in the Volta Basin of Ghana

Variables[a]	**Logit-tranformed co-efficient**[1]	**Marginal co-efficients**
Food Price Index	-0.881 (-2.95)***	-0.0105
Income level	0.038 (1.89)*	0.0005
Unemployment rate	0.130 (3.20)***	0.0015
The proportion of people working in the formal sector	0.092 (0.91)	0.0030
Urbanization rate	0.004 (0.04)	0.0004
The number of clinics per 1000 population	0.118 (2.43)**	0.0014
Weighted Distance	7.22e-08 (0.09)	8.57e-10
Weighted Distance square	-0.0001 (-2.78)***	-9.12e-07
The population density of the district (1995)	-0.058 (-2.01)**	-0.0068
Average rainfall records for 5 years (1993-1997)	0.317 (1.23)	0.0038
Coefficient of variation of rainfall	0.017 (0.29)	0.0002
Literacy rate	0.059 (1.13)	0.0007
Intercept	-3.766 (-9.31)***	
Observation	48 districts	
Prob >F	0.0000	
R^2 (Adjusted R^2)	0.77 (0.69)	

Source: Computed from Ghana 2000 census data.

The numbers in brackets are t-ratios ***, **, and * are significant at 1%, 5% and 10% respectively. [a] All the variables are in their relative values. Dependent Variable is the logit-transformed in-migration rate (Number of in-migrants over the total population of the district).

Coefficient estimates on three important economic variables (income, food price, unemployment rate) are all found to be statistically significant. As predicted, average income levels positively correspond to destination choice. That income opportunity provides a better explanation of in-migration than they do of out-migration is a common finding in a number of gross migration studies. The average food prices (measured by Food Price Index) also returned a statistically significant parameter estimate. As presumed, it corresponds negatively to the in-migration rate, which indicates that people are attracted to places with relatively lower food prices. Though some of the migrants can also be net-sellers who look for higher prices, in the general flow figures, it seems that they are overshadowed by the large number of consumers who are looking for lower prices. Another economic factor, unemployment rate, is positively associated with in-migration rates, a result that seemingly contradicts the labour migration theories of Todaro[39] and Harris and Todaro equating migration with job probability. This result could be a reflection of the argument advanced in the literature (Bukenya, et al., 2003) that migrants are more concerned with the individual probabilities of acquiring and retaining employment than with the average employment rate among all workers in a given market or state. A large number of studies have also obtained similar results. Rogers (1967), Greenwood (1969), and Wadycki (1974), as cited in Fields (1979) and Cadwallader (1992) found higher migration rates into high unemployment areas. Nevertheless, in few other studies, high unemployment rate in an area is found to be important deterrent to migration (Sommers and Suits, 1973; Da Vanzo, 1978).

Concerning the weighted distance square, the relationship is negative and statistically significant. This negative relationship indicates that at some threshold distance, people get better attracted to distant places. This, as indicated in Nabila (1974), could be the result of the uneven distribution of resources in Ghana since imbalances in regional economic development and superior information about the destination can overcome great distances.

The relative population density in 1995 was considered to determine the effect of population density on in-migration propensity. The negative estimated coefficient shows that districts with relatively

[39] Todaro (1969, 1976) argues that people migrate from rural to urban areas as long as the expected wage differential is large, even if the unemployment rate in urban destination areas is high.

higher population density experience lower rates of in-migration. That means it is more likely for less dense districts to gain population as a result of migration than the relatively dense districts.

The rest of the variables returned statistically insignificant estimates. The positive coefficient of literacy rate, average rainfall, urbanization rate and formal sector employment are as expected but not significant. The positive coefficient of the variation of rainfall is unexpected and statistically not significant.

Regarding the interpretation of marginal coefficient, it follows the same trend as that of out-migration model. The marginal coefficient of -0.0105 for food price index shows that as the relative food price in a given district increases by 1 unit, the in-migration rate to that district decreases by 0.0105 units. Also the marginal coefficient estimate of 0.0005 of the income levels indicates that a relative increase of income by 1 unit in a district brings about an increase of in-migration rate by 0.0005 units.

Table 7.5: Elasticity for a 10% change in explanatory variables (the in-migration model)

Variables	**Elasticity (in %)**
Number of clinics	14.05
Food Price Index	-5.76
Average income levels	7.96
Population density (1995)	-7.95
Unemployment rate	12.56
1/Distance square	-11.08

Source: Computed from Ghana 2000 census data

With respect to elasticity, the interpretation proceeds as follows: a 10% increase in the number of clinics brings about a 14% increase in in-migration rate. This means migrants are responsive to health facilities. Likewise, a 10% increase in average food price brings about a reduction of 5.76% of in-migration rate. With respect to the relative unemployment rate, a 10% increase in the relative unemployment rate of a district means an increase of about 13% in in-migration rate. Similar interpretations apply to the other variables.

7.5 Conclusions and Policy Implications

The main aim of this chapter is an empirical analysis of internal migration in the Volta Basin of Ghana. This chapter attempts to capture a wide set of factors that cross across disciplines, which affect migration flows by incorporating not only the geographical distance (the distance in kilometres between points of migration), but also the ecological distance (the rainfall variation across places and time) together with the socio-economic variables.

Regarding the out-migration model, results from the empirical analysis show that out-migration is a response to high unemployment rate in an area. Consistent with the gravity model, the out-migration model findings also demonstrate that migration in the VB of Ghana is predominantly short distance indicated by the negative relationship between out-migration rate and distance. Results from this chapter also show that people are moving out of places with relatively higher income levels.

Indicating the significance of health facilities and population density in directing migration flows, the in-migration model results show that people are attracted to districts with a relatively higher number of clinics and less densely populated areas. Similar to the out-migration model, the in-migration model results also indicate that people migrate short distance. What is more striking here is that at some threshold distance the internal migrants prefer to migrate to distant places (shown by the negative coefficient of the distance square). Together with this, the in-migration model results show that people are responsive to the two main economic factors, average income levels and food prices. Higher average income levels and lower food prices positively determine in-migration rates. Thus districts with higher average income levels and lower food prices are more likely to be destination choices.

In most cases, the out-migration model and the in-migration model results produced the same signs of coefficients, a result coherent with the outcome of the pictorial representation of the migratory flows of Figure 4.6, which shows an overlap of places of moderate/high in-migration and out-migration rates. For example, the positive and significant sign of the variable ‘clinic’ in both in-and out-migration model; and the positive and significant sign of the income variable.

Instead of being consistent with aggregate income measures in migration studies which conclude that migration occurs from low to high income areas (Clark and Gertler, 1983)[40]; the findings here show that people are moving from high income areas to high-income areas. The argument is that it is more likely for migrants to have the information and money necessary to migrate if they come from high income districts and they will want to choose a place with district where there is an excess demand for their skills and where incomes are high. Thus, the results imply that migration in VB of Ghana is between successful districts.

In terms of the model in Figure 3.3 (chapter 3), this movement between successful districts is explained in such a way that for a potential migrant from a low-income district the cost of migration is the limiting factor. The population of the poorest districts cannot leave simply because they are unable to finance the cost of moving. Thus, for these districts, income growth *increases* rather than decreases out-migration. However for districts with relatively high income, the supply constraint on out-migration is gradually released; and thus more and more potential out-migrants would relatively be able to finance the move. In this situation then, and in contrast with conventional theory, the home wage and out-migration are positively correlated.

[40] See chapter 3, for a review on the neo-classical approaches to migration.

CHAPTER 8 SUMMARY, CONCLUSIONS, AND POLICY IMPLICATIONS

8.1 Introduction

Migration has attracted the attention of many academics, government officials, national planners and even politicians in Africa. This interest partly emanates from the increasing realisation by the countries that the continuing and systematic movement of people within their countries has not only created many problems for them, but also has raised opportunities for their population. The opportunities could range from improving social status, increase the economic well-being and in certain cases, ensure actual survival in their societies and the environment.

One aspect of the general phenomenon which has emerged very prominently in most African countries in general and West African countries in particular in recent times is labour migration. Various views have been put forward to explain why labour migration takes place highly in some countries and regions but not in others; the factors which motivate the movement of certain kinds of people and not others; the social, economic, political and cultural consequences of the movement of people in the sending as well as receiving communities, etc. However, no single theoretical framework which has been developed so far seems adequate to cover the various complex dimensions of the phenomenon of migration.

To attempt to capture these complex phenomena, the chapter tried to see the dynamics of migration at household and district level. The preceding chapters, especially chapters 5, 6 and 7, dealt with explicit issues with the aim of answering the research questions raised in Chapter1. Needless to say, the results of the different chapters need to be integrated. The relation between the determinants of migration from the rural areas of the basin, causal relationship between migration and income, effects of migration on income sources of the sending households, the migration flows at district-level and the overall policy implications of the results are not yet made clear. Thus the objective of this chapter is to arrange and summarize the results presented in the preceding chapters and to place emphasis on the most important results of the models and ensuing policy implications.

The rest of the chapter is organized as follows. In the next section the summary of the results in the different chapters and conclusions are presented. The policy implications derived from the conclusion reached are described in section three. Finally, suggestions for future research are discussed.

8.2 Summary and Conclusions

A literature review on the description of the history, dynamics and features of human migration in Ghana was provided in chapter 2. The literature on the stream of migration as well as the causes of the migration and the migrant characteristics in Ghana were reviewed in this chapter. The chapter also discussed the impacts of migration on the economy of the households with a special emphasis to the agricultural areas.

The literature reviewed indicated that migration in Ghana is mainly dominated by the young, farm households/individuals, illiterates; moreover, there is a strong indication of chain migration, which underscores the importance of network migration. It is illustrated that a large scale of rural-urban migration led to the abandonment of farm land, reduced agricultural output and higher urban unemployment rate. The literature reviewed also suggested that appropriate measures are required to reduce this large scale rural-urban migration and the subsequent urban unemployment. It is pointed out that attempts should not be made to stop people from leaving but to get them to want to stay. This can be achieved by improving the socio-economic conditions at the place of origin. Policy measures such as improvement in the TOT of the agricultural sector (that is, the reduction of industrial protection and increases in producer prices of food and export crops); greater provision of public services in rural areas (especially education, sanitation, health, housing and electricity); and, a reform of the rural credit market will considerably contribute to controlling the out-migration of rural dwellers. It was also shown that increased incentives to farm and improved rural infrastructure have resulted in a reduced rural-urban migration and encouraged urban-rural migration, especially in the late 1980s.

Chapter 3 aimed at reviewing the important theories of migration starting from the law of migration of Ravenstein more than 100 years ago to the recent theory of migration, the NELM. Furthermore, a gravity model of spatial interaction within the framework of utility theory was also developed. Also in this chapter, the theoretical relationship between in-migration and out-migration flows was

discussed in a dynamic context. The theory explaining the reason for the cases where there is a positive correlation between in-migration and out-migration in a place was also considered.

It is suggested that the gross migration approach is more suitable in explaining migration flows. The existence of cross flows tends to render net migration data less meaningful than gross migration data. Hence, the *gross* (in- and out-migration) rather than the *net* migration is more appropriate dependent variable for modelling migration on aggregate data. On the migration responses to wage differentials, we have explicitly illustrated that migration could take place between successful (high wage) areas, which is consistent with the results of chapter 7. The theoretical reason behind this is associated with the cost of migration. The supposition is that potential migrants from low earning areas are deterred from migrating because of unaffordable costs of migration. Once this constraint is removed, the potential migrants could migrate, which entails the direct relationship between out-migration and wage levels.

Most importantly, gravity model of migration was developed and adjusted within the framework of utility theory. It is demonstrated that the gravity law of spatial interaction can be derived from the economic principle of utility maximization. The basis for the theoretical framework is that the number of trips taken from a given origin to a particular destination per unit time is the sum of the number of trips per unit time that maximizes the utilities of spatial interaction of the individuals of the origin, subject to some relevant constraints. On the other hand, theory on effects of out-migration of a member showed that that migration does not only produce lost labour effects on rural economies but it also represents a potentially important source of income and savings through migrant remittances.

Chapter 4 presented description of the study area, data sources, and data collection procedures. Descriptive statistics on region features, household characteristics and other relevant indicators was carried out to illustrate the data sets for the study. Together with this, the environmental and socio-economic conditions of the VB and its population were discussed. Preliminary results of the data set are also explained in some detail.

Regarding the environmental conditions, it was shown that the VB of Ghana is one of the driest areas in the SSA and it experiences a very high demographic pressure though relatively less densely

populated area in Ghana. The population in the VB of Ghana are principally farm households. With its unpredictable rainfall and subsequent recurring drought in the region, the access to safe drinking water for the population of the VB of Ghana is poor. The pictorial representation of the migratory flows shows that there is much overlap of places of high in-migration and out-migration rates. This positive correlation was a clear indication of the need to distinguish between the driving forces of in-migration and out-migration separately. Labour market turn over, age composition and migrant stock are explained as important reasons explaining this positive correlation. Comparing the intra- and inter-region migration flows, it is shown that the intra-region migration flow is higher than the inter-region migration. At the household-level, the data set of GLOWA-Volta was collected for observing the household migration behaviour. Migrant households are more female-headed, educated, with bigger household size, better income, and less dependency ratio than their non-migrant counterparts. The ethnic composition of sample households is dominated by Akans. More than 50% of the out-migrants had job-related reasons for moving and most (60%) of the source households reported that they benefited from the out-migration of members. The benefit comes for most (58%) through remittances, while a labour loss for farm activities is one of the problems mentioned for the migrant households.

By controlling for the endogenous selectivity, in chapter 5, an explanation for the increase in migration as ordinary effect of the rising income differential between the migrant and non-migrant households was provided. The result in this chapter maintains the long-established Sjaastad framework for the human capital approach to migration, lending credence to the significance of economic incentives on the intra-household migration decision making process. Together with the expected change in incomes, other factors are also found to explain migration decisions of respondent households. Among these factors are previous migration experience of the household head and/or spouse, household size, education, social capital, ethnic networks, having irrigated fields and off-farm activities. Results show that migrant households are self-selected and non-random part of the population. The result that migrant households have more earnings than non-migrant households lends support to the view that when there are insufficient credit markets, rural households try to diversify incomes by reorganizing the utilization of their own resources. From the point of view of the migrant household, the implication is that sending out a migrant is good for pooling risk and household farm production. Hence, government intervention in credit markets by reforming the

formal rural credit system or encouraging development of informal credit institutions is quite important for slowing down the flow of migrants out of rural areas.

Chapter 6 investigated the effects of migration and remittances on income sources. Findings show that the loss of labour to migration has a negative effect on household farm income in source areas. On the other hand, remittances sent home fully compensate for this lost-labour effect, contributing to household incomes directly and also indirectly by stimulating farm and non-farm self-employed production. Thus these findings support the NELM hypothesis that remittances loosen constraints on production and the imperfect market environments characterizing rural areas in developing countries. In view of the multiple effects of migration, we find that participating in migration at the household-level increases household income for those left behind. Thus migrants play the role of financial intermediaries making the *ex ante* incentive to participate in migration large. Given the imperfection or absence of the formal institutions for managing risk in rural Ghana (Jones et al., 2000), this result implies that rural households are induced to self-insure through the geographical dispersion of their members. In the event of transitory income shocks due to unforeseen bad local conditions (for example rainfall variation, incidence of disease of household members, pests and fire of their cropping activities, variations in the price of marketed output, etc), families can rely on the migrants for financial support. Based on the results of this study, it is found that migration and remittances have complex effects on household incomes in rural Ghana. Our results support the NELM hypothesis that migrant remittances loosen constraints on different types of household production, in this case stimulating agricultural productivity, non-farm self-employment and other activities. Thus the most frequent strategy of rural households seems to involve one or more household members moving away for cash employment while the remaining members engage in agriculture.

Based on Ghana 2000 census data, chapter 7 focused mainly on the determinants of migration at the district-level in the VB of Ghana. The findings could be seen in two aspects: the out-migration and in-migration aspects. As regards to out-migration model, results indicate that high out-migration is a response to high unemployment rate in an area. It is also demonstrated that migration in the VB of Ghana is predominantly short distance. The other striking finding is that the out-migration of people from places with relatively high income levels. It was also observed that the out-migration rate corresponds negatively to literacy rate.

Demonstrating the importance of health facilities in directing migration flows, the in-migration model results show that people migrate into districts with a relatively high number of clinics. Results also indicate that higher average income levels and lower food prices positively determine in-migration rates, a result indicative of the importance of economic factors in attracting migrants.

Instead of being consistent with aggregate income measures in migration studies which conclude that migration occurs from low to high income areas; the results of in- and out-migration model results show that people are moving from high income areas to other high-income areas. As discussed earlier, the contention here is that it is more likely for migrants to have the information and money necessary to migrate if they come from high income districts and they will want to choose a district where there is an excess demand for their skills and where incomes are high. Thus the results suggest that migration is between successful districts.

8.3 Policy Implications

As estimated results demonstrate, migration of household members increases the total household income. This implies providing households with credit systems or encouraging informal credit institutions could increase households' production efficiency and would keep them from sending migrants out to finance the farm and non-farm activities or to insure against on-farm income shocks. In addition, like in any developing country, imperfect credit and insurance markets in rural Ghana potentially create a high shadow value for migrant remittances as a means to overcome liquidity and risk constraints on household-farm production. Thus, if government wants to lessen the increasing migration from rural areas, it would be helpful to find the sources of labour-market imperfections and rectify them where possible.

(1) Providing physical infrastructure, improving healthcare and housing in the migrant sending areas. The development of physical infrastructure and social care services in the source area is essential in enhancing people's choice to stay. On the other hand, the development of a convenient, subsidized transport system, giving rural dwellers easier access to urban employment and amenities without having to permanently migrate to the cities could slow down rural out-migration.

(2) Promoting non-agricultural job opportunities in rural areas and supporting policies at the national level is also important. Increasing economic opportunities in rural areas, for example, promotion of small labour intensive industries and minor public works are relevant. Rural off-farm development also helps to satisfy the basic needs and practical ambitions of rural residents. The development of rural non-farm sector is crucial in alleviating the problems of unemployment, underemployment and poverty, and in stimulating economic growth.

(3) Supplying public services and amenities in rural areas, administrative and industrial decentralizations, land reform, rural development program, micro credit schemes, development of rural non-farm sector, and price-support for agricultural products to raise rural incomes. Policies should be pragmatic about the possibilities of providing alternatives to migration.

(4) Providing appropriate (labour intensive) agricultural technological assistance and micro credit programs. Remittances can be the means to investing in productive assets such as land and micro finance can be an effective means of improving the productivity of the poor. Thus there is a need to develop savings and credit programs to break debt cycles and de-link these from migration.

On the other hand, data on migration should be improved. Apart from the population censuses and surveys, population registers are a source of migration data in many countries. In Ghana, internal migrants are not required by law to register a change of residence at the place of origin, the place of destination or both and population registers often do not collect the detailed information required for intensive analysis of the determinants and consequences of migration. Thus there is a need for better systems of data collection, and the use of common definitions and categories of migration.

In general, internal migration policy 'best practices' are those that accommodate to, rather than explicitly seek to, change the volume and direction of internal migration flows. Policies should respond and support rather than direct people to specific areas. Policies that restrict migration often do more harm than good. Certainly, population mobility is an integral part of the development process and should not be ignored in formulating development policies. However, in order to break *vicious circles*, and to encourage more balanced development that would use national space and resources more efficiently, development planners and policy makers must be aware that any policy has the potential for significant repercussions on internal migration and population distribution. In

any case, the ability to move is a human right. It is important to stress that in Ghana, migration is a livelihood or survival strategy for individuals and families. Thus approaches to managing migration should not aim to stem the flow, but to facilitate people's livelihoods more generally.

8.4 Suggestions for Future Research

The study finally makes three important suggestions for future research in the area, depending on the results of the study. We refer to the three empirical chapters (chapters 5, 6 and 7) for drawing the suggestions.

- In chapter 5, income difference is shown to be the most important factor in a household's migration decision. However, realizing the immediate causes of migration warrant a wider research which captures some other factors, like that of relative deprivation (Stark, 1993). In addition, given the important role of the rural non-agricultural sector upon rural income (the second main source of income to the farm households, as shown in Table 6C: Appendix C), this sector may be an option for diversifying income. Thus impacts of the participation in non-agricultural activities (for example, non-farm self-employment) on the rural household incomes would be an appealing theme for future research.

- In chapter 6, although we have identified multiple ways that migration and remittances affect rural incomes in Ghana, migration may have more complex effects on household incomes than we can cover in the scope of the study. In our data set, there is mild evidence that households invest remittances in farming or self-employment activities. Thus future research in the area would focus on analyzing where the remittances exactly go. As imperfections in capital and insurance markets certainly exist in rural areas of VB of Ghana, they could provide households with a motivation to migrate as part of a dynamic strategy to invest in new agricultural and non-agricultural ventures. Additional longitudinal data are necessary to explicitly test this hypothesis.

- Attendant to data limitation, district-level migration analysis in chapter 7 dealt with only one period (1995-2000). However, to sufficiently explain the district-level migration in-flows and out-flows; cross-sectional analysis is basically not adequate. Such cross-sectional data based analysis may not lead to generalizations of the dynamics of migration it self. The static nature of cross-

sectional studies is a serious problem, especially when the reasons for migration or migrant's location preferences may have been changed so rapidly. Therefore, to understand the dynamic transition of inter-regional migration, time series analysis is clearly preferable. Additionally, in order to better understand the dynamics of inter-district migration flows, future research should look for data of longer period (time series data on in- and out-flows).

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APPENDICES

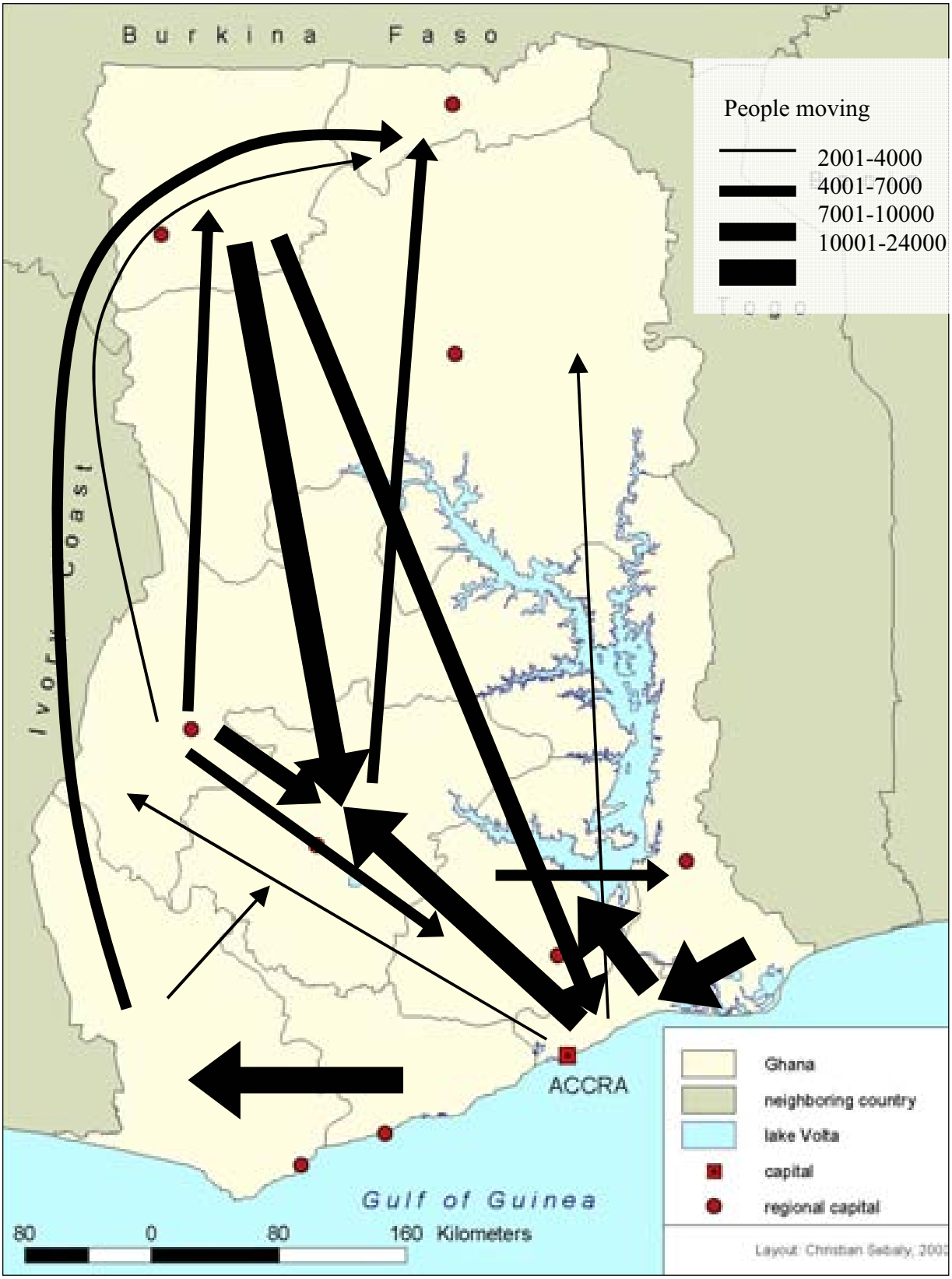
Appendix A

Table A1: Mean characteristics of growing (positive net migration) and declining (negative net migration) districts

Characteristics	Growing	Declining	All districts
	N=32	N=25	N=57
IMR	3.06	2.18	2.52
OMR	2.55	2.48	2.57
Income per capita (per adult) in 1000 Cedis	8610	8410	8500
Unemployment rate (in %)	8.3	13.52	11.22
Clinics per 1000 population	0.090	0.079	0.084
Food Price Index	0.67	0.67	0.67
Rainfall amount (in millilitres)	1070	1180	1115.65

Source: Computed from Ghana 2000 census data

Figure A1: Major Inter-regional Migration Flows: Ghana, 1995-2000



Source: Computed from Ghana 2000 Census data

Appendix B

Table B1: Sample Description

Group	Destination			Total
	Urban	Rural	Missing	
Migrant households	154	43	24	221
Non-migrant households	-	-	-	280
Total				501

Source: Computed from GLOWA-Volta survey (2001)

Table B2: Specific Group's profiles

Specific groups	Predicted probability of migration
Average household	0.44
High education (with at least Secondary school)	0.49
Female headed households	0.52
High remittances (Households with remittances of more than 20% - 100% of their income)	0.71
Non farm self-employment (Households with 20 -100% of their income is from non-farm self-employment)	0.39

Source: Computed from GLOWA-Volta survey (2001)

Table B3: Source of income

Main source of income	% of households
Farm activities	64
Non-farm self-employment activity	12
Off-farm activities	9
Migration activities	7
Actual & imputed renting	2
Other activity	6
Total	100

Source: Computed from GLOWA-Volta survey (2001)

Table B4: Ethnic group of sample households

Ethnic group of Household	Number of Households	% of Households
Akan	199	39.7
Dagbani	30	6.0
Ewe	29	5.8
Nankani	27	5.4
Gonja	26	5.2
Guan	17	3.4
Kassena	16	3.2
Konkomba	15	3.0
Bulsa	13	2.6
Other	124	24.8
Missing system	5	1.0
Total	501	100

Source: Computed from GLOWA-Volta survey (2001)

Figure B1: Probability of migration and income

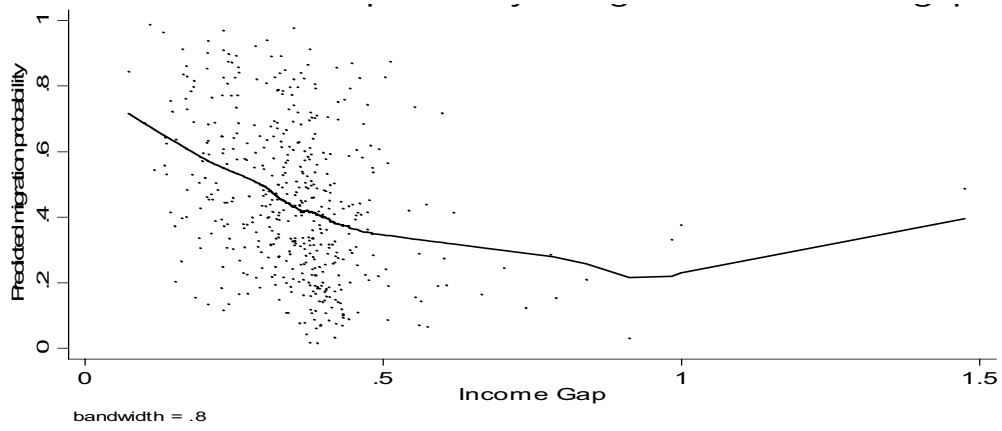


Figure B2: Curtosis of income

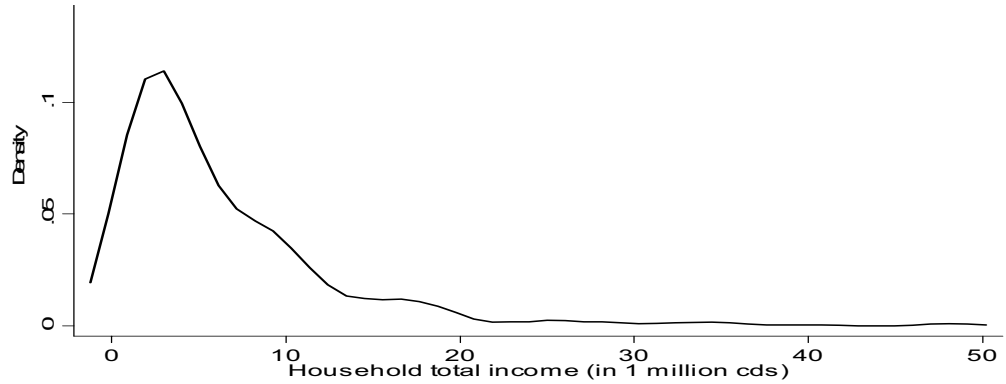
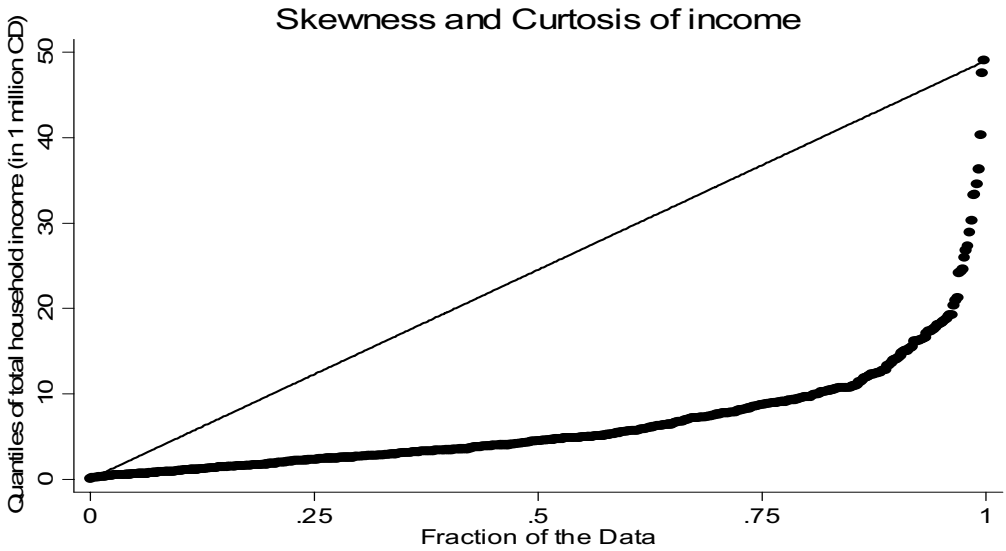


Figure B3: Skewness and curtosis of income of households



Appendix C

Table C1: Number of out-migrants in a household

Number of out-migrants from a household	Number of households	% of households
1	172	78.5
2	44	20.1
3	2	0.9
>3	1	0.5
Total	219	100

Source: Computed from GLOWA-Volta survey (2001)

Table C2: Descriptive statistics on income sources (per year)

Variables	min	max	mean	Std deviation
Remittances	0	2,400,000	126,733.6	303,887
Farm income	122,471	2.1e+08	36,339,622	11,716,478
Non-farm self-employment	0	12,000,000	680,772.88	1,515,217
Other income	0	2.2e+07	1,088,061	2,734,034

Source: Computed from GLOWA-Volta survey (2001)

Table C3: A Probit model on self-employment activity

Variables	Coefficient	Standard error	Mean
Household size	0.0163 (2.61)***	0.0063	9.04
Education of adult members	-0.00018 (-0.869)	0.0002	-9.12
Mean age of adult household members	0.0090 (6.796)***	0.0013	35.24
Sex of household head	-0.01581 (-1.322)	0.1196	-1.79
Number of dependents in a household	0.01536 (1.289)	0.0119	1.38
Population, community	-0.000016 (-0.783)	0.00002	495.98
Public transport, community	0.00006 (0.553)	0.0001	-46.39

Source: Computed from GLOWA-Volta survey (2001)

Appendix D

Procedure of computing the marginal coefficient from the logit-transformed dependent Variable (migration rate) in chapter 7 is shown as below:

Let, $Y^* = \ln(Z) = a + bX_i$

Where $Z = \frac{Y}{1-Y}$

$\frac{dY^*}{dX_i} = b$. Thus, $dY^* = b_i dX_i$

As $Y^* = \ln(Z)$, then $Z = e^{Y^*}$

$dZ = e^{Y^*}.dY^* \quad \Rightarrow \quad dZ = \left(e^{a+b_i X_i}\right).b_i dX_i$

As $Z = \frac{Y}{1-Y}$, then $Y = \frac{Z}{1+Z}$

$dY = \left(\frac{1}{1+Z} - \frac{Z}{(1+Z)^2}\right)dZ$

$dY = (W - Q)dZ$,

Where $W = \frac{1}{1+Z}$ and $Q = \frac{Z}{(1+Z)^2}$

$dX_i = 0.001\bar{X}_i$, where $\bar{X}_i$ is the average value of $\bar{X}_i$.

Appendix E

Protab estimations

These protab estimations are conducted in order to make an alternative way of interpreting the out put of the logit transformed coefficients in Tables E1 and E2. *Protab* computes predicted proportions for different values of a predictor variable while holding the other variables at their mean values. Thus, we use the protab procedure to interpret the results of the models. Tables E1 and E2 present the corresponding predicted proportions of the out and in-migration rates respectively for the minimum and maximum values of the independent variables holding other variables at their mean values. For example, as we go from a district with the lowest percentage of unemployment rate to the district with the highest unemployment rate, the out-migration rate increases from 2.16% to 4.09% (Table E1). This indicates a positive relationship of unemployment rate to out-migration rate. Also, the out-migration rate increases from 2.11% to 2.87%, as one moves from a district with the lowest income level to the district with the highest income level. As regards to literacy rate, out-migration rate decreases from 2.70% to 1.89%, as one goes from district with the lowest literacy rate to district with highest literacy rate. With respect to distance, it is shown that keeping other variables at their mean values, out-migration rate increases from 1.45% to 5.24%, as we go from the farthest district (a

district with the maximum weighted distance) to the nearest district (a district with the minimum weighted distance).[41]

Table E1: Predicted values of the significant explanatory variables for the out-migration model, given all other variables at their mean values

Variables	Predicted proportion of out-migration rates (in %)	
	From	To
Unemployment rate	2.16	4.09
Number of clinics	2.07	3.29
Income level	2.11	2.87
Literacy rate	2.70	1.89
1/Distance	1.45	5.24

Source: Computed from Ghana 2000 census data

Table E2 shows the *protab* estimates for the predicted proportions of the in-migration rates. As in Table E1, it is a one-way table explaining the effect of the independent variables on the in-migration rates as one proceeds from the minimum values to the maximum values of the variables. We did the *protab* estimation only for the significant variables since to further interpret the insignificant variables would not merit. The estimate of the health facilities (number of clinics) is interpreted in such a way that the in-migration rate to a district increases from 2.09% to 3.71% when we go from a district with the least number of clinics to a district with the highest number of clinics. On the other hand, the Food Price Index has a negative relationship to the in-migration rate, indicated by the decrease of in-migration rate from 4.29% to 1.82% as one goes from a district with lowest Food Price Index to the one with highest Food Price Index. Similar interpretations apply to other variables.

[41] Remember that, the coefficient of distance is in its reciprocal form. Thus, the nearest district will have the highest 1/distance.

Table E2: Predicted values of the significant explanatory variables for the in-migration model, given all other variables at their mean values

Variables	Predicted proportions of in-migration rates (in %)	
	From	To
Number of clinics	2.09	3.71
Food Price Index	4.29	1.82
Average income levels	2.22	2.89
Population density (1995)	2.62	1.97
Unemployment rate	2.13	5.13
1/Distance square	2.68	1.66

Source: Computed from Ghana 2000 census data