Labour Market Adjustment in Jamaica

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Abstract

The central purpose of this thesis is to explore the dimensions of labour market adjustment in Jamaica. The paper adopts a microeconometric approach, relying on new and more detailed Jamaica Labour Force Survey data for the period 1983-2006. Over this period, Jamaica has experienced significant expansion in its external trade which has been characterized by a severe import bias. Also, during this time, Jamaica's agricultural and manufacturing sectors experienced declines in their respective employment shares of 44% and 36% while service sectors expanded. One chapter of the thesis explores the empirical link between expanding trade flows and manufacturing labour market adjustment. The thesis also explores whether and to what extent sectoral labour market adjustment in Jamaica has been accommodated by an accompanying occupational transformation. Central to analyzing the issue of occupational adjustment however, is the careful definition of what constitutes a skill in order to elucidate the role of skill specificity in labour market adjustment. The thesis then investigates the incidence of unemployment in Jamaica in an attempt to identify key factors leading to escape from unemployment within a low skilled, high-unemployment, developing country context.

The study finds an important role for worker characteristics, trade and industry information in affecting labour market adjustment in Jamaica. Using occupational skill definitions due to Dolton and Kidd (1998), the study also finds that most of the occupational and sectoral mobility in Jamaica, over the review period, took place among unskilled manual workers. As such, the Jamaican employed labour force experienced very little skill upgrading over the 24 year period covered. The very limited up-skilling observed over the review period was due to the emergence of relatively more highly-skilled, sales and distribution related occupations. As far as adjustment costs are concerned, across all mobility types, simple sectoral moves were- in general, relatively less costly; with occupational transformation playing an accommodative role to the sectoral adjustment. Industry information, educational qualifications, geographic location, gender and the degree of skill specificity and were all critical determinants of the type of adjustment observed in the Jamaican labour market. Finally, the thesis underlines the very high incidence of long-term unemployment among uneducated, unskilled, young males in Jamaica. The study reveals negative duration dependence in the Jamaican labour market and suggests a critical role to be played by worker training in affecting unemployment escape probabilities.

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List of Abbreviations

ACP	African, Caribbean and Pacific
APNE	French National Employment Agency
BLS	Bureau of Labour Statistics
CARICOM	Caribbean Community
CBT	Community- Based Training
CET	Common External Tariff Agreement
CEPII	Centre d'Etudes Prospectives et d'Informations
CPI	Consumer Price Index
CPS	Current Population Survey
CXC	Caribbean Examinations Council
DCO	Dominion Colonial and Overseas
EBT	Enterprise-Based Training
EU	European Union
FDI	Foreign Direct Investment
FINSAC	Financial Sector Adjustment Company
GCE	General Certificate of Education
GDP	Gross Domestic Product
GHS	General Household Survey
GNP	Gross National Product
HDI	Human Development Index
HEART	Human Employment and Resource and Training
H-O	Heckscher-Ohlin
IADB	Inter-American Development Bank
ICT	Information Communication Technology

IFS	International Financial Statistics
IIA	Independence of Irrelevant Alternatives
IIT	Intra- Industry Trade
ILO	International Labour Organization
IMF	International Monetary Fund
ISIC	International Standard Industrial Classification
ISCO	International Standard Occupational Classification
JCTC	Jamaica Commodity Trading Company
JIC	Jamaica Industrial Classification
JSOC	Jamaica Standard Occupational Classification
LDC	Lesser Developed Countries
LFS	Labour Force Survey
MIIT	Marginal Intra-Industry Trade
NACE	Classification of Economic Activities in the European Community
NAFTA	North American Free Trade Agreement
NIS	National Insurance Scheme
NTA	National Training Agency
NVQ	National Vocation Qualification
OAS	Organisation of American States
OECD	Organization of Economic Cooperation and Development
PATH	Programme for Advancement through Health and Education
QLFS	Quarterly Labour Force Survey
RER	Real Exchange Rate
SAH	Smooth Adjustment Hypothesis
SITC	Standard International Trade Classification
STATIN	Statistical Institute of Jamaica
TVET	Technical Vocational and Educational Training
UK	United Kingdom
UMCIT	Unmatched Changes in Trade

UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
US	United States
UWI	University of the West Indies
WDI	World Development Indicators
WITS	World Integrated Trade Solutions
WTO	World Trade Organisation

Chapter 1

Introduction

1.1 General Introduction

An easily convincing case can be made for the empirical investigation of labour market outcomes in Jamaica. Any review of the economic literature on this small island economy will reveal that most of the domestic and international economic research is focussed on the host of macro-economic issues which confront the independent nation state. Among these issues are the significant debt burden, economic imbalances, macroeconomic stability and economic growth. Notable omissions among these highly researched topics are the issues of the Jamaican labour market and problem of high unemployment. This is a particularly startling omission in light of the centrality of such issues to an economy whose technology is so highly reliant on labour and the fact that Jamaica has a chronic problem of high disemployment, poverty and crime.

Unfortunately, the relative dearth of research in the area of labour markets is common among many poor developing countries where not much investment is made in the collection of detailed labour market data. In particular, not many datasets exist on which longitudinal, individual and firm level information can be accessed– the very type of data which has enlarged the boundaries of understanding of labour market phenomena over the past two decades. Furthermore, while it is true that in the Jamaican case, Quarterly Labour Force Surveys of a respectable quality are administered regularly, these reports generally present employment aggregates and the surveys from which these aggregates are created are not generally available in sufficient detail to allow for microeconometric analysis by researchers. Fortunately, the Statistical Institute of Jamaica was gracious enough to make the data available in sufficiently greater detail to allow us the opportunity to attempt to fill this glaring gap in the literature. Notwithstanding the binding constraints and the remaining data limitations, certain stylized facts emerge in the Jamaican labour market data which would puzzle the critical economist.

One stylized fact that can be observed from the employment aggregates typically presented in the Jamaican Quarterly Labour Force Surveys produced by the

Statistical Institute of Jamaica over the past three decades, is that employment totals and aggregates, in general, remained relatively static for over two decades with the population growing at a rate of less than 1% per year over the period and with the employed labour force growing at an even lower rate. The simple, practical implication of these intersection of facts is that there has not been much variation to exploit in the data; at least in the form that it has been previously been made available by the Statistical Institute. Where the data has been utilized however, it has been utilized for macro-economic research; to which this type of data lends itself more readily.

This study hopes to take a first step towards filling the glaring gap in literature. Its main thrust is to provide an empirical treatment of new labour market data on Jamaica; all the time, critically utilizing, and indeed, criticizing the current theoretical paradigm where appropriate. In general, micro-econometric techniques are applied to the data throughout the thesis. The efficacy of the micro-econometric approach is displayed by our ability to identify salient characteristics of individual workers, and to identify specific groups of workers in the Jamaican economy that exhibit distinct behavioural responses to economic stimuli. Using this information we are then able to judge which specific groups and worker-types are more or less likely to be affected by the changing economic climate. In so doing a more humanistic and personal interpretation of the facts can be formed and a deeper understanding is gained as to the nature of the inherent costs of adjustment. Moreover, as we will show, through this more disaggregated approach to understanding labour markets, one can identify the remarkable sectoral and occupational shifts that belie the relatively static, aggregated, macro-economic employment data. With the detailed records of the Quarterly Labour Force Surveys between the years 1983-2006 we are able, for the first time, to gain insights into the magnitude and composition of important labour market flows and to calculate individual probabilities of mobility at both the industry, occupational and sectoral-levels, and then, finally to provide detailed estimates of probabilities of transition between the main labour market states themselves.

We are also able to address, in one chapter of the thesis, the topical issues surrounding the effect of Jamaica's increasing trade exposure under liberalization on worker adjustment within the Jamaican labour market. How did the Jamaican labour market adjust in the era of liberalization? Were jobs created or destroyed in the net during this period? In what sectors were they created (lost) and for what types of workers? To our knowledge, no other existing study attempts to elucidate these issues for Jamaica.

Interestingly, the time period under review for most of our analysis- 1983-2006, coincides with a period of unprecedented growth in regional and world trade. The Jamaican economy, itself saw a 450% increase in its *real* imports and a relatively smaller, though significant increase in its *real* exports of 310%. This increased openness and global integration; which is such a defining characteristic of this era has presented many opportunities as well as challenges for both economies of the "North" and the "South". This statement has been no less true of the Jamaican economy, which, by virtue of its size, proximity and economic ties to the US economy, one of the largest world economies, is highly vulnerable to the rapid changes that have occurred in the scale and structure of global trade. It is for this reason that the Jamaican case is of particular interest because it represents a realistic portrayal of how a "small open economy"- the cornerstone of so many theoretical models of international trade and labour economics- will likely respond to the new and expanding global economy.

As can be expected, there cannot be univalence between the theory and reality and true-to-form there are stylized features, vulnerabilities and constraints on the Jamaican economy which may mute or magnify the effects predicted by the leading theories of labour market adjustment under trade. In fact the "ceteris paribus" assumptions of the theory will have to be reconciled with the realities of a country facing serious economic and social challenges for over *3* decades. Perhaps the most serious among those problems is the significant debt burden which stands at 130% of the Gross Domestic Product. The upshot of this is that the central government faces significant debt expenses which serve as an effective constraint on its ability to invest in physical and human infrastructure and to carry out the basic functions of government. As a result of this, the international competitiveness of the Jamaican economy has been negatively and severely affected.

No doubt, parallels can be drawn linking the Jamaican experience to that of other developing countries. Although we know that specific outcomes differ across economies due to a multiplicity of factors, it is precisely because of this variation that we are able to identify the distinct effects and roles of various factors through empirical research. Understanding the labour market outcomes in Jamaica should aid in increasing the frontiers of understanding of the dynamics of change from a developing country perspective within the context of the new global economy.

In sum, the main thrust of our research is to examine several dimensions of the Jamaican labour market adjustment. To carry out this analysis we rely on the most detailed micro-econometric data on the Jamaican labour market available. It is hoped that as a result of our efforts we can inform policy in Jamaica, the Caribbean and the wider school of thought concerning labour market issues.

1.2 Thesis Outline

This thesis is concerned with exploring key aspects of the dynamics of labour market adjustment in Jamaica over the period 1983-2006. The thesis proceeds as follows: *Chapter 2* provides an overview of the Jamaican economy. The goal of this chapter is to give the reader a background of the Jamaican economy and, hence, an exposure to the context within which we conduct our analysis. We outline in this chapter issues such as the size of the Jamaican economy and labour market and key trends in important economic variables which help to describe the economy and its dynamics.

Our outline reveals that the economic analysis of post-independence Jamaican economy can be delineated into distinct stages, reflecting the full spectrum of economic ideology. In fact, the wide range of economic policies pursued over time is reflected in a variety of economic outcomes. Firstly, the industrial push of the early 1960's saw the economy experience fantastic rates of economic growth and propelled the small island economy into the top percentile of the distribution of growth rates among all world economies at that time. Subsequently, the populist, social democratic experiment pursued by the administration during the decade of the 1970's was concurrent with an approximate 25% contraction in the size of the economy and marked the genesis of the country's debt problem effectively reversing the growth momentum. Our discussion of this critical decade within the economic history of Jamaica, will hopefully give the reader an inkling of the background against which structural and liberalization reforms were implemented subsequently in the 1980's. These reforms, coupled with inherent vulnerabilities would later culminate in the financial crisis of the mid 1990's and general economic stagnation thereafter; towards the end of the sample period. Throughout the chapter, we attempt to relate these developments to developments in Jamaica's trade and labour markets.

Chapter 3-the first empirical chapter of the thesis, is an attempt to analyse the effects of globalization and trade on labour market adjustment in Jamaica. After examining the trends in sectoral re-allocation of employment occurring during the period, we focus our analysis on the manufacturing sector in much the same spirit as Elliot and Lindley (2006b). The key question we attempt to answer in this chapter of the thesis is "What is the incidence of sectoral and industrial adjustment in Jamaican manufacturing and what are the causal factors driving this adjustment?" A fascinating, yet related question which we attempt to answer using the data is: "To what extent was increased trade a causal factor in the adjustment?" Matching industry level trade flows with individual employment records allows us to tackle this question econometrically within a probability modelling framework; taking explicitly into account the critical dimension of adjustment into disemployment. By extending the Elliot and Lindley (2006b) framework to include out-of-job movers, we fill a gap in the empirical literature while, at the same time, exploiting novel Jamaican data.

Before estimating our model, however, we provide in *Chapter 3* a critical survey of the literature regarding labour market adjustment to trade. We show that, in the theoretical literature, the treatment of labour market and its adjustment under trade varies under differing theoretical approaches. So much so that it may prove difficult, even for the careful reader, to keep track of the role of labour markets and the type of labour market adjustment one would expect to observe when moving from an autarkic to non-autarkic equilibrium. After surveying the full menu of Ricardian, Ricardo-Viner and Heckscher- Ohlin models, we find, *inter alia*, a common thread in these theories. They prove to be highly restrictive, with far too strong assumptions regarding the role of the labour market and the role it plays under adjustment. In particular, the assumption of full-employment (equivalently the assumption of a fixed or perfectly inelastic labour supply) is simply too restrictive for a high unemployment economy such as Jamaica.

Our quest for a theoretical framework which takes unemployment into account leads us to explore elements of implicit contract theory, minimum wages, efficiency models, fair- wage models as well as search theory. As a final point of departure, we use insights from development theorists such as Lewis (1954) and Harris and Todaro (1970). It becomes obvious after this foray that a wide array of factors, including high unemployment itself, play a significant role in determining outcomes under trade. These outcomes are sometimes unfavourable and may, in fact, starkly contrast standard trade-theoretic predictions. For example, the *Smooth Adjustment Hypothesis* (SAH) alluded to in the literature by Balassa (1966) and Krugman (1981), posits that in transitioning from the autarkic equilibrium, if the increase in trade is of an intra-industry rather than an inter-industry nature the adjustment costs should be smoother and of a lesser magnitude. Although prior tests of this hypothesis have yielded some favourable results, one cannot merely assume the same result will follow for a low-skilled, high-unemployment setting where skills are, in general, neither sector- nor indeed industry-specific. By including appropriate measures of trade within our empirical model, we are able to make comments about the applicability of this hypothesis to the Jamaican data and by extension to the developing country setting. We also combine the search theoretic approach with the literature on worker-firm heterogeneity and the simultaneous job-creation and destruction paradigm of Klein *et al* (2003a) in order to find a suitable theoretical framework within which we can analyze the Jamaican data.

In *Chapter 4* we turn our attention to analyzing job-to-job mobility within the Jamaican labour market. To accomplish this task the analysis is extended in three main ways in order to utilize the worker flow data to facilitate a broader perspective of the dynamics of the Jamaican labour market. Firstly, though a common artefact of the empirical literature, studies analyzing manufacturing sector dynamics, no matter how detailed, are insufficient to describe the prevailing conditions in any labour market as a whole. Secondly, this extension allows us to extend the purview of our analysis beyond the boundaries of the tradeable sector to include Jamaica's rapidly growing non-tradeables sector. Thirdly, it may be more intuitively appealing to think of the individual worker as facing the decision at each stage of his career of whether to change occupation, given the possibility of promotion and the other attractions of an occupational move, rather than a decision to change sector. Therefore, in this chapter, we explore the causal factors driving such a choice, and the degree of interdependence between the decision to move sector and that of changing one's occupation.

A key consideration in carrying out this analysis is defining an economically meaningful interpretation of the occupational and sectoral categories. As Shaw (1987) points out the problem associated with occupational change "is that a broad theoretical model of change is inherently difficult to measure, due to the very idiosyncratic nature of occupational skills." We appeal to the literature to arrive at suitable definitions based primarily on the empirical work of Elliot and Lindley (2006a) and Dolton and Kidd (1998). These definitions allow us to measure the degree of various types of job-to-job mobility over time in Jamaica. Moreover, we attempt to measure the skill content of the Jamaican labour force and study its dynamics.

We then ask two important questions of the Jamaican data. Firstly, we explore the nature of the inter-occupational and intra- occupational transition in the Jamaica. Secondly, we ask of the data "What are the causal factors responsible for the job-to-job mobility in Jamaica?" and "Do the effects of these causal factors differ based on the type of job-to-job mobility?" We attempt to answer these questions using a micro-econometric approach. Not only does our analysis allow us to add to the literature regarding the anatomy of labour market adjustment in a developing country setting but we are able to identify specific worker types who were most affected in the adjustment process. This is achieved through the microeconomic nature of the survey information which allows us to identify the characteristic traits as varied information about the levels of educational attainment, age, experience, skill and other salient socio-economic features of the survey respondents. To the extent that we can accurately identify these worker types accurately we are able to direct policy attention to specific affected groups in order to ensure that re-employment opportunities are maximized and that this is accomplished at the least economic, social and human capital cost.

An interesting result of our empirical investigation in *Chapter 4* is that, in Jamaica, the most significant category of movers is those movers, referred to herein as simple movers, who remained within their initial occupational grouping but changed sector only. Interestingly, Elliot and Lindley (2006a) present quite dissimilar results for the UK over the period 1985-1991. In the UK the highest ranking category by order of magnitude was workers who had changed occupation but not sector. We ask "Is this significant difference in the qualitative result trivial or is it non-trivially related to differences in these economies related to the costs of adjustment?" Does it imply, for example, that changing sector might represent a relatively cheaper transition in Jamaica while the opposite is true for the UK? Questions such as these are addressed in the chapter on the basis of the existing empirical evidence and appropriate conclusions drawn.

In *Chapter 5* we tackle frontally one of the most significant economic problems facing Jamaica - the problem of unemployment. The mammoth scale of the problem facing the small island economy is beyond dispute. Labour Force Survey data issued by the Statistical Institute of Jamaica reveals that the unemployed as a fraction of those individuals 14 years and over averaged 10.8% over the period 1983-2006 whereas individuals regarded as being out-of-the labour force averaged 32.06% over the same period. Such outcomes are indicative of an economy for which the problem of unemployment is not only significant but also persistent.

The first step in understanding the unemployment problem in Jamaica lies in its definition. As Strobl *et al* (2009) and Abowd and Zellner (1985) point out, the distinction between participation and non-participation often proves to be ambiguous especially when job search behaviour is taken into account. We conjecture an even more blurred relationship in a low-skilled, high unemployment environment such as Jamaica, in which, as Lewis (1954) suggests, the marginal product of labour may in fact be negligible. In Lewis' (1954) portrayal of these economies an "unemployed" worker may simply be hired periodically to run errands or be hired solely based on the largesse of the employer. Despite this, we use the ILO definition of unemployment in order to estimate the probability of escape from unemployment since the Jamaican labour force survey does not allow us enough information to widen the definition of the unemployed.

The reader of *Chapter 5* will be exposed to key and specific theoretical explanations of unemployment in Jamaica. We deliberately extend the explanation proffered by Kim (2007): that the underlying reason behind the persistent unemployment is that the reservation wage is too high due to significant remittance inflows. Although we leave room for this explanation, we are in search of a far more comprehensive explanation of the phenomenon for four reasons. Firstly, the high unemployment problem predates the phenomenal growth in remittances inflows into the Jamaican economy which occurred during the 1990's. And what was the magnitude of remittance inflows when Nobel Laureate Sir Arthur Lewis (1954) fully described and modelled the unemployment problem in Jamaica in his famed paper in 1954? Secondly, the volatility in remittance flows is not mirrored in the dynamics of unemployment. Thirdly, to adopt the neoclassical approach to modelling labour markets totally neglects the role of the "searcher"-or the unemployed. In light of this shortcoming of the neoclassical model, our goal is to find a more inclusive theoretical framework that can be used to model this phenomenon. Fourthly, no prior attempt has been made to model unemployment in Jamaica using micro-econometric data. In fact, the unit of analysis used in Kim's (2007) study was the cluster (see also Alleyne, 2000).

In *Chapter 5,* therefore, we show that the econometric challenges faced in exploring the issue using Jamaican Labour Force Survey data may be numerous but not insurmountable. In this Chapter, we exploit the survey design itself in order to retrieve "success" and "failures" with which to construct our probability model. The challenge is complicated by the fact that the Labour Force Survey is not a longitudinal survey. The econometrics of renewal and survival processes is generally the primary method of analysis used to explore issues of escape probabilities from unemployment within the empirical literature. However, this approach tends to rely on the use of panel or longitudinal data. We therefore also fill a gap in the literature by offering an alternative empirical methodology whereby repeated cross-sectional data can be used to investigate the issue. This is a helpful addition to the literature and adds additional value to Labour Force Survey data and demonstrates how the survey design can be exploited in order to address an empirical problem which is anathema to developing- country labour force survey data. Chapter *6* presents the salient conclusions, suggests possible directions for future research and suggests key policy recommendations arising from the research.

Chapter 2

Background of the Jamaican Economy and Labour Market

2.1 Overview of Economy

Jamaica is a small, developing country located in the Caribbean Sea. The island is located 90 miles south of Cuba and within 120 miles west of Haiti. It is also situated only 635 miles off the southern coast of the United States of America. Having first been inhabited by Amerindian peoples, the island would later become a Spanish Colony in 1492 and would later fall under British rule in 1655. In 1962 the island became fully independent from Britain. The island is democratic, though it pursued a somewhat socialist philosophy in the decade of the 1970's. Jamaica's economy can be described as undiversified being highly dependent on agricultural production (principally sugar cane, banana and cocoa), mining of bauxite/alumina and tourism.

We present in *Table 2.1* a brief summary of recent, key, economic and social descriptors of the Jamaican economy. *Table 2.1* reveals that the country has a population around the 2.7 million mark. The labour force is comprised of less than half of these individuals. Using the National Income as measured by the Gross Domestic Product (GDP), Jamaica ranks 112th out of the 181 countries for which data is collected by the International Monetary Fund (IMF), on a per capita basis, however, the country ranks in the mid- to early 80's on the list from the same source depending on whether GDP per capita is measured in terms of current prices or purchasing power parity dollars. Table *2.1* also provides information on economic growth and reflects the fact that for some time, the Jamaican economy has experienced growth that has been both sluggish and low.

Jamaica's economy can be said to be at an advanced stage of economic transition; in that, both fertility and mortality rates are experiencing decline. Furthermore, the majority of workers within the economy are employed within the services sector; which accounts for just over 60% of total employment. The remaining employment is shared almost equally between industry and agriculture; with agricultural sector enjoying a slightly superior share. This is an interesting development, especially in light of the fact that for most of the economic history of the small island nation, it is the agricultural production of its sugar and banana crops which has dominated its

Indicator	2000	2003	2006	2008
Population (Millions)	2.586	2.631	2.683	2.705
Employed:				
Labour Force (Millions)	1.179	1.173	1.206	1.231
Unemployment Rate (%)	15.5	11.7	9.6	10.6
Employment Shares (%)				
Agriculture	20.5	20.1	18.1	18.2
Industry	17.9	17.3	17.7	17.7
Services	61.3	62.4	64	63.9
Output:				
GDP per Capita (US$ Current)	3479.06	3579.60	4502.02	5438.48
GDP (US $Billions Current)	9.01	9.34	11.99	14.6
Annual GDP Growth	0.88	3.5	2.72	-0.95
Inflation	8.17	10.32	9.29	9.57
GDP by Sector:				
Agriculture Share (%)	7.56	6.26	5.99	5.32
Industry Share (%)	25.97	24.19	25.33	25.34
Services Share (%)	67.43	69.37	69.58	69.34
External Sector:				
Import Share (%)	36.70	39.14	47.13	57.94
Export Share (%)	14.44	12.72	17.8	18.36
Debt/GDP ratio	88.70	123.82	117.76	109.93
F.D.I. (% of GDP)	5.2	7.67	7.36	9.8
Poverty Line	18.7	19.1	14.3	12.3
Human Development Index	0.75	0.75	0.768	-

Table 2.1 Jamaica - Key Indicators

Source- World Development Indicators, Statistical Institute of Jamaica

economy. Under the aegis of the World Trade Organisation (WTO) however, preferential access to European markets has been eroded; so that, for Jamaica, as well as other African, Caribbean and Pacific (ACP) countries, the contribution of these sectors to the economy has waned. Also, from as early as the 1980's, tourism has emerged as the major gross foreign exchange earner displacing these traditional, mainstay agricultural sectors.

Two key observations emerge from examining the trade statistics presented in *Table 2.1*. Not only do imports dominate trade flows, representing upwards of 35% of the national income - and growing, but also, the value of imports has been increasing exponentially. On the other hand, the value of exports remains at a much lesser magnitude and, though showing some signs of growth, in no way rivals the rate of increase in the share of imports. Taken together, these facts imply that the trade deficit in Jamaica has been widening. A closely related observation from the table is that the national debt stock has also been on the rise- as the country, unable to fund- on its own- its demand for foreign goods and services, resorts to borrowing in order to meet the shortfall. As a consequence, Jamaica has acquired the dubious distinction of being among the top ten most highly indebted countries in the world (relative to its GDP)[1]. Therefore, the funds required for financing of the government's budget and to service the payments for its debt greatly constrains the government's ability to invest in the country's physical and human infrastructure. Partly due to this fact, Jamaica falls in the medium human development category[2] based on the Human Development Index (HDI), but is still one of the highest-ranked countries in the Americas using this measure; despite experiencing only a moderate improvement in its HDI ranking in recent years.

2.2 Jamaica: Paths of Development

Perhaps the best way to contextualize the issues analyzed in this thesis is to briefly review Jamaica's recent economic history. This exercise is of critical importance, since it informs the reader of the initial conditions prevailing before the process of trade liberalization began. Secondly, such a review gives the reader a sense of the sequencing of the events which have shaped and continue to shape the labour market and economic landscape of economy. An examination of post – independence GDP growth rates is particularly instructive.

From *Figure 2.1,* it is clear that over the sample period, the Jamaican economy experienced great volatility and a wide variation in its growth outcomes; ranging from periods of robust growth, to deep recessionary periods and periods of relative stagnation. In fact, King (2001) opines that Jamaica's post-war economic history falls naturally into four phases; each corresponding to the type of economic

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[1] Source: IMF Statistics.
[2] The categories are very high, high, medium and low development.

development strategy pursued by the country. We would go further than King (2001) to posit that there is also a marked and direct correspondence between the growth

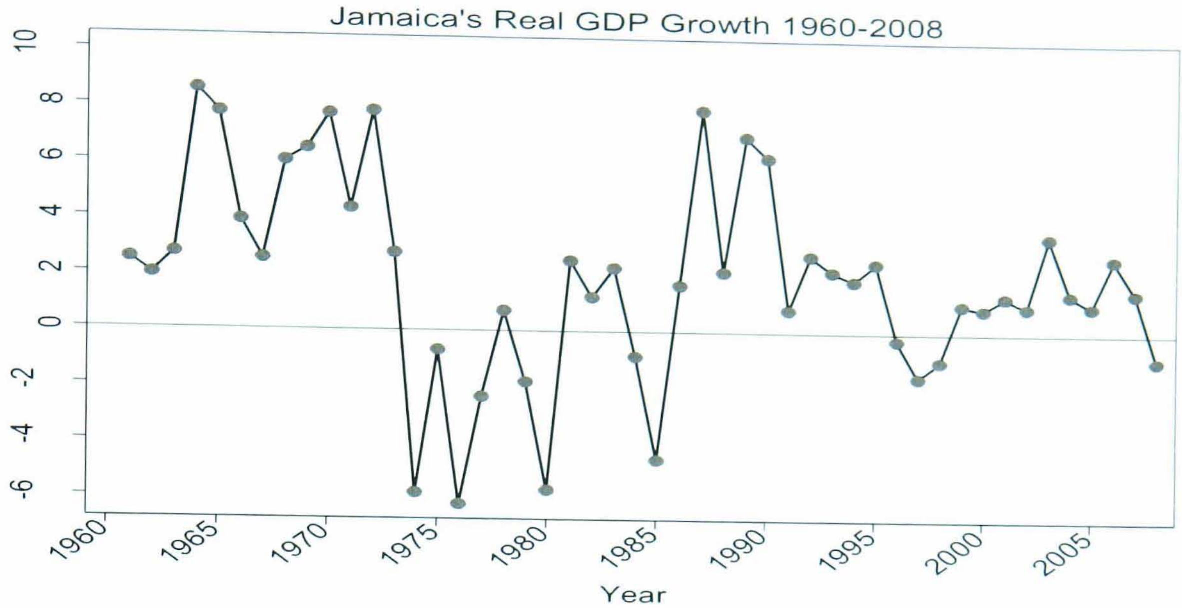


Figure 2.1 Jamaica's Annual GDP Growth 1960-2008
Source: IFS

outcomes and changes in the political regime, especially for the earlier years shown in the figure. The first period 1962-1972 was marked by significant growth. This period was then followed by a period of disillusionment and experimentation with socialism from 1973-1980. Thirdly, we have the re- installation of the post-independence political party and limited recovery. The final period is characterised by crisis, sustained economic stagnation and low growth. This final period beginning in 1990, extends to the present day, with the *status quo* of sub-par economic fortunes persisting across political regimes.

The first period up to the early 1970's, can be characterized as an era of high and impressive growth rates, a stable macroeconomic environment, and increasing industrialization. As can be seen from *Figure 2.1,* between the years 1961-1973 economic growth was impressive. The annual average rate of economic growth during this period was in fact 5%, peaking at 8.6% in 1964. In the ensuing years, and for most of the 1970's, economic policy was marked by significant state intervention. During this time, the Jamaican government pursued an ill-fated populist economic policy called "Democratic Socialism" which resulted in recession, double-digit inflation, and closure of the economy to trade. By 1977 Jamaica entered into its first Loan agreement with the World Bank, with its conditionalities. The period of the 1970's marked the genesis of the Jamaican debt crisis. Note well, that the average annual rate of decline of GDP during the period 1974-1980 was -3.15%, reaching a nadir of -6.26% in 1976.

The 1980's can be described as an era of significant state intervention as well, much similar to the 1970's. However, King (2001) distinguishes between the two periods by recognizing that while the ideological basis for the 1970's was clear there was no distinctive ideological thrust of the economic policy of the 1980's. It was within this period that the liberalization reforms began- coaxed into being through obligations and conditionalities attached to the structural adjustment programmes. Growth outcomes in this decade were relatively better than those in the 1970's but cannot compare with the economic success of the 1960's. The average annual rate of growth of GDP over the period 1981-1990 was 2.6% even though economic growth peaked at just below 8% in 1987. Remarkably, a growth rate of over 6% was maintained over the last two years of this period. The growth outcomes reflect what could be seen as somewhat of a recovery over severe contraction of the 1970's. We note the low annual growth outcomes that characterize the years 1991-2006. GDP growth rates over this period average 1.19%. The highest growth rate achieved during this period was 3.5% in 2003. Also 1997 and 1998 represented years of stagnation with the economy contracting nominally by 1% and 1.2% respectively. Overall, there has been an absence of any real growth for most of the post-independence years.

The poor growth outcomes of real GDP are almost perfectly mimicked by the fluctuations in real GDP per capita over the period. Despite poor growth outcomes, there is evidence that Jamaican economy has been experiencing a decline in poverty. It has been argued that the improvement in the poverty statistics throughout the decade of the 1990's, despite the declining economy, has been due to two factors; firstly the substantial increase in the flow of remittances fuelled by the substantial Jamaican immigrant communities in the United States and the United Kingdom and secondly, the reduction in the inflation rate, which had peaked at 80% in 1992 during the height of the process of financial and capital account liberalization. At the same time, King (2001) has reported a narrowing of the income distribution during this period, negatively affecting the fortunes of the wealthiest quintile due to the appreciation in the value of financial rather than real assets after the liberalization episode.

2.3 External Trade and The Jamaican Economy

In this section we answer three simple, yet pertinent, questions in our attempt to provide a brief description of Jamaica's external trade. The first question we seek to answer is "What is the volume of Jamaica's external trade?" The second question: "Which countries are Jamaica's chief trading partners?" and finally we enquire about the composition of Jamaica's external trade.

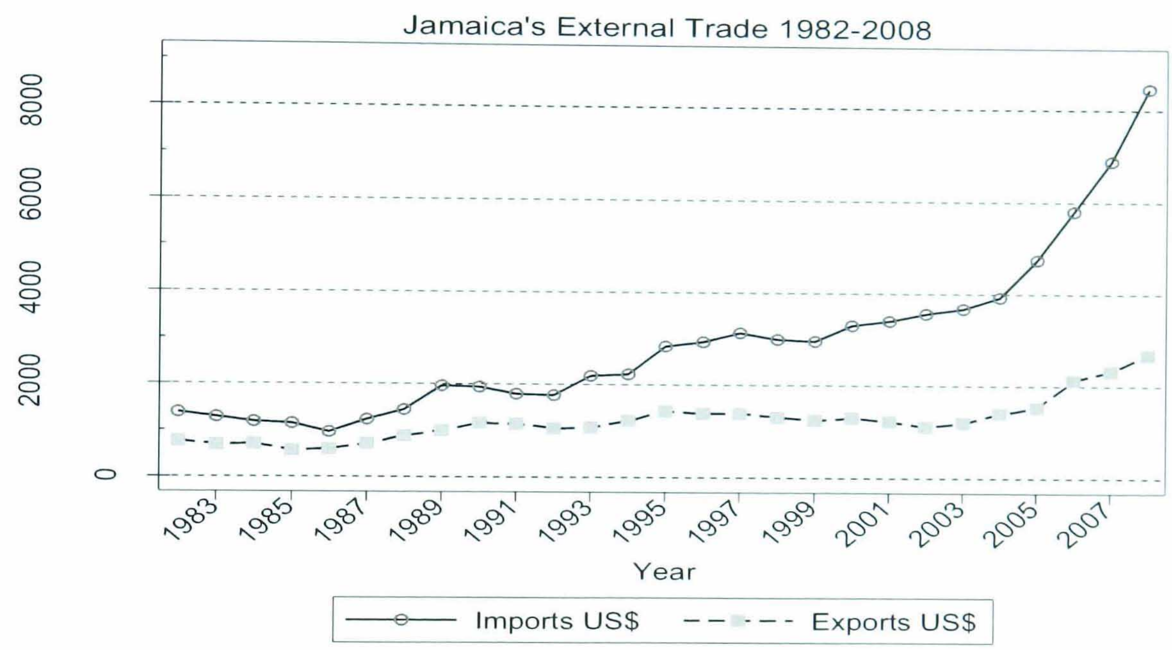
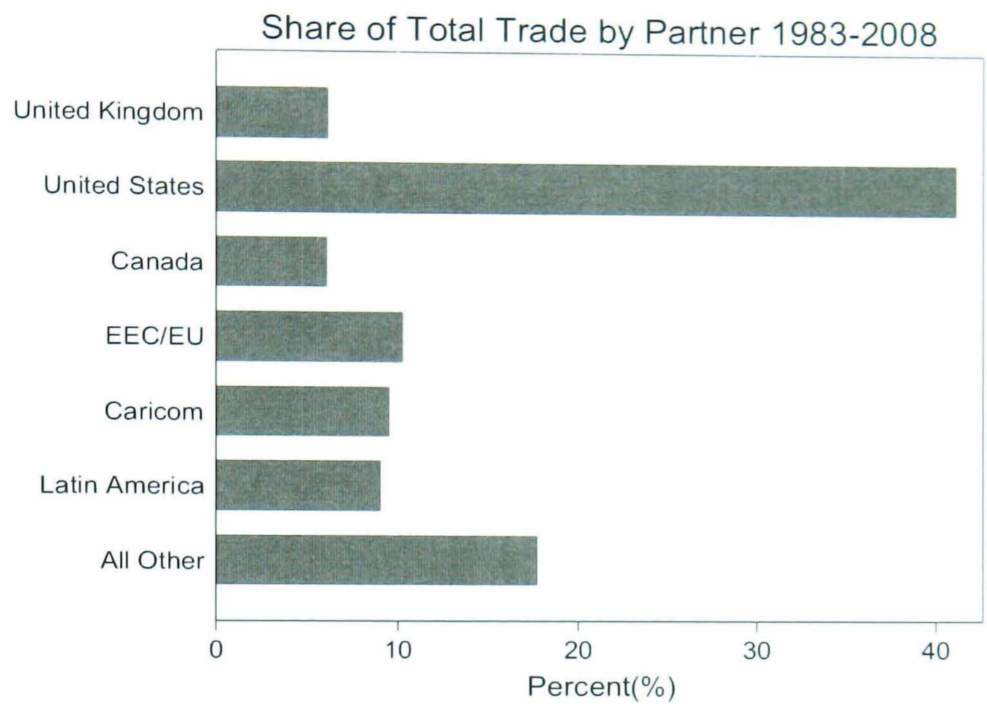
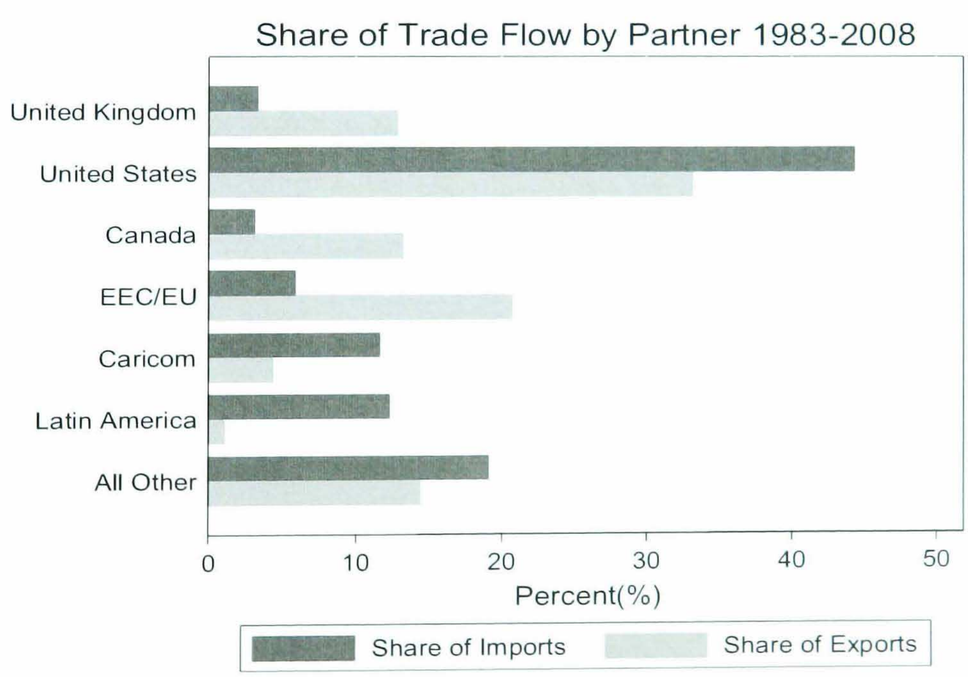


Figure 2.2 Jamaica's Imports and Exports 1983-2008 US$-Millions
Source: Statistical Institute of Jamaica, Bank of Jamaica

Figure 2.2 indicates that there has been a substantial increase in the value of trade in Jamaica over the review period. In fact, the approximately 2.1 billion US$ value of external trade registered in 1982 increased more than five-fold in nominal terms, by 2008. It is also clear that, over time, the value of Jamaica's external trade becomes increasingly dominated by imports; which has seen an exponential increase leading to an ever- widening trade deficit. In fact, imports have increased from US$ 1.3 billion to $US 8.45 billion over the 27-year period shown in the figure. Moreover, the growth rate of imports significantly increases towards the end of the sample, thus rapidly increasing the rate of deterioration of the current account. Although the value of exports has also grown significantly over the period of analysis, its growth has been relatively less spectacular than the growth in imports. In fact, compared to the six-fold expansion in imports, the value of exports has grown by 350%; averaging 13% growth in each calendar year.



(a)



(b)

Figures 2.3a and 2.3b: The Proportion of Jamaica's Trade by Partner, 1983-2008
Source-Statistical Institute of Jamaica

Figure 2.3a, is helpful in answering the second key question since it shows Jamaica's trade by trading partner over the period 1983-2008. We see from the figure that the United States of America is, by far, Jamaica's most dominant trading partner, both in terms of imports as well as exports. So dominant is the United States of America (US) as a trading partner, that the 41.1% share of Jamaica's total trade, which it commands, quadruples the share of trade of the next most significant trading partner- the CARICOM- the regional trading bloc, which accounts for 9.5% of the total value of trade, over the period. Latin America ranks closely behind, accounting for 9% of the external trade, mostly due to the importation of Venezuelan oil, followed by the trade share with the E.U./E.E.C. Both the United Kingdom and Canada account for 6% each of the total value of trade with Jamaica. The aforementioned country groups alone, taken together, account for 80.6% of Jamaica's trade value- with all other countries in the world accounting for the remaining 17.8%.

When trade is disaggregated into imports and exports as in *Figure 2.3b*, the importance of the US as a trading partner is even more easily seen. In fact, the volume of trade with the US dominates both sides of the balance of trade; accounting for 33.2% of exports and 44.4% of all imports over the 1983-2008 period. The value of Jamaica's import trade from CARICOM and Latin America each account for approximately 12% of the value of all trade inflows. Imports from the EEC/EU represent an even smaller share- at 6%. *Figure 2.3b* also reveals that the second largest market for exports is provided by the EEC/EU which accounts for 20% of Jamaica's export trade. Furthermore, the UK and Canada each account for approximately 13% of all exports from Jamaica. *Figure 2.4a* shows the annual share of the total import values accounted for by Jamaica's major trading partners. Based on the figure, the dominance of the United States as the major source of imports is again clearly evident. Although the average share of annual imports from the United States is 46.26% there is some fluctuation around the sample mean. Inspecting the figure, one observes a trend increase in the share of US imports at the beginning of the sample. Despite some initial volatility, the US share of total Jamaica's imports eventually climbs to, and eventually fluctuates around 50% of all imports for some time. However, since 1999 the share has generally been on the decline to its 2006 level of 37% before recovering somewhat towards the end of the sample. The evolution of the import shares for the Latin American region tells a contrasting story. In 1983 the import share stood at 17%, before declining to a low of 7% in 1999.

Since that time, there has been an increase in the import demand from Latin America relative to other trading partners and at the end of the sample period an import share of over 17% was once more realized.

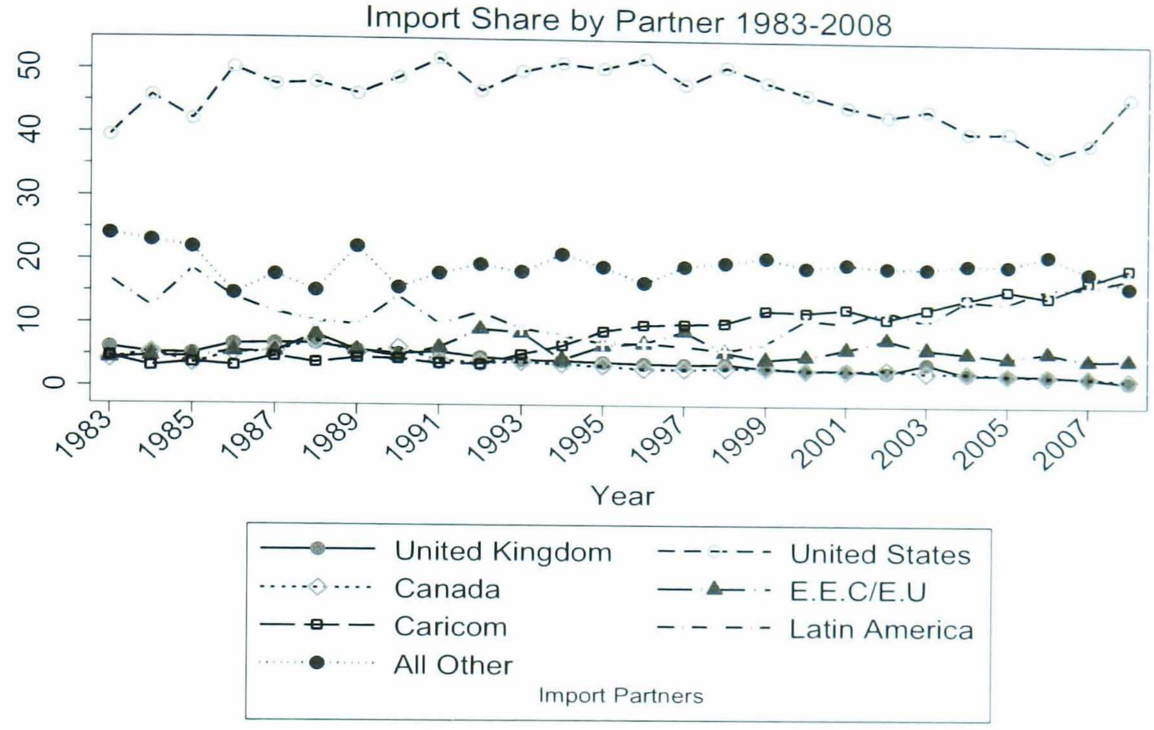


Figure 2.4a Import Share by Major Trading Partner 1983-2008
Source-Statistical Institute of Jamaica

It is also remarkable that the share of imports into Jamaica from CARICOM has been rising since the early 1990. The share of imports from CARICOM stood at a mere 4.7% of the total value of all imports however, by the end of the period the figure stood at 14.78%. From *Figure 2.4a* we can also observe a noticeable decline in the share of imports from the UK over the period. This development is significant in light of the fact that Jamaica was once a British colony and has strong historical trading ties with that country.

Turning our attention to export shares, we can see from *Figure 2.4b* that the US, again, accounts for the dominant share of exports over the entire sample period, though there were notable periods of decline in its export share. For example, notable periods of decline are 1984-1990 and from 1999-2006. There was a significant but temporary spurt in the export share to the United States in 1984. In that year, the export share peaked at over 50%. This, zenith was never again achieved for the remainder of the sample with a comparable fall in the share of exports to the US occurring in 1985. Another period of growth in the share of exports to the United States was between 1989 and 1995. This period saw the export share increasing from 26% to 36.8% in 1996. The series peaks out in 1998 at 40% and then we observe a trend decline to its nadir in 2004. The last years of the sample period depict increased share of exports to the United States.

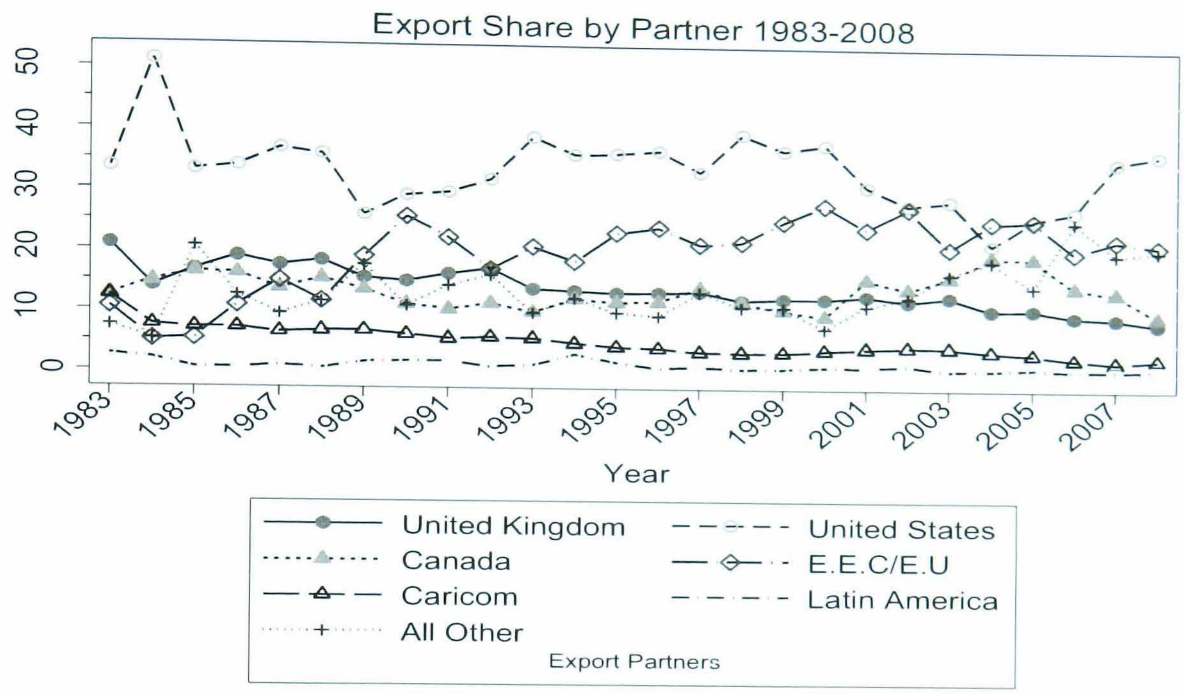


Figure 2.4b Export Share by Major Trading Partner 1983-2008
Source-Statistical Institute of Jamaica

Overall, *Figure 2.4b* reveals a secular decline in the share of Jamaica's exports to the United Kingdom and to CARICOM. Over the period the share of exports to the United Kingdom and CARICOM fell by 6% and 10% respectively. In fact, in 2006, exports to CARICOM from Jamaica as a share of the value of total annual exports was a mere 2%. So we see that while the share of Jamaica's trade with the United Kingdom is falling over the sample period, it does appear that, over review period, the rise in trade with CARICOM is in fact characterized by a growing current account deficit between Jamaica and the regional trade grouping. This could be evidence that Jamaica may in fact be less competitive than other members within CARICOM and/or does not have the capacity or productivity to meet the demand for

Year SITC section	1983 Import (Export) (%)	1990 Import (Export) (%)	2000 Import (Export) (%)	2008 Import (Export) (%)
0-Food and Live Animals	13.98 (16.8)	12.07 (15.62)	13.97 (17.4)	10.4 (10.63)
1-Beverages and Tobacco	0.68 (5.4)	1.06 (3.2)	0.9 (4.6)	1.1 (0.04)
2-Crude Materials except Fuels	3.3 (60.2)	2.4 (64.4)	1.6 (57)	0.87 (56.3)
3-Minerals, Fuels, Lubricants etc	30.2 (3.9)	19.81 (1.4)	18.39 (0.29)	40.62 (17.9)
4-Animal and Vegetable oils and fats	1.1 (0)	0.93 (0)	0.6 (0)	0.65 (0)
5-Chemicals	10.26 (3.4)	11.77 (2.15)	10.5 (5.4)	11.4 (8.4)
6-Manufactured goods by material	16.22 (2.4)	15.41 (1.8)	13.9 (0.9)	10.6 (0.6)
7-Machinery and transport Equipment	18.37 (2.4)	25.48 (2.7)	23.2 (2.1)	14.9 (1.5)
8-Miscellaneous Manufactured goods	4.2 (5.3)	9.31 (8.7)	14.2 (12.4)	8.0 (0.7)
9-Commodities and transaction	1.64 (0)	1.77 (0)	2.8 (0)	1.5 (0.2)

Table 2.2 Composition of Trade Flows in Jamaica
Source-UN Comtrade Statistics

its exports from the other member states, while the home demand for the products of its regional competitors have been rising.

Both Canada and the United Kingdom are relatively important export markets for Jamaican products. However, while both countries demand between 10%-20% of the total value of Jamaican exports, Canadian demand appears to be stronger peaking at 19.5% in 2004 before declining to 1% above its period-wide average of 13.5 % in 2006 only to fall away further towards the end of the sample period. Another significant export market and trading partner, that might be worth mentioning is Norway, which accounted for 6.2% of the value of Jamaican exports over the sample period.

Table 2.2 above shows composition of Jamaica's trade flows by SITC section for four selected years: 1983, 1990, 2000 and 2008. The table reveals that despite the significant increase in the volume of Jamaica's external trade, the shares of trade remained more or less constant over nearly three decades. In particular, the sections containing the largest import shares for all years shown in the *Table* are minerals, fuels and lubricants, manufactured goods, machinery and transport equipment as well as food and live animals. The ordering of these categories however tends to vary over time such that; while it can be observed that highest import shares on average tend to be observed in the mineral, fuels and lubricant category, import shares in the machinery and transport equipment category dominate that category in some years since the turn of the decade of the 1990's. On the other hand, in the export category the significance of agricultural exports to Jamaica's balance of trade can be evidenced in the relatively high export shares in the: crude materials except fuels and the food and live animals categories. A significantly increased export share can be observed in the mineral fuels and lubricants category in 2008 because of the impact of increased refining capacity and significant investment in ethanol production by that time.

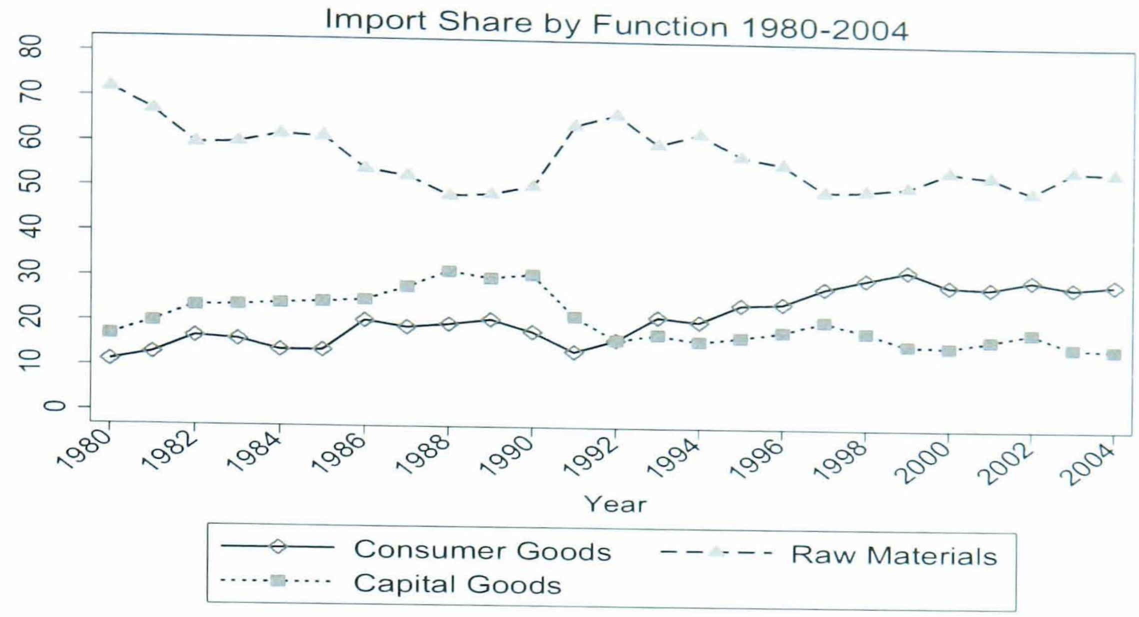


Figure 2.5: Import Share by Function 1980-2004[3]

Source-Statistical Institute of Jamaica

Figure 2.5 shows Jamaica's imports by function. The figure shows clearly that raw materials are the major component of Jamaica's imports over the period 1980-2006. A closer look at the breakdown provided by the Statistical Institute and summarized in *Table 2.2*, reveals that major components of Jamaica's raw material import bill are crude oil and other types of fuel. Also, from the figure, a trend decline in the import share of raw materials is observable during the 1980's with two periods of significant decline occurring between 1980 and 1983 and between the years 1985 and 1988. The latter period of decline coincides with the declining price of oil which characterized the late 1980's. Meanwhile, we observe trend increases in the shares of both capital and consumer goods during the decade of the 1980's. *Figure 2.5* reveals that consumer goods imports as a share of total imports surpassed the share of capital goods imports in 1992. This evidences the relative shift in the import demand towards consumption goods and away from capital goods; a trend which appears to have started at the turn of the decade of the 1990's. By 2004, the import share of consumer goods had risen to 30%. On the other hand, since 1990 there has been a decline in the share of imports attributable to capital goods. By 2004, the share of the import dollar spent on capital goods stood at a mere 15% which is half of its peak percentage for the sample period of 30% that was realized in 1988. Examining the

[3] Since 2004 trade inflows disaggregated by function have no longer been recorded by the Statistical Institute of Jamaica.

evolution of import share by function therefore underlines the fact that imports represent a substantial share of Jamaica's external trade.

	1983	1990	1994	2000	2006
Current A/C	-335.088	-312.099	81.6	-367.4	-1182.86
Goods Balance	-438.5	-502.1	-551.2	-1441.5	-2943.41
Services Balance	136.8	329.1	524.9	603.2	627.615
Transportation	-109.9	-143.35	-196.2	-256.6	-426.445
Travel	347.7	637.7	889.5	1123.9	1596.63
Other Services	-88.45	-165.25	-168.4	-264.1	-542.571
Income	-154.89	-430	-352.0	-349.9	-615.63
Current Transfers	121.5	290.9	459.9	820.8	1748.57
Official	6.8	116	19.2	147.9	145.37
Private	114.2	174.9	440.7	672.9	1603.2
Capital and Financial A/C	336.03	282.751	-81.6	337.72	1080.1
Capital A/C	-20	-15.7	10.4	2.2	-27.68
Capital Transfers					
Official	-	-	18.2	15.6	4.09
Private	-	-	-7.8	-13.4	-31.77
Net Errors and Omissions	-0.94	29.35	-10.6	29.68	102.76
Financial A/C	356.027	298.65	-92.0	335.521	1107.78
Reserves	56.65	-65.29	-337.5	-499.37	-230.34

Table 2.3 Jamaica's Balance of Payments Summary ($US Millions)
Source-IMF Statistics
Recall that in the Balance of Payments accounts a negative reserves quantity represents an increase in reserves by that amount.

Table 2.3 shows a summary of Jamaica's balance of payments for a few selected years. A brief examination of Jamaica's balance of payments is helpful since the summary contains useful information, *inter alia*, on Jamaica's trade in goods and services, financial claims and gifts such as transfer payments (for example, remmitances) but also in services. The balance of payments summary reveals that whereas for almost all of the selected years the Jamaican economy experience a deficit in its current account balance, such deficits to a large extent reflected deficits in the trade (merchandise) account of the balance of payments. In fact in the services account of the balance of payments the Jamaican economy has experienced a surplus in all selected years. The Caribbean region is a major tourist destination worldwide and Jamaica along with (Bahamas, Barbados and St. Lucia) is one of the more popular tourist destinations in this region reaps substantially in terms of the foreign exchange that is earned from tourism. In Table 2.3 we have summarized the balance of payments accounts to give the reader and idea of the magnitude of the tourism earning inflows. The line item: "travel" in the services account shown in Table 2.3 shows an increase in over the years displayed beginning at $US347.7 million in 1983 to $US1596.63 by the year 2006. This is a very important line item driving the surplus in the services account of Jamaica's balance of payments. However, Table 2.3 also reveals that transfer payments (such as remittances sent by private individuals residing overseas and official government grants/gifts) and net capital inflows (such as foreign direct investment and portfolio investments). On the other hand, Jamaica also experiences significant annual outflows of net income related to these investment activities.

2.4 Labour Market, Employment and Reforms

2.4.1 Labour Market Aggregates

Figure 2.6 depicts the evolution of the employment aggregates for Jamaica. The population has been growing at a rate 0.75% per annum over the period represented. This places Jamaica in the left tail of the statistical distribution of worldwide population growth rates.

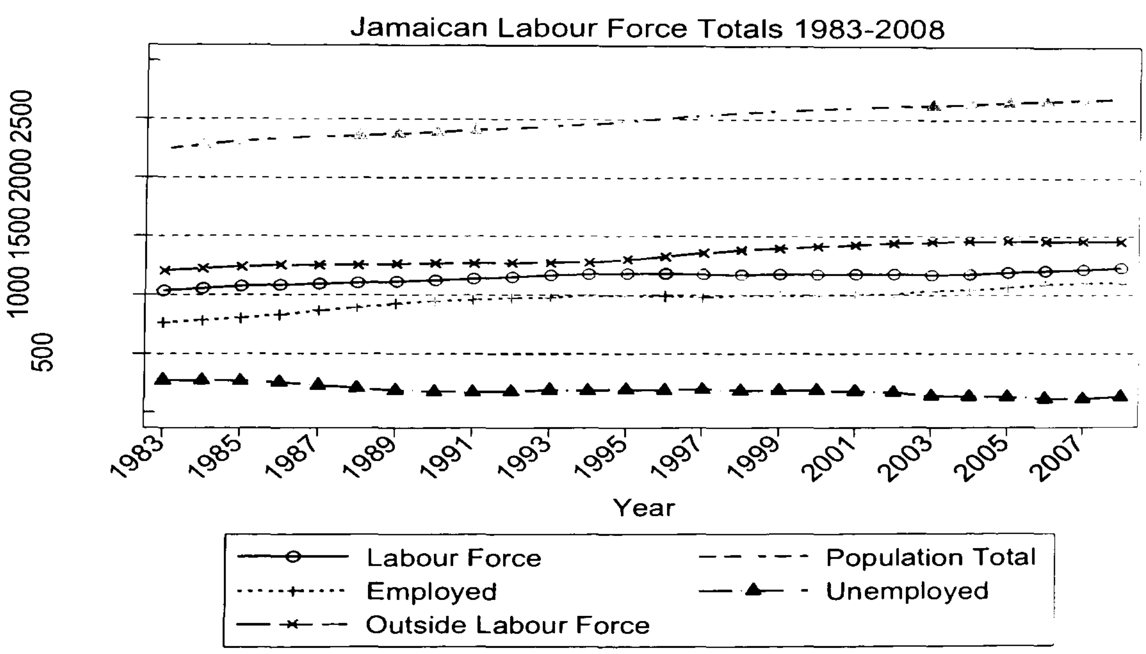


Figure 2.6: Labour Force Totals 1983-2008
Source-Statistical Institute of Jamaica

Closer inspection of Figure *2.6* reveals that labour force growth has not kept pace with the rate of increase on the size of the population. In fact, employment growth has also been very low; averaging 1% per year, which is a general indicator that the Jamaican economy has not been experiencing significant job creation. At the same time, we observe an expanding outside-of-the labour force category against which the economy's declining unemployment should be counterbalanced. This is a fascinating phenomenon to which we will devote a fair deal of attention in *Chapter 5* of the thesis.

2.4.2 Human Capital

Employment in Jamaica is highly skewed towards the services sector as can be evidenced from *Table 2.1*. By the most recent estimates[4], 1% of individuals employed within the service sector yields, on average, approximately 1% of national output. On the other hand, 1% of the employed in the agricultural production yields, on average, less than one-third of a percent of output. Further examination of the data reveals that, over the period, average productivity of agricultural labour has been on the decline. Interestingly however, the share of the Jamaican work force employed in industry appears to be the most productive, in that, a comparable share of employed put to work in this sector equivalent share employed in this sector yields substantially greater contribution to GDP than the other two broadly-defined sectors; 1.4% of the national product. Despite this fact, employment in both industry and agriculture are on the wane. Jamaica has a respectable but, relatively low literacy rate of 80% and its working population is not highly-skilled. This will, no doubt, have implications for the character of the labour market adjustment within this small, developing economy.

Table 2.3 shows the evolution of key labour market indicators for Jamaica. In this table, we present indices for the nominal wage rate, consumer price index, real wage rate, unit labour productivity and unit labour costs. The corresponding graph, based on the table, which shows the evolution of these labour market indicators are presented in *Figure 2.6*. The figure also reveals that during the early 1980's the

[4] See *Table 2.1*

Jamaican labour market was characterized by falling wages, labour costs and productivity in the aftermath of the 1970's. By the mid-1980's, however, there was a

Year	Nominal Wage rate (1)	Consumer Price Index (2)	Real Wage Rate (3)	Unit Labour Productivity (4)	Unit Labour Cost (5)
1983	69.3	54.1	128.1	119.5	107.3
1984	83.1	69.1	120.3	117.1	102.7
1985	87.5	86.9	100.7	103.2	97.5
1986	100.0	100.0	100.0	100.0	100.0
1987	115.6	106.7	108.4	104.8	103.4
1988	131.8	115.5	114.2	103.9	109.9
1989	163.2	132.0	123.6	110.0	112.4
1990	203.7	161.0	126.5	114.9	110.1
1991	291.3	243.2	119.8	114.4	104.7
1992	469.1	431.2	108.8	117.9	92.3
1993	710.5	526.4	135.0	120.7	111.8
1994	892.1	711.0	125.5	119.8	104.7
1995	1134.0	852.6	133.0	117.7	113.0
1996	1408.5	1077.7	130.7	118.3	110.5
1997	1569.5	1181.8	132.8	117.6	113.0
1998	1821.6	1283.8	141.9	116.4	121.9
1999	2009.2	1360.2	147.7	119.7	123.4
2000	2258.2	1471.4	153.5	120.7	127.2
2001	2403.4	1574.2	152.7	121.7	125.5
2002	2456.2	1685.6	145.7	113.0	129.0
2003	2805.5	1859.6	150.9	112.2	134.5
2004	3160.0	2113.0	149.6	113.0	132.3
2005	3408.1	2436.2	139.9	111.8	125.1
2006	3767.6	2645.5	142.4	110.7	128.7
2007	4201.2	2891.4	145.3	110.7	131.3

Table 2.4 Key Labour Market Indicators for Jamaica

Notes:

1. Column 1 is defined as compensation of employees divided by total employment. This is used as a proxy for the nominal wage rate. Data on compensation of employees was retrieved from the National Income and Product Accounts produced by STATIN.
2. CPI data was rebased from IFS data
3. Real wage rate is defined as the nominal wage rate divided by the CPI
4. The unit labour productivity is defined as the real GDP divided by the number of employees, or output per worker
5. Unit labour cost is defined as column 3 divided by column 4.
6. Source: Statistical Institute of Jamaica.
7. Similar tables were constructed by Alleyne (2000) and Gafar (1986) this table has been updated and rebased by the Author.

reversal of this trend. On the one hand, wages began to rise and, with it, unit labour cost. On the other hand, there was an attendant increase in unit labour productivity. This increase occurred against the background of Jamaica's foray into manufacturing of apparel during this period. With a change of political regime and an ensuing financial liberalization in 1989, followed sharp inflation which peaked at over 70% in 1991-1992. Increased inflation inevitably impacted both the real wage rate and unit labour cost, both of which dipped sharply by approximately 10%; a relatively substantial decline. The real wage would rebound shortly thereafter, so that by the mid-1990's workers' wages had re-settled to the previous levels once enjoyed in the late 1980's. At the same time, productivity growth, which had been steadily increasing since 1986, levelled off in 1993. Unit labour productivity would remain relatively stable at this level before entering into secular decline towards the end of the review period.

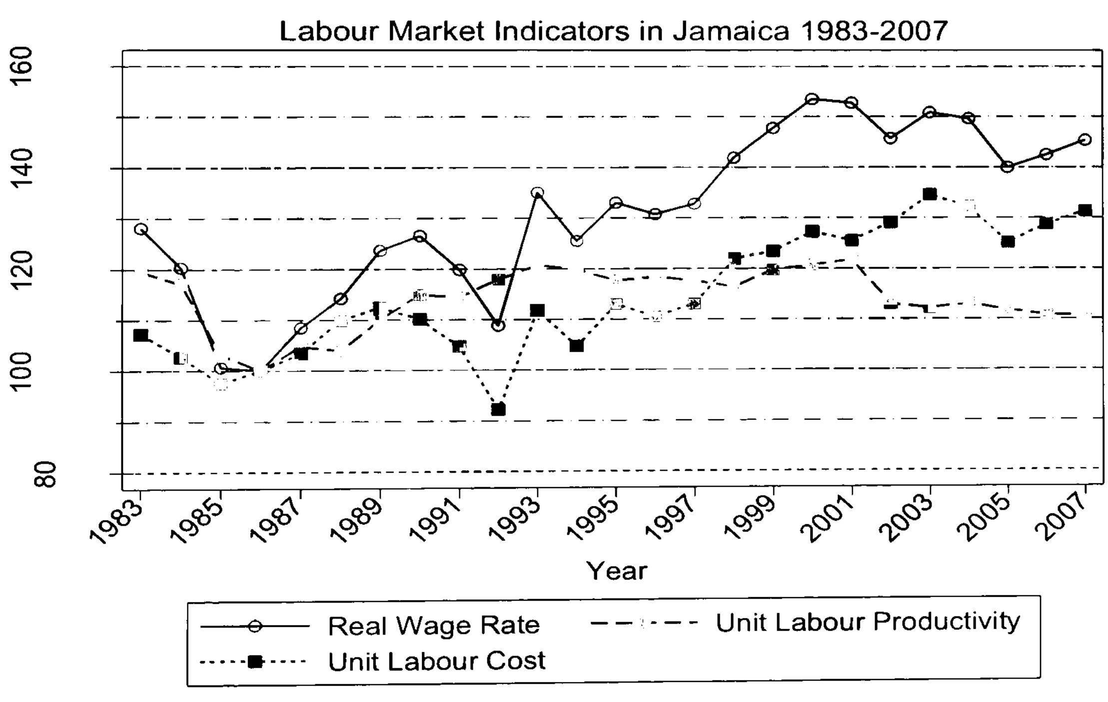


Figure 2.7 Labour Market Indicators: Jamaica 1983-2007
Source: Author's calculations

An interesting feature of the Jamaican economy is that, despite the poor growth in labour productivity, wages and unit labour cost continued to increase until year 2000. Real wages have returned to the 2000 level since then. We will return to a more careful discussion of these issues in *Chapter 3* of the thesis where we treat specifically, labour market adjustment within Jamaican manufacturing. However, it would appear, based on preliminary evidence, that a combination of rising wages and declining average product of labour might have had deleterious consequences for Jamaica's competitiveness *vis-à - vis* its trading partners.

2.4.3 Poverty and Inequality in Jamaica

In *Figure 2.8* below we, track the evolution of two measures of poverty and inequality; the Gini coefficient as well as the poverty percent measured using the "per adult equivalent method". The figure shows that income inequality, as measured by the Gini coefficient, has been relatively constant in Jamaica over the period covered here. The magnitude of the Gini coefficient itself depicts a highly inequitable distribution of income. The only noticeable perturbation in the evolution of the Gini occurred in 1997 during the period of financial crisis.

On the other hand, the poverty series exhibits significant variation. The spike in the series in 1991-1992 coincides with the highly inflationary episode at the beginning of that decade. Interestingly however, the poverty rate has been in secular decline for the remainder of the period. The fact that this phenomena has occurred within the context of low economic growth is particularly interesting.

Figure 2.8 Poverty Indices-Jamaica 1990-2008
Source-Planning Institute of Jamaica

Needless to say, this issue has not escaped the attention of economists studying the Jamaican economy. Among the explanations offered for this phenomenon is the significant increase in migrant remittances over the period. In fact, Alleyne and

Kirton (2006) report that between the years 1996 to 2002 alone, remittances to Jamaica increased from US$ 651 million to US$ 1130.6 million dollars[5]; an increase of 73.6%. However, according to a World Bank (2004) report on Jamaica "remittances are a significant part of the coping strategy of the poor, but it is less clear that they explain the sharp fall in poverty after 1995". The increase in wages towards the end of the period covered in *Figure 2.7*, along with increased interest incomes as a result of contractionary monetary policy used to combat the inflation of the early 1990's and high levels of burrowing by the government are, quite likely, closely related to this phenomenon.

While the phenomenal growth of remittances might have had beneficial effects on the Jamaican economy, it is not without its costs. The flip side to this phenomenon is significant emigration; and in particular skilled emigration, of individuals from Jamaica to mainly the US and the UK. Witter (2004) reports annual emigration of 20,000 per year while World Bank data places estimates of the country's tertiary graduate emigration at 84.7%. We do not address emigration directly in this thesis. However in *Chapter 4* we will explore empirically the relationship between skill levels and labour market adjustment in Jamaica. From that chapter the reader will get an idea of the changes in the skill content of the Jamaican labour force over time and hence begin an exploration, albeit indirectly, of the impact effects of these phenomena on the Jamaican labour market. Further details will be explored in *Chapter 5* where we address the role of skills in understanding the chronic problem of unemployment in Jamaica.

2.4.4 Labour Market Imperfections

The existence of labour market imperfections can also play a role in determining labour market outcomes. These rigidities can affect how wages are determined within the market and by extension, may serve to moderate or exacerbate the effect of external shocks on the labour market adjustment process. Moreover, there is a growing body of research providing some evidentiary support for the assertion that types of labour market institutions can interact with each other to affect outcomes in a given economy (see Boeri and Van Ours, 2008). *Figure 2.9* shows the evolution of

[5] This US$1130.6 million represents 14.31% of the Gross Domestic Product (GDP) in 2002 dollars.

the minimum wages in Jamaica between the years 1983-2006. Minimum wages were introduced in Jamaica in 1975 as a poverty alleviation mechanism. The nominal monthly wage shown in the diagram below shows an increase in the minimum wage between 1983 and 2006. In 1983 the nominal monthly minimum wage in Jamaica stood at JA $120, however by 2006 the nominal minimum wage was JA $11200 per month. Although this increase might appear significant at first, a closer look at the evolution of the real minimum wage over the period reveals that in real terms the increase when viewed in real terms was more modest. In fact, in year 2000 dollars the Jamaican minimum wage increased by a mere JA $ 2392.50 over the period. What is more, Figure 2.9 shows that the real minimum wage remained fairly stable up to 1998 despite the inflationary period of the 1990's in Jamaica. This results shows that the increases in the nominal value of minimum wage in Jamaica over the period merely preserved the real purchasing power of the wage. However, the following three years saw an increase in the minimum wage. Furthermore, the *Figure* shows that towards the end of the period this increase was halted and eventually registered some decline.

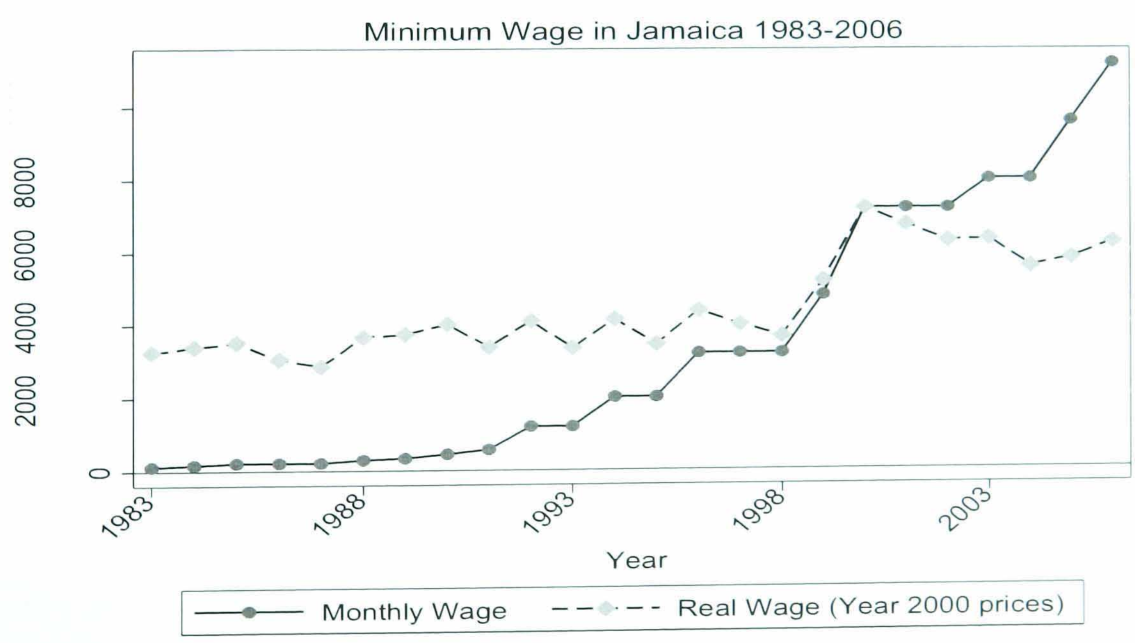


Figure 2.9 Evolution of the Minimum Wage in Jamaica
Source-Ministry of Labour and Social Security

Downes, Mamingi and Antoine (2000), in an Inter-American Development Bank study, perform an audit of labour market regulation and employment in the Caribbean. They document various labour market regulations and institutions present within the Jamaican labour market. In the area of social protection, the authors report the existence of severance payments in Jamaica and retirement benefits. Retirement benefits are provided through the National Insurance Scheme (NIS). Under this scheme, employees and employers each contribute 2.5% of the worker's income (5% for self-employed individuals) to the fund which is a vehicle for the provision of sickness, maternity, health benefits related to workplace accidents; to name a few. Various other labour market developments have ensued since the publication of that paper. Jamaica has instituted a free health care system since 2008. Moreover since 2002, Jamaica has also introduced the PATH programme (Programme for Advancement through Health and Education); which is a conditional cash transfer scheme to assist very poor households containing elderly persons- not in receipt of a pension, persons with disabilities, children and poor, lactating women. Severance pay in Jamaican is awarded after *2* years qualifying service and yields a rate of benefit of 10 days per year for the first 5 years and 15 days per year for the first 2 years. As far as the institutional side of the labour market is concerned, information is very limited. However, the authors note low levels of unionization in the Caribbean labour market despite strong representation in areas such as ports, public sector and utilities sector. They also note very few changes to labour market legislation over the past *3* decades.

Central wage bargaining is also a relatively recent addition to the labour market landscape in Jamaica through the Memorandum of Understanding; which is a centrally agreed government measure to annual wage inflation of government workers which has been a relatively recent feature of the Jamaican labour market; with the first agreement signed in 2004. In the area of active labour market programmes in Jamaica there is the HEART/NTA training programme, which is a seen as a model for the Caribbean as well as other technical and vocational and competency-based training initiatives as well as the enhanced literacy programme. These programmes are addressed at greater length in *Chapter 5* which looks at the probabilities of escape from unemployment in Jamaica.

Using data for the English Speaking Caribbean, and after estimating a dynamic labour demand function, Downes *et al* (2000) conclude that although several labour market regulations exist in Jamaica, the overall level of distortions caused by these institutions are relatively small when compared to the level observed in Latin American economies. They go further to state that the voluntaristic model of industrial relations by a number of Caribbean countries; including Jamaica has meant that there is little change in the labour laws over time. In the Jamaican case, most labour laws have remained unchanged since their introduction in the mid 1970's (King, 2001).

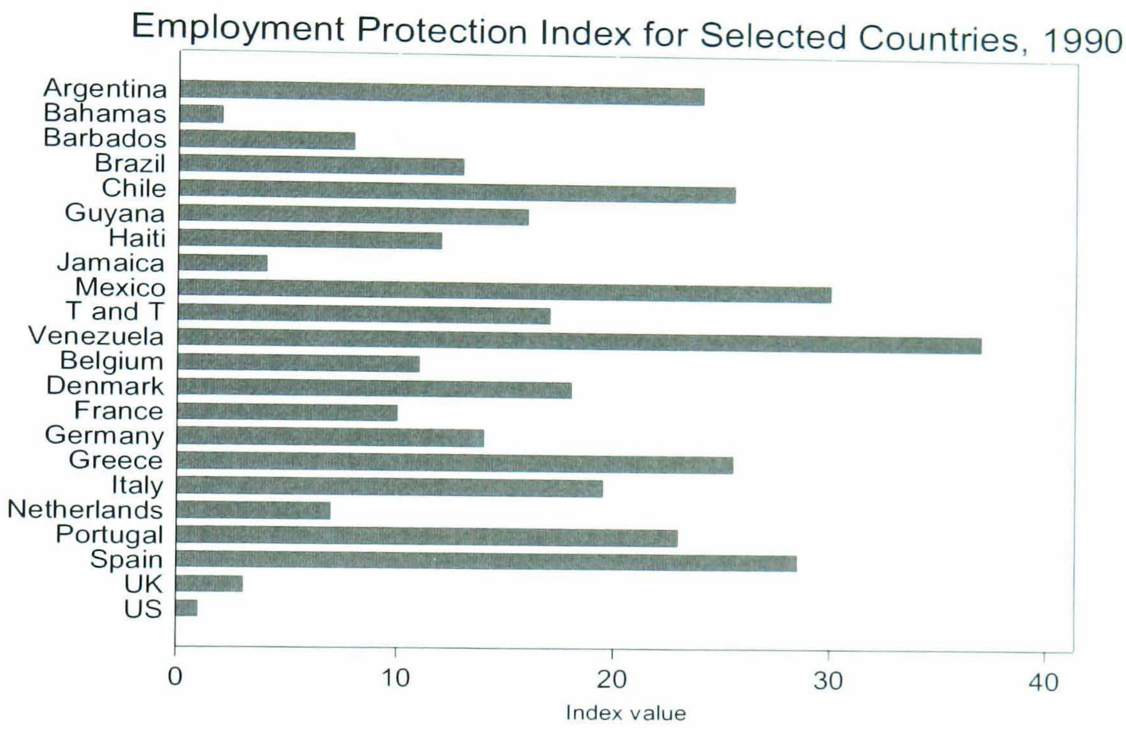


Figure 2.10 Employment Protection Index for Selected Countries, 1990
Source-Pages and Marques (1998)[6]

Pages and Marques (1998), in an IADB commissioned study, provide some evidence on the extent of labour market rigidities in Latin America and the Caribbean. Following a methodology developed by Grubb and Wells (1993), these authors estimate an index summarizing information on (1) the length of probationary periods (2) advance notice periods (3) the actual costs of dismissing a worker (4) whether dismissals related to firm's difficulties are likely to be deemed as just or unjust cause for dismissal (5) whether reinstating the worker in its job is mandatory once a dismissal is deemed unjust. Although the index constructed by the authors uses data from 1990, their work represents one a few sources of data where a comparison is made between the Jamaican labour market and other labour markets in, not only Latin America and the Caribbean, but also in Europe. *Figure 2.10* presents a

[6] All countries on which the index is reported by Pages and Marques (1998) are not presented here. We have selected a sub-sample of countries which provide a fair idea of the extent of employment protection in Jamaica *vis-a'- vis* European and other Latin American countries.

summary of these authors' employment protection index which is essentially the arithmetic mean of independent, ordinal indices calculated on each of the five (5) dimensions of labour market protection listed above. It is clear that for the *Figure* that Bahamas and Jamaica are among the lowest among the Caribbean and Latin American countries presented in the sample. Based on the results from the index it would appear that Latin American countries are relatively high and also suggests that the Jamaican labour market could have more lax employment protection conditions than is the case in various European nations. The same conclusion is arrived at by Downes, Mamingi and Antoine (2000) in their investigation of this issue.

Country	Minimum Wage US$ Monthly (Nominal)[7]	GDP per Capita US (Nominal, IMF data, 2010)	Minimum Wage Percentage of Average GDP per Capita (%)
Argentina	388.70	9138	51.04
Bahamas	640	21879	35.10
Barbados	400	14326	33.51
Brazil	332.8	10816	36.92
Chile	335.4	11828	34.03
Guyana	150.8	2868	63.10
Haiti	31.2	673	55.63
Jamaica	192.4	5039	45.82
Mexico	90.74	9566	11.38
Trinidad and Tobago	287.04	16753	20.56
Venezuela	299	9960	36.02
Belgium	1839.5	42630	51.78
Denmark	2912	56147	62.24
France	1872	41019	54.76
Germany	-	40631	-
Greece	740	27302	42.28
Italy	-	34059	-
Netherlands	1398.6	47172	46.25
Portugal	485	21559	35.09
Spain	960	30639	48.88
United Kingdom	948	36120	40.98
United States	1160	47284	29.44

Table 2.5 Minimum Wage Data from of a Cross-Section of Selected Countries, 2010
Source-Authors calculations, ILO minimum wage database, various sources

Table 2.5 displays monthly minimum wages for a cross-section of countries including Jamaica. Jamaica's minimum wage was introduced in 1975 as a part of the

[7] Minimum wage figures are most recent gathered by the Author from various sources ILO minimum wage database and various other sources.

then governments poverty alleviation strategy at that time the minimum was SJA 20. By 1990 the nominal minimum wage had increased to $JA 110. The rate of stepwise increase in the Jamaican minimum wage increased throughout the inflationary period of the 1990's and not stands at $JA 4500. From the cross section of countries displayed in *Table 2.5* it is clear that Jamaica's monthly minimum wage in nominal terms is relatively low compared to that of the other countries included in the Table. However as a percentage of the GDP per capita, the Jamaican minimum wage is more or less in the middle of the distribution of countries featured in the dataset.

Still, for the researcher who would like to investigate these issues, there exists a real challenge; namely, the shortage of accessible data on the various types of labour market institutions we would expect to have an impact on the labour market outcomes for Jamaica. For example, as far as we are aware, no data exists on the degree of union coverage in Jamaican at the sectoral, occupational or industry level. On the other hand, the ready availability of the minimum wage variable, does not lead to its inclusion within the modelling framework used in this thesis since it would seem that, in Jamaica's case, the minimum wage does not significantly affect labour market outcomes (World Bank, 2004; King, 2001; Alleyne, 2000). Yet other labour market measures were introduced either after the main period of study in this thesis (1983-2006) of towards the final few years of sample period.

There has been a tradition within the economic literature on Jamaican labour markets to model the market using a dualistic approach. Under this schema, disparities in different segmentations of the market make it useful to think of the different labour markets, functioning alongside each other but at the same time interacting with each other to determine outcomes. As we will see this dualism may be a function of differing access to technology or capital (as in Lewis's (1954) "modern and backward" sectors) or across geographical, skill, and occupational lines. As far as is relevant, we will have to take these issues on board in our attempt to understand labour market adjustment in Jamaica.

Chapter 3

Labour Market Adjustment to Trade Liberalization in Jamaica

3.1 Introduction

In this Chapter, we investigate labour market adjustment in Jamaica. The purpose of our study here, is to understand the nature and causes of labour market adjustment in Jamaica and the extent to which increased exposure to trade led to such adjustment. Jamaica represents an interesting case for four main reasons. Firstly, studies that use micro-economic data to study the effects of trade liberalization in, small developing economies are extremely rare. Secondly, the period under analysis 1983-2006 was immediately preceded by the closure of the economy to trade and the pursuit of a socialistic regime by the then Jamaican government and therefore provides an interesting background against which to conduct our analysis. Thirdly, we attempt to carry out our analysis over the most lengthy time period we have seen for any such study, and hope that, as a result, we will be better able to capture, more fully, a great deal of the adjustment. Finally, a look at the Jamaican economy may help us understand the face of adjustment when there is an abundance of unskilled, unemployed labour. Before we look at the Jamaican data however, let us construct the theoretical framework which forms the basis our inquiry.

3.2 Theoretical Models of Trade and Labour Markets

One remarkable observation after reading the trade literature is that although the labour market lies at the heart of any exposition of traditional comparative advantage theory of international trade, issues pertaining to the labour market adjustment, especially issues pertaining to unemployment have been largely overlooked. To understand the failure of these early models to address the issue of labour market adjustment, we briefly examine the foundations of the theory.

3.2.1 Early Trade Models

3.2.1.1 Ricardian Labour Market Adjustment

The law of comparative advantage was first presented in 1817 by David Ricardo, a British economist of the Classical school, and arose out of a disagreement with Adam Smith (1776) that, assuming a two- country, two-good model, an absolute advantage was necessary on the part of each country for trade to yield mutual benefit. Using the famous example of two nations; England and Portugal, Ricardo (1817) showed that if each country were to specialize in the good it produces more efficiently, then both countries would stand to gain from mutually beneficial trade. The model however hinges crucially on the strong assumptions of a *2x2* world in which there are constant costs and a fixed technology; where there is only one factor of production (usually labour), which is homogenous, perfectly mobile but immobile internationally. So that, from the genesis of the theory of international trade, it is labour that determines the value of both commodities and essentially all the action within the model; determining productivities, relative values of commodities and ultimately the pattern of trade[8]. There is labour adjustment in the Ricardian model but this adjustment results in specialization, and comes at no cost- an outcome which is most likely incongruent with reality. Therefore, despite its centrality to the model, labour's homogeneity, infinite international mobility costs and costless mobility between sectors, render the model of little use in elucidating the issue of adjustment under trade.

Moreover, the failure of the Ricardian model to adequately account for the differences in productivities-thus effectively assuming rather than explaining the source of comparative advantage, the seemingly unrealistic result of complete specialization emanating from the model and the silence of the model on factor price determination meant that there was need for a richer theory explaining trade between countries and one that could offer a greater insight into labour market adjustment.

3.2.1.2 Labour Market Adjustment and Heckscher-Ohlin Trade Theory

The alternative comparative advantage trade theory to the Ricardian Model is the Heckscher-Ohlin (H-O) model of comparative advantage. The physical formulation of the theory states that a country will tend to export goods which use factors found locally to be in relatively greater abundance such that its endowment ratio of that factor is relatively greater than its trading partner (Heckscher, 1919; Ohlin: 1933). On the other hand, the factor price formulation of the theory compares autarkic factor prices to free trade factor prices. For example, the home country is relatively labour abundant if its wage rate relative to its capital rental rate in the autarkic

[8] The labour theory of value which underlines this formulation of the model was later replaced with the opportunity cost formulation by Harberler in 1930 (Bernhofen, 2005; Samuelson 2005).

equilibrium is lower. Note that the advantage of this formulation of the theory is that it provides a link to commodity prices since, as we know, commodity prices are linked to factor prices. In fact, the link between the two: commodity and factor prices, can be argued to be even closer than the link between commodity prices; the proximate cause of trade, and factor endowments. The assumptions of homotheticity of preferences, identical and homogenous (or linearly homogenous) technologies, fixed supply of labour and balanced trade is usually invoked to ensure agreement between the two versions of the theory.

What then of labour market adjustment in the Heckscher-Ohlin model? Firstly, underpinning the model's foundations is the assumption of costless mobility of labour. Therefore, whatever the potential adjustment costs that might have been incurred as a result of the labour adjustment under liberalization are simply assumed away. Secondly, the full employment assumption made in the formulation of the theory, differs starkly from the Classical assumption underlying the Ricardian model and immediately rules out questions such as: "Does liberalization cause unemployment?" As it turns out, the main contribution of the H-O model to understanding the adjustment to trade is in laying the theoretical framework for the Stolper- Samuelson Theorem. This theorem is a core result flowing from the H-O model which states that an increase in the domestic price of a good leads to an increase in the real return of the factor used relatively intensively in its production and to a decrease in the factor reward of the other factor (Stolper and Samuelson; 1941). Jones (1965) later showed, using the so called "Jones equations", that given $\hat{p}_1 - \hat{p}_2 > 0$, within the context of a *2x2x2* model, the Stolper- Samuelson result could be stated concisely using the following inequalities;

$$\hat{w} > \hat{p}_1 > \hat{p}_2 > \hat{r} \qquad 3.1$$

where $\hat{w}$ and $\hat{r}$, represent the changes in the real return to labour and capital respectively and whereas $\hat{p}_1$ and $\hat{p}_2$ represent the changes in the prices of the commodities produced in each sector and good *1* uses labour relatively intensively[9].

[9] Interestingly, this result generalizes to the "N x N" dimensional (even case) given that the matrix of optimal factor intensities is non-singular. For each factor there must be a "natural enemy": that is,

Directly flowing from the Stolper-Samuelson theorem is the result that trade liberalization will benefit the country's relatively abundant factor and will harm the country's relatively scarce factor. Furthermore, the theorem posits that the relative benefits accruing to this abundant factor flows across sectors that is- if labour is the abundant factor and it gains from trade in one industry it should benefit in all; with the latter result emanating from the concavity of the production function, negatively sloped relative price line under free trade and costless domestic factor mobility.

3.2.1.3 Labour Market Adjustment and the Ricardo-Viner Model

The Ricardo- Viner model is an extension of the *2x2x2* H-O model in which one factor faces infinite costs when moving between sectors in stark contrast to the perfect factor mobility of the simple H-O framework. The analysis of this model is due to Mussa (1974), Jones (1971), Mayer (1974) and Neary (1978) among others, and has been the most widely used of all the traditional trade-theoretic models in tackling labour market adjustment under trade. It is usually viewed as a short-run model in the sense that it models factor adjustment to trade over a "run" short enough for one factor (usually capital) to be assumed fixed. By virtue of the importance of this model in labour market adjustment theory, we devote a few lines to outlining the model. In a 2*x*2*x*2 framework we could write the country's production as;

$$G(p, L, K_1, K_2) \equiv \max_{L_i \geq 0} \sum_{i=1}^{2} p_i f_i(L_i, K_i) \quad \text{subject to;} \qquad 3.2$$

$$L_1 + L_2 \leq L$$

where p_i is the price of good *i*, f_i is a concave, differentiable, linearly homogeneous technology used in the production of good *i*, L_i is the labour employed in sector *i*, and K_i is the capital employed in each sector.

Given that the above constraint holds as an equality, we could write the first order conditions as;

$$w = p_1 f_{1L}(L_1, K_1) = p_2 f_{2L}(L_2, K_2) \qquad 3.3$$

---

some good for which an increase in its price will lower the real return to the factor (Jones and Scheinkman;1977) where f_{iL} is the marginal product of labour in the *i*th industry. This expression is the familiar statement of equalization of returns to labour across industries. If this condition were not to hold, then labour; the mobile factor, would continue to move into the industry which payed it the highest wage (w), thus diminishing its marginal product in the receiving industry until the equilibrium written above held. Totally differentiating this common wage yields;

$$\frac{dw}{dp_1} = f_{1L} + p_1 f_{1LL} \frac{dL_1}{dp_1} < f_{1L} = \frac{w}{p_1} \qquad 3.4$$

where the second differential of the production function of good 1 with respect to labour is written as f_{1LL}. By re-arranging and multiplying by -1 we arrive at the expression,

$$-\frac{dp_1}{p_1} < -\frac{dw}{w} \text{ , or equivalently } -\hat{p}_1 < -\hat{w} \qquad 3.5$$

This shows that a price decrease (caused by, say, a reduction in import tariffs) is proportionally greater than the concomitant decrease in income. Workers in industry 1, the industry that was liberalized, can now afford more of good 1 in *real* terms since wages have fallen by less than the decline in good 1's price. They are worse off in terms of good 2 since its price remains unchanged, yet wages have been reduced (See Jones and Neary, 1984 p. 22). This holds true for workers across both industries (because of the common wage rate) so that the effect of the liberalization on the mobile factor is indeterminate; hinging crucially on the individual worker's relative consumption of each good. Recalling that the zero profit condition is binding;

$$\hat{p}_i = \theta_{iL}\,\hat{w}_i + \theta_{iK}\,\hat{r}_i \qquad i = 1,2 \qquad 3.6$$

Where θ_{iL} and θ_{iK} are the unit cost shares of labour and capital respectively and r_i is the return to capital, it must be the case that $-\hat{r}_1 < -\hat{p}_1 < -\hat{w}$. This suggests that the factor specific to the import- competing sector is worse off in terms of both goods. We show this result in the diagram below. In *Figure 3.1*, the horizontal axis measures the economy's total labour endowment L, which is allocated between industry 1 (measured from origin O_1) and industry 2 (measured from origin O_2). The assumption of concavity ensures that the labour demand curves $p_1 f_{1L}$ and $p_2 f_{2L}$ are downward sloping and intersect at the initial equilibrium point A.

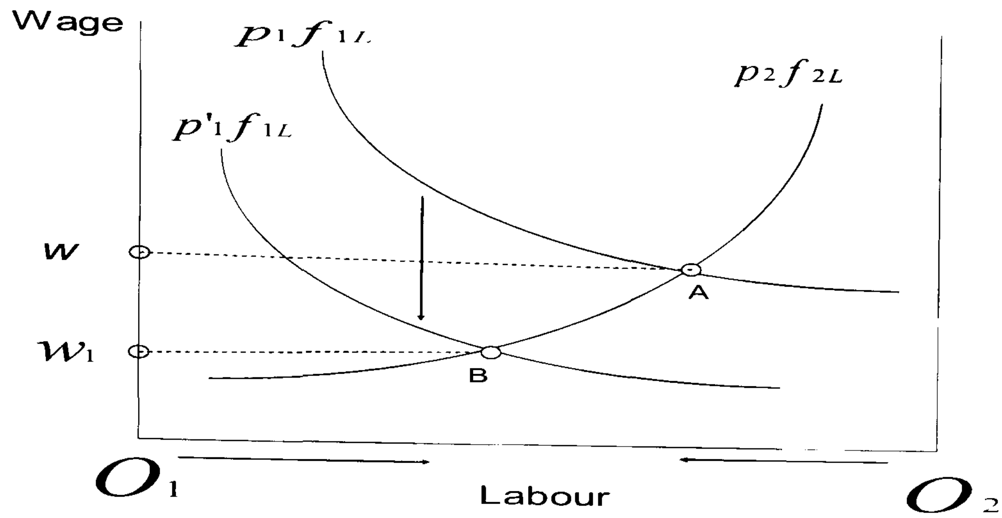


Figure 3.1 Beaker Diagram Showing the Effect of Reducing an Import Tariff

The reduction of the import tariff causes $p_1 f_{1L}$ to shift to $p'_1 f_{1L}$ and an excess supply of labour arises in industry 1 at the old wage ***w***. Labour must therefore adjust, exiting industry 1 thereby reducing r_1. The flow of labour into industry 2 will increase capital's return in that industry, given that it has no choice but to use capital less intensively, (increase the relative intensity if labour it employs) allowing us to rewrite the above inequality as;

$$-\hat{r}_1 < -\hat{p}_1 < -\hat{w} < 0 < \hat{r}_2 \qquad 3.7$$

Liberalization, therefore, when viewed through the Ricardo-Viner lens, unambiguously hurts the import –competing, industry-specific factor, benefits the immobile factor in the other industry (usually assumed to be the export industry) and has an ambiguous effect on the mobile factor.

Although the Specific Factors model helps us to understand why industries rather than factors will tend to lobby for protection -clarifying the distributive effects of trade, it raises questions about the economic process that generates the cross-industry distribution of immobile factors and does not explain what generated the immobility itself. When applied to the labour market, the immobility of factors could be thought of as the acquisition of industry or sector- specific skills or the lack of transferrable skills that serves to effectively tie the fortunes of the worker to that of a particular industry. Alternatively, we could think of these costs as information asymmetries that effectively constrain a worker's mobilty. Whither possibility, the theory is silent. Furthermore, the theory does not allow us to make any statements about the effects of trade liberalization on employment since, after all, unemployment is absent from the model as was the case in the "plain-vanilla" H-O framework.

Of note, important contributions have been made in extending the Ricaro-Viner model. Adding a non-tradable sector to the model results in the "Australian model" analyzed by Dornbusch (1974), Edwards (1988), Edwards and Edwards (1990), and summarized succinctly by Milner and Wright (1998). In general, these full-employment models generate long-run, Stolper-Samuelson effects with the short- run effects varying depending on the assumptions made regarding factor intensities, factor mobility and the nature of rigidities. Since we are primarily concerned, in this chapter, with understanding mobility within the Jamaican context and not primarily with the distributional issues which is the major concern of such models, we will not be detained by these models too much. Sufficing though, we wish to highlight that, from them; we see that the structure of the labour market appears to affect outcomes under trade; certainly under conditions of full employment. The Ricardo-Viner model can therefore be thought of as a rather lengthy, elaborate footnote to H-O theory providing the framework within which we can analyze adjustment under significant mobility costs; albeit a useful and interesting one.

3.2.2 Trade and Labour Market Adjustment Theory with Unemployment

Several alternative theoretical approaches have been taken in order to incorporate unemployment into the open economy model. Most notable among these approaches are implicit contracts theory, efficiency wages, fair wages, the minimum wage approach and search theoretic models. In this paper, we model the Jamaican labour market adjustment in a manner consistent with search theory. However, before we provide a brief sketch of the theoretical framework of the theory, we wish to highlight a few of the key theoretical results from the growing trade and unemployment literature.

One of the earliest attempts to model unemployment under trade was by Brecher (1974). In his *2x2x2* model, unemployment was generated through the mechanism of a binding, economy-wide minimum wage which effectively created a perfectly elastic supply of labour at the wage floor and an excess supply of labour at points above it. He showed that with unemployment and incomplete specialization, increases in foreign demand for the capital-intensive, export good will worsen home unemployment (and welfare) and that in the case of the labour- intensive export good analogous results apply[10]. Matusz (1986) uses implicit contracts theory to show that trade affects unemployment *via* two channels; firstly by changing the composition of high employment- security (low employment- security) sectors in the long- run making them low employment security (high employment- security sectors), in which case, unemployment increases (decreases) and secondly, by changing contractual agreements in such a way that employment security could fall even if there were an improvement in the terms of trade. However, in Matusz's (1986) model, wages more than compensate for declines in employment causing welfare to always be lower in the autarkic equilibrium; a result that generally contrasts the theme of the trade with unemployment literature. While an interesting departure, the model is not easily empirically implementable due to the fact that it key parameters are not readily observable.

Efficiency wages have also been used to model unemployment under trade. In a single factor model in which there are two industries, only one of which is perfectly and costlessly monitored, Copeland (1989) illustrates how standard Stolper-Samuelson effects emerge; however, relative price movements additionally affect the distribution of worker types across sectors. The model also shows how countries with "lazier workers" may have a comparative advantage in the good that can be costlessly monitored. By endogenizing monitoring within the implicit contracts framework, Brecher (1992) produced the straightforward result that protecting the capital- intensive (labour intensive) industry will cause a fall (rise) in employment[11]. Kreickemeier and Nelson (2006) and Agell and Lundburg (1995) exemplify the fair wages approach. The latter authors find that in the presence of social norms, some of the results of the standard theory change and that the relation between factor

[10] He also showed that, in either case, if the country lacks (possesses) monopoly power in trade the optimal trade policy is not necessarily free (taxed) trade.
[11] Whereas in a distortionary equilibrium a labour subsidy proved to be the optimal policy approach in his earlier paper featuring the minimum-wage economy, his later paper proposes a small consumption tax, capital tax and monitoring. See also Hoon (1991)

abundance and trade patterns disappears. In particular, if factor prices move opposite to workers perceptions under trade, losses from trade occur and protecting the labour intensive industry may well increase employment.

3.2.2.1 Search Theory and Labour Market Adjustment

Early attempts to use search- theoretic models to generate unemployment under trade are due to Davidson, Matusz and Martin (1988)[12] and Hosios (1990). Both these models incorporated the notion of search costs to explain the welfare effects of trade on employment. Quite apart from the intuitive appeal of these models, they also draw on 2 decades of research in analyzing the matching function and developing a firm understanding of its properties (Blanchard and Diamond, 1989; Chirinko, 1982; Pissarides, 1986, 1990; Warren 1996)[13]. Combining the matching function with the search in a *2x2x2* model, Hosios (1990) was able to find evidence of Stolper-Samuelson and Rybszynski-like effects under trade. In particular, he found that an increase in the price of the good from the sector where the matching process is labour-intensive (capital vacancy intensive) raises the real –steady state income of the unemployed (vacant firms) and lowers the permanent income of vacant firms (unemployed workers). This result suggests that the fortunes of unemployed workers are somehow linked to the fate of the sector that matches labour more intensively.

The definitive paper combining search theory with labour market outcomes under trade is Davidson and Matusz (1999). In brief, the authors consider a *2x2x2* model in which units of capital and infinitely-lived workers meet and engage in a productive relationship characterised by constant returns. The model is characterized by an exogenous break-up rate b_h and arrival rates which can be written as;

$$e_h^l = (1 - s_h)E_h \text{ for } h = X, Y \qquad 3.8$$

$$e_h^k = s_h E_h \text{ for } h = X, Y \qquad 3.9$$

where e_h^l, e_h^k are arrival rates of employment prospects for labour and capital to industry h respectively, s_h is the proportion of labour in the unemployment or

[12] These authors build on an earlier model Davidson and Matusz (1987)

[13] The properties of the matching function have also been tested empirically see for example Davidson and Woodbury (1992), Cole and Rogerson (1999), Mortensen and Pissarides (1994).

search sector[14] and E_h is a constant symbolizing the efficiency of the search function. The equilibrium allocation of workers across industries X and Y is based on the discounted asset value equations;

$$\rho V^i_{sh} = e^i_h(V^i_{eh} - V^i_{sh}) \qquad 3.10$$

$$\rho V^i_{eh} = \alpha^i_h P_h - b_h(V^i_{eh} - V^i_{sh}) \qquad 3.11$$

From the first equation, we can see that searcher i's expected payoff for searching (V^i_{sh}) is based on his discounted (ρ) evaluation of the difference between the payoffs of being employed (V^i_{eh}) and that of searching. On the other hand, worker i's payoff comprises his share of the profits from the match ($\alpha^i_h P_h$)[15] less whatever his expected losses, weighted by the applicable break-up rate (b_h) in the industry of employment, were he to become unemployed. In equilibrium therefore, the following equations are binding;

$$b_h I_{eh} = e^i_h I_{sh} \text{ for } h=X,\ Y \text{ and } i=L,\ K \qquad 3.12$$

$$V^i_{sx} = V^i_{sy} \qquad 3.13$$

where I_{sh} and I_{eh} represents the number of type i factors in either search or employment in industry h respectively. The first condition, 3.12, is a flow condition on factors employed in both sectors. It guarantees fixed stocks of employed and unemployed in each sector. The last condition is the familiar sectoral pay-off equality condition under risk neutrality.

The major result of this search model is that turnover rates, themselves, can affect the pattern of trade. In particular, Davidson and Matusz (1999) find that, *ceteris paribus*, the country with lower breakup rates will tend to have the comparative advantage. Additionally, they find that the relative efficiency of the search technology can also be a determinant of comparative advantage. The main logic of their argument is that, for factors that negatively affect the expected earning in sector h, higher wages are needed to entice workers to search (or produce) in that sector;

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[14] In particular the authors write s_h as $s_h = \dfrac{L_{sh}}{(L_{sh} + K_{sh})}$ where L_{sh} and K_{sh} represent the levels of labour and capital employed in the search sector.

[15] α^i_h is determined by the Nash Cooperative Bargaining Solution

this higher wage, in turn, effectively drives up the relative price of good h[16]. The authors were also able to extend the results of Hosios (1990) for employed (matched factors). They find that matched factors are analogous to immobile factors in the Ricardo-Viner model since an existing job creates a sectoral attachment, but since matched workers will once again become unemployed, there are also H-O effects. On the other hand, the unemployed are effectively the "mobile factor" causing their gains or losses from trade to be consistent with H-O. The degree to which the Ricardo-Viner and Stolper-Samuelson effects dominate, in the case of the matched factors, hinges crucially on the level of attachment to the industry. Another interesting result from their model is that, under trade, given equality of break-up rates across countries and a relatively more efficient search technology in the capital abundant country, then the small country would see an unambiguous reduction in unemployment in the specialized production of its export good.

Since we have worker flow data for Jamaica, the search theoretic model parametized in terms of break-up rates and arrival rates- though not ideal, is more closely aligned with our analysis of the Jamaican data than all other search theoretic models. Davidson and Matusz (2004) are clear on what they have in mind when they write the parameters e_h^i and b_h. Clearly, exits from an industry as measured by Labour Force Survey data can be either voluntary or involuntary and could occur for reasons far removed from the creation or dissolution of jobs. However, as Blanchard (1990) and others have pointed out there is a systematic relationship between the two types of flows; a point to which we will return later. As regards the other models of trade under unemployment, it is fair to say that while providing some important insights into the causal factors that may influence labour market adjustment under trade, in general, they seem to be difficult to implement empirically. For example, if one were to implement empirically the implicit contracts approach, how would one go about assessing the disutility of effort of a worker or the Arrow-Pratt measure of absolute risk aversion? Moreover, if we agree that the determination of the "fair wage" depends on social norms in a particular community at a given time, then the critical question must be asked regarding the process whereby such fair wages are derived

[16] See also Davidson (1997). This paper provides results of the model under alternative assumptions of factor immobility

and the time span during which they are effective. Failure of a model to answer these key questions exemplifies its weaknesses. Such questions, therefore, make these other approaches to modelling the labour market under adjustment to trade less attractive than the search theoretic approach.

Nevertheless, these alternative theoretic approaches to modelling labour market adjustment under trade provide an interesting background to our analysis for a number of reasons. Firstly, we can conclude from them that many of the results of full-employment trade theory are reversed and/or amended; with the extreme case being a total absence of the gains from trade. Furthermore, these models provide insights regarding some of the key factors that might affect labour market outcomes under trade such as, *inter alia*, the incidence of labour market controls, the effect of risk on labour market behaviour and investment decisions, how wages are set in the labour market, industry turnover and information asymmetries. Moreover, if these models are correct, we can also expect to observe labour market adjustment taking place in other dimensions of the labour market rather than simply *via* industrial/sectoral reallocation. For example, labour market adjustment could also occur through changes in job or worker characteristics, and could also occur through changes within employment or may possibly extend to adjustment in unemployment as well.

Also, we draw the reader's attention to later papers of Davidson and Matusz *et al* which explicitly consider the adjustment process after trade liberalization instead of merely focusing- as earlier papers have, on steady-state equilibrium properties. Building on the insights of an earlier model by Grossman and Shapiro (1982) in which workers acquire transferrable skills in order to avoid the costs of unemployment, Matusz (2001) shows that workers face a wide array of costs under adjustment; whether real, psychic, private or societal. For example, along with the inevitable loss of wage income, an involuntary worker separation may also result in the loss of self-esteem, family disruptions and loss of long term friendships. The society is also deprived of the output that could have been produced, were that worker still employed productively. These costs may be incurred even if the intervening period of unemployment is temporary. According to these authors, taking into account, what they term -"real societal costs" of labour reallocation could significantly diminish whatever gains were to be had from trade.

In an attempt to model these costs, Davidson and Matusz (2000) extend their model in two directions; firstly by broadening the framework to include worker abilities and secondly by including a training sector. We illustrate their model briefly with the aid of the diagram below.

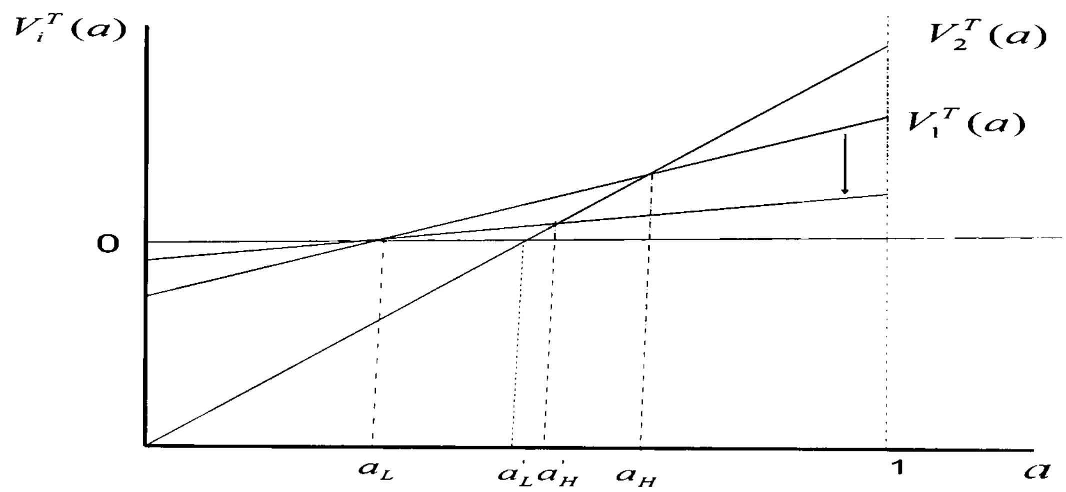

Figure 3.2 Diagram showing the Effect of Liberalization on Worker's Payoffs

The above diagram depicts the payoff from training in industry *1*- $V_1^T(a)$, and industry *2*-$V_2^T(a)$. The vertical axis measures the asset value associated with each sector $V_i^T(a)$ while the horizontal axis depicts ability (a_j) which is uniformly distributed over the interval [0, 1] with higher ability, more productive individuals having a higher value of a_j. Industry *2* is the high-tech sector, in which the value accruing to the trained worker increases relatively faster with ability. Training incurs a fixed cost within this framework and the worker only decides in which sector to train based on his payoffs, which are linearly increasing in his ability. For $a_i < a_L$ it is pointless to enter the labour market because of training costs while at a_H the worker is just indifferent between training in either sector. Above this point, higher ability workers gain greater reward from training in industry *2*. If an exogenous price shock were to affect industry *1*'s good, such as a reduction in an import tariff, then within the Davidson and Matusz (2001) framework $V_1^T(a)$ would rotate clockwise, as shown in the diagram. This would cause all ability $a_j \in \lfloor a_H^{'}, a_H \rfloor$ workers to gradually switch to training in industry *2*[17]. For small enough price changes, however, industry *1* workers would not quit but instead would carry out their search in the same industry. Liberalization therefore increases the trainers in the other sector. This model also includes the interesting characteristic of equilibrium overshooting of unemployment under liberalization. Moreover, under alternative assumptions than made by the authors about the interaction of prices with training costs, it is easy to imagine a downward shift (rather than rotation) of $V_1^T(a)$ making training pointless for workers $a_L < a_j < a_L'$; effectively shutting out a greater proportion of low-skilled workers out of the labour market and making training pointless for a larger share of the community. From this model, we see a critical role for the transferability of skills, length of worker training, break-up and job creation rates on the adjustment process. Interestingly, these authors also find that, the welfare gains from trade liberalization are greatly diminished by adjustment costs and could possibly be negative if sector *1* is sufficiently small before the liberalization, making industry *2* significantly more attractive under liberalization. We will have to determine to what extent these features are important in describing the adjustment in the Jamaican case.

3.2.2.2 Trade and Mobility: Insights from Development Theory

The fact that labour market adjustment in lesser developed countries (LDCs) may differ from that of more advanced economies has not escaped the attention of labour market theorists over the years. The Nobel Prize winning, Caribbean economist Sir W. Arthur Lewis (1954)[18] was among the first to address this issue in his seminal paper by contemplating the problem of economic development in Asia and economies such as "Egypt, India and Jamaica". Viewing labour markets in underdeveloped economies as dualistic, he used the concept of "unlimited supplies of labour" to explain the condition of many LDCs in the world at that time. According to Lewis (1954), unlimited supplies of labour exist when the marginal product of labour is so low that the "modern sector" could access an unlimited pool of workers from the "backward" sector at the going wage. As is the case with most

[17] The effect of this shock on *industry 2* workers depends on the assumptions made about parameters such as the break-up rate and the job creation rate, length of training, job search and so on.
[18] Lewis' model was later formalized by Fei and Ranis (1961).

labour models "with unemployment"[19], the focus of Lewis' thesis was on wage determination, welfare, the functional distribution of income, accumulation and growth; issues with which we are not primarily concerned in this chapter. Incidentally, in the often ignored, open-economy version of his model, Lewis explicitly advocated that Jamaica should specialize in light manufacturing, because of its relative lack of agricultural resources[20], given that its productivity in agriculture- its backward sector, was very low.

That aside, other dualistic labour market models which have spawned from the work of Lewis (1954; 1979) yield important insights regarding the adjustment process. For example, Harris and Todaro (1970)[21] included *geographically distinct* sectors in their dualistic model namely; urban modern employment, agricultural employment and unemployment. The main result from the Harris-Todaro model is that workers allocate themselves geographically such that expected wages across both productive sectors are equalized at $E(W_U) = E(W_A)$. This leads to the condition;

$$W_U^e \frac{E_U}{L_U} = W_A^e \qquad 3.14$$

where W_U^e the equilibrium is urban wage rate, E_U is the urban employment level, L_U is the urban labour force and W_A^e is the equilibrium level of employment in the agricultural sector. Since productivity is higher in the urban sector by assumption- implying that ($W_U^e > W_A^e$), then open unemployment results (or $\frac{E_U}{L_U}$<1) as rural workers from the agricultural sector reallocate to the urban sector to search for employment. Since not all of these workers are successful in their quest for employment, urban unemployment inevitably results. To the extent that changes in relative prices pass though to factor prices and, in particular, the relative wage of the urban employed workers, the simplest dualistic labour market models suggest an intersection of geographical adjustment with inter-sectoral reallocation. This strand of the literature generalizes to models in which there are, *inter alia*, the existence of

[19] As Fields (2005) remarks, Lewis's model was really a model of full employment with his assumptions on the marginal and average product of labour being used to model a type of under-employment.
[20] i.e. relative to its population and other countries such as U.S.A and Argentina
[21]Fields (1975) and Ranis and Stewart (1993)

informal markets, preferential hiring of better- educated workers, employment fixity, risk aversion, duality within the rural sector, endogenous rural wage setting (Corden and Findlay, 1975; Calvo, 1978; Moene, 1992; Chakravarty and Dutta, 1990) to name a few. We would like to incorporate these factors in our explanation of the adjustment in Jamaica. Moreover, from the briefest sketch of the development literature it emerges that the search theoretic approach adapted in this chapter is entirely consistent with this general class of models.

3.2.3 Does the Type of Trade Matter?

The Smooth Adjustment Hypothesis (SAH) is a key concept from the trade literature which will form part of the analytical framework for analysis. According to Elliot and Lindley (2006b) the Smooth Adjustment Hypothesis (SAH) makes the distinction between traditional Heckscher-Ohlin- type trade centred on resource differences as opposed to intra-industry based trade (IIT) based on economies of scale. The Hypothesis states that if trade expansion is of an intra-industry rather than an inter-industry nature it will lead to a smoother (and hence less costly) factor adjustment[22]. It is natural to assume that if trade is intra-industry in nature, factor transfer requirements to facilitate the adjustment can be contained within industries or even within the firms themselves since the emphasis here is more on product variety. Conversely, inter-industry trade implies that imports and exports are unmatched in the sense that the factor requirements for the adjustment are derived from contracting sectors. From a theoretical perspective, the papers of Lovely and Nelson (2000, 2002) are worthy of mention. These papers represent rare attempts to integrate the Smooth Adjustment Hypothesis within a general equilibrium framework, "effectively auditing the partial equilibrium intuition behind the Smooth Adjustment concept" (Elliot and Lindley, 2006b). In their paper, Lovely and Nelson (2000) conclude that it is not possible to establish clear priors from trade models about the relative degree of intra-industry and the relative changes in net intra-industry trade. They go on in Lovely and Nelson (2002) to question the usefulness of certain dynamic IIT measures as indicators of labour market adjustment due to a lack of theoretical foundations when these measures are applied to large scale, multi-sectoral liberalizations such as the EU and NAFTA and suggest that it would be

[22] Balassa (1966), Krugman (1981), OECD (1994) and Cadot et al (1995) are a few of the studies that either directly or indirectly allude to the Smooth Adjustment Hypothesis.

more appropriate to examine small- scale changes across single sectors. One who reads the literature well will find that that since the costs of adjustment tend to hinge on the nature of the skills within the labour force, and in particular, whether or not those skills are sector-specific, the current state of the empirical literature still leaves room for one to wonder about the applicability of the Smooth Adjustment Hypothesis under conditions where skill levels are low and general. Hopefully, exploring the Jamaican data will provide new insights in this regard.

3.3 Empirical Models of Trade and Labour Markets

Much has been written on the effects of trade and labour markets, with the majority of the literature focussing on the effect of trade on wages and its distribution within a given community. This strand of the literature, into which we will not enter, is important but does not directly concern us here and is far beyond the scope of this chapter; we are more concerned with the factors driving the adjustment of labour in Jamaica- that is -whether and to what extent trade is important in explaining the adjustment. As a result, we limit our ambition in this section to accomplishing two main goals. Firstly, to situate our empirical analysis within the vast literature and secondly to highlight some key findings from past research which we deem germane to our current line of inquiry.

3.3.1 Multi-country Studies

There are not many multi-country studies that deal directly with the issue of liberalization and labour market adjustment. Instead, multi-country studies tend to focus chiefly on the relationship between trade and economic growth, treating employment as a side issue, if at all. One of the earliest multi-country studies was carried out by Papageorgiou, Michaely and Choski (1991). This World Bank commissioned study examined 36 episodes of liberalization in 19 different countries before 1985 and found that although the effects of liberalization varied from case to case "liberalization did not, as a rule, raise unemployment even in individual sectors of the economy such as manufacturing and agriculture". They found that where there was a decline in manufacturing employment, for example, agricultural employment more than compensated. The results from these studies have since been challenged by Greenaway (1993) and Collier (1993). Moreover, Agenor and Aizenman (1996) have pointed out that these cross country studies provide very little information on employment in non-manufacturing activities or the aggregate unemployment rate. Dollar and Collier (2001) take a more reserved view of the issue. While reiterating the positive effects of liberalization on employment and wages, they point out that "small changes in employment may actually hide substantial churning".

There is also a collection of papers on the ILO website addressing this issue[23]. These papers focus on Asian economies, OECD countries, and the larger Latin- American economies. As Lee (2005) points out: the developing countries chosen have "all experienced rapid growth in the past two decades and were among the leading group of developing countries that had benefited the most from growth in world trade". And yet, while favourable results on both employment and wages were found for the Asian economies, the large Latin-American economies showed insignificant changes or declines in manufacturing along with sharp increases in the skill differential[24]. These negative results have been attributed *inter alia,* to bad initial conditions, problems of economic management and an over-dependence on natural resources. Furthermore, these ILO papers provide some evidence that, OECD countries, while showing some negative employment effects in the 1980's, registered employment growth in the 1990's despite increasing wage inequality, which is generally attributed to skill-biased technical change. Finally, Wacziarg and Wallack (2004) were unable to find general evidence of sectoral shifts as a result of liberalization at the 1-digit level but were able to find some evidence at the 3-digit level for a sample of 25 countries. They discovered, however that "the effects of liberalization on labour market shifts vary across countries in a way related to the scope and depth of reforms". It must be said, however, that in this study the only data on liberalization used in the estimation of the regressions was information on the timing of the reforms along with labour market adjustment measures. The Wacziarg and Wallack (2004) study therefore, while instructive, does not apply a rigorous structural or theoretical framework within which reliable conclusions can be drawn. In light of this, the clear pattern emerging from the findings from multi-country studies is that broad generalizations regarding the relationship between trade liberalizations and labour market reallocation should be avoided and, as such, case studies might be

[23] http://www.ilo.org/public/english/employment/strat/publ/index.htm
[24] These general results are confirmed in a recent IADB (2004) study.

more instructive in elucidating this important relationship. This is the approach we pursue in analyzing the Jamaican case.

3.3.2 Country Studies

We will briefly summarize some results from country studies on labour market adjustment to trade. This is no mean task given the plethora of studies and approaches that have been used to investigate this issue over past 3 decades. We will view this vast literature through two lenses. Firstly, we give priority to literature using the micro-economic based flow approach, since this is the current paradigm and the method we adapt in this paper. Secondly, we will have to consider the results from both developed and developing country studies since developed countries have "tended to liberalize more gradually" and there is a tendency towards non-tariff barriers in these countries (Goldberg and Pavcnik, 2004) whereas, in general, reform for developing countries have been more deep and identifiable. This distinction in the literature is self-evident, and has affected research methodologies across country types. In this section, we restrict our review to studies utilizing the labour market flow paradigm - placing particular emphasis on supply-side flows.

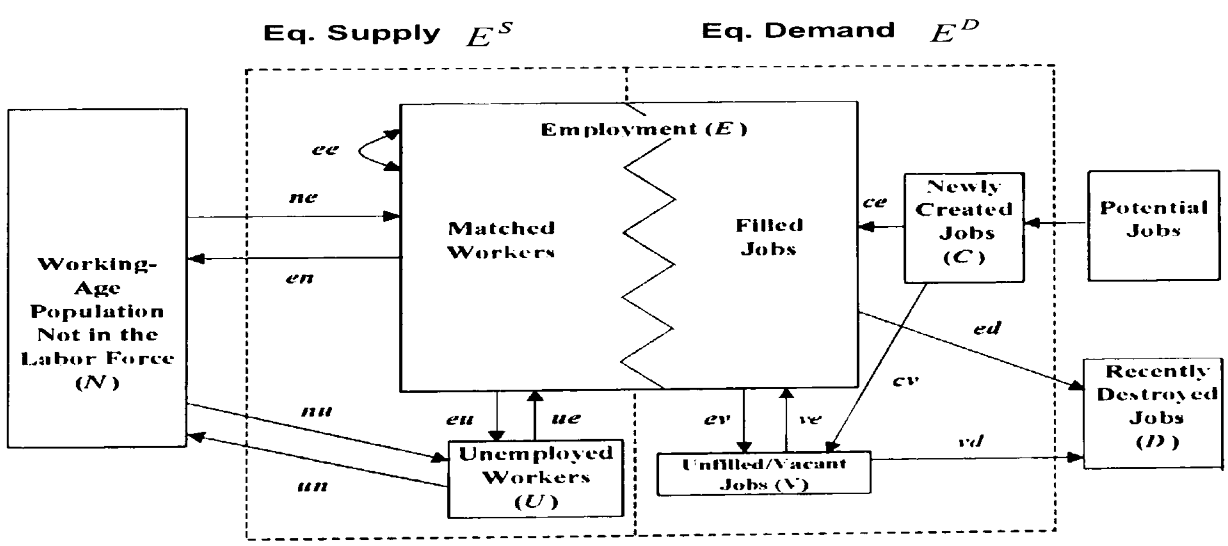

Figure 3.3 A Useful Typology of Labour Market Flows (due to Klein, Schuh and Triest, 2003b)

Figure 3.3 depicts various labour market states. The tiny arrows in the diagram show the possible labour market flows between states; with each type of flow differing in its magnitude and observability[25]. As Klein *et al* (2003b) points out, although total net employment (E) represents the sum of worker- matched jobs, the levels of labour supply and demand are never totally equal because there are always vacant jobs (V) and unemployed workers resulting from heterogeneity and matching- related frictions. In our study of the Jamaican labour market, we will be using labour supply data. In particular, we analyze four distinct types of worker flows.

We examine job-to job flows within the manufacturing sector (*ee*), flows between manufacturing and other sectors (*ee* flows), flows from employment to unemployment (along arrow *eu*) and from unemployment to out-of-the labour force (along arrow *en*). As we shall see, this is the first study, as far as we are aware, using such data from a small, open, developing country. In the literature, studies utilizing the flow approach use either demand-side flows such as plant- level data on job creation (*ce* and *ve*) and job destruction (*ed*) or labour force survey type data from which supply side flows (*ne, ee*, and *nu*) can be retrieved[26] . Other studies simply use net employment aggregates. Net employment data, however, may significantly mask the adjustment that occurs within the labour market during equilibrium. The advantage of the labour market flow approach is to provide a realistic view of the labour market. Since within this paradigm, taking the heterogeneity of both workers and firms into account, we are left with a more accurate view of a labour market in a constant state of flux- in which workers continuously move between states for a multiplicity of reasons which may or may not be directly related to trade[27].

Table 3.1 provides a brief summary of studies that have utilized the labour market flow approach in examining labour market adjustment under trade. The Elliot and Lindley (2006b) paper exemplifies the method we will apply in our analysis of the

[25] The observability of the flow is generally a function of the quality of the data. For example survey instrument, reporting standards, or the means whereby the data are collected.

[26] Blanchard (1990) discusses the empirical relationship between demand –side and supply-side of flows.

[27] So that net increases in employment cannot be interpreted as job creation in the same way that one cannot accurately conclude that increases in the stock of unemployed is synonymous with job destruction.

Table 3.1 Summary of Trade Studies Using Labour Market Flow Data

Article	Sample, Periodicity	Industries, countries	Dependent Variable	Regressors	Finding
Bentivoglio and Pagano (1999)	1992-1995	Eurostat Labour Force Survey data, 14 Nace manufacturing industries	Unemployment share, employment share, and reallocation share	Sectoral indices of import and export intensity	Rising Asian imports do not destroy jobs in UK, Germany, France and Italy.
Brulhart, Elliot and Lindley(2006)	1986-1991, 1992-2000	QLFS data and LFS data , UK	Share of workers who move industry or occupation, Individual level occupational and sectoral distance of moves	IIT, MIIT	MIIT reduces distance of both occupational and sectoral worker moves, the more open the industry.
Elliot and Lindley (2006a)	1995-2000	Three digit, manufacturing sector, LFS data,	Multinomial logit probability of changing jobs inter-industry and intra-industry manufacturing	Trade openness, IIT, UMCIT	High IIT leads to increased probability of intra rather than inter-industry moves, more within than between industry reallocation observed for UK, low level of inter-sectoral moves
Gourinchas (1999)	1972-1988, quarterly	Gross job flow data from 68 "traded" and 35 "non-traded" industries (of possible 450), US data	Job Creation rate Job Destruction Rate	Trend of four-digit SIC industry-specific RER	Appreciation raises both job creation and destruction and depreciation lowers both rates
Goldberg, Tracy and Aaronson (1999)	1977-1997	CPS data, 18, 2-year panels, US	Probability of changing jobs for men across successive surveys, manufacturing	2-digit SIC industry specific import and export exchange rates	Exchange rate significantly affects job flow probability during appreciation but not during depreciation and sign differs for import and export RER.
Greenaway, Upward and P. Wright (2002)	1975-1995	UK Labour Force Survey	Transition probabilities for expanding/ contracting/, same sector/ non-employment moves.	Demographic characteristics-skill level, educational etc	Job specific vs. transferable skills play a role, housing market, sectoral shocks also affect adjustment. There appears to be a difference between factors causing job-to- job as opposed to employment to. non-employment moves.

Table 3.1 Summary of Trade Studies Using Labour market Flow Data (continued)

Article	Sample, Periodicity	Industries, countries	Dependent Variable	Regressor	Finding
Haltiwanger and Vodopivec (1999)	1989-1995	Estonian labour Force Survey	N/A	N/A	Deriving job flows from worker flow data suggests that the degree of labour market flexibility plays an important role in labour market adjustment.
Haynes, Upward and Wright (2002)	1988-1993 US, 1990-1997 UK	Panel Data- PSID and BHPS	Inter-sectoral and intra-sectoral probability, probability of exiting employment, Hazard function	Information about labour market experience, demographic factors	Individuals switch sector the longer they are unemployed; individuals initially search in the sector they were employed, significant costs of worker mobility.
Kletzer (1998, 2000)	1979-1994	Three digit SIC industries, US	Displacement rate (gross worker flows)-manufacturing	Price of imported good for particular industries, export sales	Export sales significantly lower displacement rates, import competition or an increase in import share is broadly consistent with greater worker displacements. Changes in trade conditions measured by relative import prices have no effect on displacement.
Klein, Schuh and Triest (2003a)	1975-1993, annual	450, 4- digit SIC Industries, manufacturing US	Job flow variables (Job creation, job destruction, reallocation)	Exchange rate, cyclical and trend exchange rate	Appreciation results in job destruction, and reduction in net employment growth, job flows respond differently to changes in trend and real rates, both flows increase with appreciation. Exchange rate movements have both re-allocative and aggregate effects on job flows.
Upward and Wright (2003)	1991-2001	PSID US, BHPS UK	Binary probit, probability of promotion, demotion and exit	Demographic characteristics- skill level, educational etc	Skill-upgrading leads to promotions, no evidence that skill upgrading causes dislocation or demotion.

Jamaican data. By matching industry-level trade flows to individual worker data, these authors were able to investigate the effect of trade openness and intra-industry trade on job-to job flows (different kinds types of *ee*) within the UK manufacturing sector. They find some supportive evidence for the Smooth Adjustment Hypothesis - that intra-industry trade shocks were related to the relative propinquity of worker moves; with displaced workers more likely to find alternative intra-industry employment rather than finding a job match in some other 2-digit industry. Important papers such as Gourinchas (1999) and Klein, Schuh and Triest (2003a) link exchange rate movements to gross job flows. These studies find robust evidence that real appreciations are "bad" for jobs. The results of Goldberg *et al* (1999) and Kletzer (1998, 2000) taken together, suggest that the supply-side, employment benefits of trade hinge crucially on export sales and not just on changes in the terms of trade. The link between labour market adjustment and mobility to skill levels, educational attainment, labour market structure as well as geographical location has been pursued and has been confirmed by numerous empiricists. Two striking features of the literature revealed by the brief survey provided here, however, is the lack of empirical research for developing (or poor) countries and the focus of this body of research on the manufacturing sector. Whereas we are not able to extend our analysis to agriculture and mining sectors because of time constraints, an empirical examination of labour market adjustment within the context of a developing economy is the goal of this study.

3.3.3 Developing Country Studies

Some empirical evidence on the impact of trade liberalization on labour market adjustment in the developing country setting exists for Latin- America. Using plant-level panel data for Mexico, Ravenga (1997) found that, between the years 1984-1990, a 10% reduction in tariffs was associated with a 2-3% reduction in manufacturing employment and that there were also attendant wage effects, including the widening of the skill premium. According to Moreira and Najberg (2000), Brazil's manufacturing sector was hard hit by trade liberalization with manufacturing employment declining by 13.7% between 1990-1997- the years of liberalization. They make use of a growth accounting approach, relying on net employment data. More recently, new evidence has emerged about the case of Brazil from Ferriera, Leite and Wai-Poi (2007). These authors were able to find some evidence, using economy-wide, worker-flow data that trade liberalization affected the inter-sectoral distribution of labour and also had the effect of reducing inequality in the wage distribution. Further south, in Chile, Levhinson (1999) used manufacturing census data to show that the liberalization of the Chilean economy in the 1970's coincided with economic shocks which accounted for an 8% decline in manufacturing during the period 1979-1986. Similar results have been found for Africa. Rattso and Torvik (1998) found that Zimbabwe's trade liberalization of the early 1990's was followed by a contraction in output and employment and was accompanied by a sharp increase in imports; substantially deteriorating the trade balance. Using Computable General Equilibrium (CGE) analysis, the authors found that the liberalization episode caused de-industrialization; thus hampering the growth potential of the economy. Currie and Harrison (1997) found weak unemployment effects using Moroccan manufacturing data. They found that relatively large adjustments in both import and export tariffs (over 20% reduction) led to employment adjustments of 6 % or less. It is worth noting that most of these studies use net-employment data in contrast to the labour market flow data[28] which we will use in our empirical analysis of the Jamaican case.

Perhaps the most sanguine analysis of a developing country has been contributed by Milner and Wright (1998) who find that the liberalization of 1984-1990 in Mauritius resulted in increased manufacturing employment and no contraction in the importables- producing sector. Subramanian (2001) suggests that Mauritius' positive results were due to its institutions rather than its trade policy. Similarly positive employment results have been reported by Harrison and Ravenga (1998) for Costa Rica, Peru and Uruguay while for other studies the results are inconclusive[29].

In sum, it would appear that there is no general rule governing the relationship between trade liberalization and employment. It would also appear that there is greater evidence from country studies pointing to the negative effects of trade liberalization on employment growth. Under liberalization, favourable employment

[28] A notable exception is Levhinson's (1999) Chilean study.

[29] eg. Roberts and Tybout (1997).

outcomes seem to be strongly linked to export growth and a robust supply-side response, while dominance of a import demand- side response in trade flows seems to have an association with negative employment effects. The results also suggest that labour market adjustment to trade liberalization critically hinges on the degree of transferability of skills of the worker. Notwithstanding these results, there is an apparent lack of research using the labour market flow paradigm for developing countries. This could be due to data availability issues. Overall, much of the variation in the results seem to depend on the peculiarity of the institutional framework, initial conditions, and labour market conditions of the countries as well as the nature and character of the reforms. We therefore find the case study approach to studying liberalizations more informative and hence adapt this method in analyzing the Jamaican data.

3.4 Liberalization and Reforms in Jamaica

3.4.1 Setting the Context

In this section, we briefly look at the background against which the reforms in Jamaica were implemented. We therefore extend the exposition broached in our introductory chapter to elaborate on the economic conditions prevailing in Jamaica preceding the implementation of the liberalization measures. While not providing comprehensive details, we provide sufficient details here for the purposes of our analysis (the reader would be better advised to consult Bloom, 2001; King, 2001; Gafar, 1997; Witter, 2004 for a more in-depth description).

3.4.1.1 Industrialization by Invitation: 1960s

The policy direction taken during 1960's in Jamaica reflects the work of Raul Prebisch (1959) and Arthur Lewis (1954). The motivation for economic development at this time was industrialisation as a means of creating employment in order to absorb the population growth which the agricultural sector was incapable of employing. In general, the main tools of economic policy were the system of taxation, state promotion and to a lesser extent market protection; whereas the agent of change was foreign direct investment. The policy milieu comprised legislation; which was initially enacted in 1947-1949 and later expanded in the 1960's to permit tax holidays, incentivisation of Jamaican-based manufacturing, allowances for accelerated depreciation and the granting of tax concessions for the production of textiles, bauxite, tourism and essentially any industry with an exported product.

The government agency spearheading industrial policy at that time was the Jamaican Industrial Development Corporation (JIDC), which was first established in 1952 for the purpose of promoting Jamaican manufacturing through the distribution of promotional material, the provision of cheap factory space, technical and financial assistance to favoured industries (Stephens and Stephens, 1986). Under this type of economic policy the economy experienced significant growth rates alongside the development of small-scale manufacturing and food processing industries. However as King (2001) and Witter (2004) point out-it was the mineral export industry; which was based on the extraction and exportation of the bauxite ore and the tourism sector that were the main drivers of the remarkable economic growth experienced by the Jamaican economy during this period. Expansion in the tourism sector during this decade also led to spill- overs in the construction industry. At the same time, there was relatively very little protection of the domestic market from imported competition (Figueroa, 1993).

3.4.2 State Populism: 1970s

With the change of government in 1972 came an ideological shift in the economic policy of Jamaica to one which had redistribution as its main objective. There were three defining characteristics of this era; restrictions on the domestic market, state intervention in economic activity and the closure of the economy to external trade. For the purposes of our study, we are particularly interested in the latter feature since it provides, from an empirical standpoint, a convenient if not ideal background against which to analyze the liberalization reforms in Jamaica.

The ideology of Democratic Socialism, which stood at the heart of the economic and development policy, required that the government should be in control of "the commanding heights" of the economy. This policy involved the nationalization of, the largest commercial bank Barclay's Bank DCO, the telecommunications monopoly, the electricity utility company and the national transport company[30]. The government would later take over failing enterprises in order to prevent unemployment as economic conditions deteriorated throughout the decade. As a result, the reach of government extended into the manufacturing sector and even tourism. Moreover, the social equity and redistribution programmes pursued during this period resulted in a marked increase in public expenditure on health, education and housing as new schools were constructed and tuition was abolished at all levels of the educational system. There was also a preponderance of public work programmes whose primary function was simply to provide employment.

It is arguable that the most significant shift within Jamaica's economic policy had to do with the closure of its economy to world trade. Exchange controls were introduced in 1974 and were made increasingly stringent throughout the decade. A licensing requirement was introduced for the importation of all consumer goods, tariffs were raised, and quantitative restrictions were imposed on a wide range of imported commodities, including the outright prohibition of some products. During this time, subsidies were also introduced on staple foods and kerosene oil. Foreign capital was discouraged both in word and through the nationalization of various foreign-owned entities. The government also set up a monopoly called Jamaican Nutrition Holdings- a company that had been established in 1975 to engage in the bulk importation of basic foods and to become a vehicle for bilateral food aid[31]. Meanwhile, imported consumer goods disappeared from the store shelves. This period also saw the introduction of numerous price controls including the setting of a national minimum wage.

By the end of the 1970's, the public sector employment rose by 66% and the real non-debt service expenditure of the government increased by 88%, the public sector expanded from 10.2% to account for 16.2 percent of GDP. Further the first calendar year saw the economy contract by 5.4%. The average annual rate of contraction of the economy throughout the period of this administration/economic policy was around 2.5%. Also, unemployment rose from 22%-30% between 1972 and 1979,

[30] Nationalisation was limited to acquiring controlling interest in the respective companies and was carried out with compensation.
[31] The Jamaica Nutrition Holdings was a part of the government's response to the rising import bill of the 1970's

investment declined and single digit inflation enjoyed in the 1960's ended, averaging over 12% during this period. Accordingly, between 1977 and 1980 the government concluded two agreements with the IMF, both had conditionalities which could not be met, and the loans were suspended (Girvan, Bernal and Hughes, 1980). Subsequently however, between the years 1977 and 1990, Jamaica would sign eight (8) agreements with the IMF and six (6) with the World Bank.

3.5 Reforms

The process of reform and liberalization deepened after 1980, albeit, under the stimulus of IMF and World Bank Agreements. Importantly, the reforms were also multidimensional in nature. In this section we cover primarily the process of trade reform. At the start of the period the average import tariff rate stood at 50% according to World Bank (1994) estimates. There were also a large number of quantitative restrictions, licensing agreements and the existence of the state-run import monopoly-the Jamaica Commodity Trading Company (JCTC). The latter was expanded at the beginning of the period to include even more products.

3.5.1 Trade Reforms

The process of trade reform in Jamaica can be viewed to have taken place in four phases. The first phase of the reform took place between 1982 and 1985 after Jamaica entered into World Bank Structural Adjustment Loan Agreements totalling US$190 million. Under these agreements some 180 items were removed from the import licensing requirement list. On the other hand, a new and expanded system of tariffs was imposed and tariff increases were implemented on some items (under the heading of "Stamp Duties")[32]. This phase of the reform, in reality, signalled a mere shift in the tools of protection; from quantitative restrictions to tariff protection. In fact, Witter (2004) points out, that lending was discontinued after 1985 because the World Bank was dissatisfied with the pace of the reforms.

The second phase of the reform process, which occurred from 1987-1990, saw a reduction in high tariff rates and stamp duties. The higher levels of tariffs were in line with the import substitution agenda of the Government. World Bank (1994)

[32] These tariffs did not apply to imports from CARICOM countries. The Caribbean Community (CARICOM) is the regional trading bloc.

describes the old Jamaican import schema as one characterized by "high tariff rates, stamp duties imposed on top of the non-tariff restrictions, complex customs procedures and a large number of exceptions to the general rules". The liberalization thrust during this period, therefore, sought to reduce bureaucratic obstacles by simplifying the tariff code and its administration. During this phase there was a further reduction in the level of tariffs and the removal of a large group of products from the restricted imports list. The Jamaica Commodity Trading Company remained the sole importer of a reduced list of commodities while others remained on the restricted list (World Bank, 1994).

The years 1990-1991 saw the implementation of phase three of the liberalization process in which a wide range of vegetables, peas, and roots, oils and fats and other products were removed from the import licensing list. During this phase export licensing requirements were also removed in relation to fruit vegetables, plants and coffee. Furthermore, 1991 marked the cessation of the activities of the Jamaica Commodity Trading Company and with it, the lifting of all import and export licensing requirements. A new import tariff schedule was also issued with lower tariff levels.

Phase four of the liberalization was characterized by further tariff cuts. The new tariff schedules of 1993 and 1995 showed a substantial reduction in tariff levels. Tariff reduction in these two years and later in 1998 occurred under the Common External Tariff Agreement (CET) of the Caribbean Community (CARICOM) - the regional trading bloc. Under the CET, a schedule was stipulated for the reduction of tariffs on commodities imported from outside the region. Further reductions in tariff levels followed. Throughout the period the Government also pursued other non-tariff measures to facilitate trade[33]. Tariff rates in Jamaica over the period are listed in the table below.

From *Table 3.2* it is clear that, over the period, Jamaica experienced a downward trend in both the variation and average import tariff. The table shows constant tariff

[33] For example, the World Bank's Private Sector Adjustment Loan of 1993 included as conditionality the improvement in the speed of clearance at customs.

Year	Average Import Tariff (%) (King, 2001)	Standard deviation of Tariffs	Average import Tariff (%) (WTO, Trade Policy Review)
1980	25.7	24.3	n.a
1981	25.0	20.7	n.a
1982	25.0	20.7	n.a
1983	25.0	20.7	n.a
1984	25.0	20.7	n.a
1985	25.0	20.7	n.a
1986	25.0	20.7	n.a
1987	25.0	20.7	n.a
1988	25.0	20.7	n.a
1989	25.0	20.7	n.a
1990	25.0	20.7	n.a.
1991	22.1	16.8	20.3
1992	22.1	16.8	n.a.
1993	15.9	13.4	n.a.
1994	15.9	13.4	n.a.
1995	14	13.4	14.0
1996	14	13.4	20.8
1997	14	13.4	10.9
1998	11.8	14.7	9.7
1999	n.a.	n.a.	8.9
2000	n.a.	n.a.	10.6
2001	n.a.	n.a.	n.a
2002	n.a.	n.a.	8.9
2003	n.a.	n.a	n.a
2004	n.a	12.3	8.6
2005	n.a	n.a	n.a
2006	n.a	n.a	n.a

Table 3.2 Import Tariff Descriptors for Jamaica

Source: King (2001)[34] from data published in the proclamations rules, and regulations of the Jamaican Parliament extended by the author using Witter (2004), WTO (2004) and WTO (2005).

levels up to 1993- at which point, a reduction in the rate can be observed. This reduction in the tariff rate coincides with the third phase of the liberalization process

[34] King (2001) calculated his estimates from a sample of seventy- two (72) representative commodities using parliamentary records..

described earlier. Subsequent reductions in the tariff rate consistent with phase 4 of the reforms can also be observed from the table. Although the trends in tariff levels, evidenced in *Table 3.2*, merely reflect one dimension of the liberalization reforms, the trend reduction in the tariff rates over the sample period is undeniable.

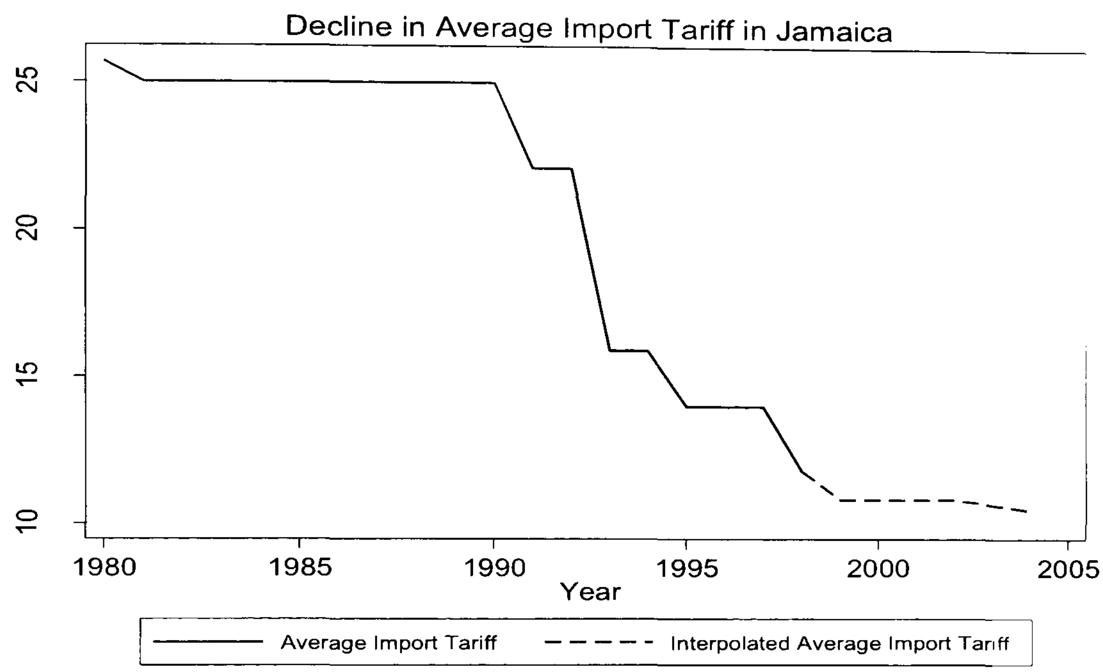

Figure 3.4 Decline in Average Import Tariff in Jamaica.
Source: King (2001), Various years of WTO, Trade Policy Review for Jamaica.

Figure 3.4 is based on *Table 3.2* and plots the decline in the average import tariff in Jamaica over time. The primary series used to create the figure is the King (2001) average import tariffs in the Jamaican economy. The latter years represented in the table represented data derived as a result of splicing the series with the WTO trade policy review data for the subsequent years. From the figure it is clear that Jamaica experienced a significant decline in its average tariff on imports over the period moving from 25% average import tariffs to 10.5% by the end of the sample. Furthermore the figure also highlights the pace of the tariff reforms showing that the fastest pace of tariff reductions occurred in the period 1990-1993 this period corresponds with phase 3 of the reform process described earlier. It is also important to observe that the consistent decline in the rate of average tariffs in Jamaica over the period suggests that there was an absence of import tariff policy reversals in the Jamaican case.

Year (1)	Index (2)	Value of Privatizations (US$m.) (3)		Number of Privatizations (4)	
		Accumulated	*Change*	*Accumulated*	*Change*
1980	0.03	0.0	0.0	0	0
1981	0.03	1.7	1.7	2	2
1982	0.00	-53.3	-55.0	1	-1
1983	0.00	-53.3	0.0	1	0
1984	0.00	-53.3	0.0	1	0
1985	0.00	-53.3	0.0	1	0
1986	0.02	-23.6	29.7	7	6
1987	0.06	63.8	87.4	11	4
1988	0.07	81.0	17.3	13	2
1989	0.13	198.9	117.9	25	12
1990	0.16	256.3	57.4	28	3
1991	0.18	289.2	32.9	37	9
1992	0.20	321.6	32.4	43	6
1993	0.22	370.3	48.7	51	8
1994	0.25	430.0	59.8	60	9
1995	0.25	430.6	0.5	63	3
1996	0.25	431.0	0.4	66	3
1997	0.16	243.8	-187.2	60	-6
1998	0.14	219.5	-24.3	58	-2
1999	0.16	255.1	35.6	61	3
2000	0.16	255.7	0.6	65	4
2001	0.27	458	202.3	70	5
2002	0.27	460.1	2.1	75	5
2003	0.55	1012.8	552.7	80	5
2004	0.55	1013	0.2	84	4
2005	0.55	1013	0	84	0
2006	0.55	1013.2	0.2	85	1

Table 3.3: Privatization of Public Enterprises in Jamaica

Source: King (2001) calculations based on data provided by National Investment Bank of Jamaica, Ministry of Finance, and the Financial Sector Adjustment Company. Values post-1998 completed by Author based on information made available by National Investment Bank of Jamaica.[35]

3.5.2 Privatisation

Arising out of the development strategy of the 1970's, by 1980 the Jamaican government had whole or partial ownership of enterprises in a wide range of industries-including tourism, telecommunications, food processing and distribution,

[35] Notes: "Index" is a linear transformation of "Accumulated" value of privatizations, mapped to a 0-1 interval; "Value of Privatizations, which is net of acquisitions, is expressed in millions of nominal U.S. dollars; Negative values appear in this table whenever acquisitions exceed investments; "Number of Privatization" is a count of each act of privatisation, even where the enterprise was partially divested.

banking, manufacturing, electronic media, agriculture, transportation and construction. Government ownership was most dominant in the tourism and banking industries. By 1980, the government owned well over half of the capacity of the tourism sector and the government owned the largest commercial bank-National Commercial Bank.

Table 3.3 shows the annual value and number of privatisations in Jamaica for the period 1980-2006. We have also included an extended privatisation index in column (2), along the lines of King (2001), to aid in understanding the pace of the reform process. From the table we see that there was a marked increase in the number of privatisations in the year 1986 with more privatizations taking place in that year than had taken place since 1980. These privatisations were carried out in order to meet conditionalities. The most significant among these was the sale of 51% of the shares of the largest commercial bank-the National Commercial Bank. Four further divestments followed in 1987, including 90% of the shares in the cement company, 19% of the shares of the telecommunications monopoly to Cable and Wireless International. In 1988 only two acts of privatization occurred including a further divestment of shares in the telecommunications company.

In subsequent years the privatisation process intensified. By 1996, sixty-six (66) privatizations had taken place for accumulated proceeds of almost US$500 million. King (2001) reveals however, that despite the increased pace of privatization between 1989 and 1996, at the end of that period the productive capacity that remained in the hands of the government of Jamaica was more than what had been already privatised in the previous 15 years.

The table is also suggestive that there was some policy reversal in the government's privatisation policy since between 1997 and 1998 as the government had to assume at least partial ownership or effective control of all but one commercial bank, all but two insurance companies, along with several trust companies and merchant banks. This move was deemed necessary in order to control the financial crisis which had arisen on the heels of the liberalization of the capital account, the foreign exchange markets and trade policy.

3.5.3 Capital Account and Financial Liberalization

The first move towards liberalizing the capital account came in January, 1990 when exporters became authorized to hold foreign exchange denominated accounts in the government's attempt to counter the hoarding of foreign exchange (King, 2001). Six months later, commercial banks were empowered by the Bank of Jamaica under the Exchange Control Act to open foreign exchange accounts and to set their own foreign exchange rates. By September 1991, the Exchange Control (Removal of Restrictions) Order was implemented, lifting exchange controls and permitting private citizens to buy foreign exchange from authorised dealers without permission from the central bank or the furnishing of an import license. Also, in 1991 quantitative credit restrictions such as selective credit restrictions and overall credit ceilings were removed; ceilings on deposit rates were also lifted within the context of a loan programme with the Inter-American Development Bank. In 1992, the Exchange Control Act was repealed entirely and foreign exchange dealers other than commercial banks were authorized to deal in foreign exchange. On the other hand, financial intermediation was being restricted with the rise in the liquid assets ratio of commercial banks from 20% in 1989 to 33.5 percent in 1992 and then 50% until 1995.

Shortly following the removal of capital controls and exchange rate liberalization in 1991, the value of the currency depreciated precipitously by 167%[36]. Given the fact that the import to GDP ratio stood at 50% at that time, the significant rate of depreciation soon passed through to prices. In fact, inflation reached 80.2 %; an outcome which also coincided with expansionary monetary policy[37]. As King (2001) points out expansionary monetary policy continued alongside high interest rate policy until 1997 at which time the growth of base money was finally reigned in and inflation subsided. Despite the phenomenal expansion of the Jamaican financial sector following the removal of quantitative restrictions this growth was short-lived; as by the mid-1990 many financial institutions became insolvent. The Jamaican

[36] This rate of depreciation contrasts the average annual 19% depreciation in the Jamaican dollar experienced over the preceding 10 years.

[37] In fact, the expansionary monetary policy had begun in 1988 after a September hurricane called Gilbert which devastated the Island. Nevertheless, the marked increase in inflation coinciding with the liberalisation reforms is suggestive that the reforms contributed to this phenomenon.

government intervened using a company set up for that purpose called the Financial Sector Adjustment Company (FINSAC) at a cost of 60% of GDP (King. 2001)[38].

3.6 The Data

We use micro-data from the April quarters of the Jamaican Labour Survey collected by the Statistical Institute of Jamaica (STATIN). This dataset is, to our knowledge, the most detailed and comprehensive source of labour market data for Jamaica and contains information on every respondent interviewed over the period in the applicable quarter. Moreover, the period of interest is relatively lengthy and spans the years 1983 to 2006. In our case, we pool the Quarterly Labour Force surveys from 1983-2006. We choose to begin at the year 1983 because in this year the survey instrument, for the first time, elicits responses from individuals surveyed regarding their circumstances twelve (12) months before the survey date. Quite conveniently, the time span includes all the years for periods in which there have been episodes of liberalization reforms. The Jamaica Labour Force Survey contains information on employment as well as key social and economic characteristics of the individuals surveyed.

The data is not without its limitations. For one, the April survey for 1991 was not carried out by STATIN and hence does not appear in our dataset. Also note that the surveys for the intervening years- 1995 to 1997 -could not be provided by STATIN[39] and had to be sourced from the Derek Gordon Databank; a data repository unit within the Sir Arthur Lewis Institute at the University of the West Indies (UWI). Unfortunately, the quality of the data for this period (1995-1997) is not comparable to that provided by STATIN since the industrial and occupational codes had been recoded to the one-digit level of the Jamaica Industrial Classification (JIC) and the Jamaica Standard Occupational Classification (JSOC) respectively. In addition, personal identifiers for the individual records for the 1995-1997 data had been removed prior to their delivery to the Derek Gordon Databank by STATIN. This impairs our ability to construct pseudo-panels and to arrive at mobility estimates at the two-digit level (or higher) for these years of the data. Despite these data

[38] King (2001) makes an accounting estimate of costs of the intervention; we believe that the economic costs of the intervention were much greater.
[39] The datasets are missing from the archives of the Statistical Institute of Jamaica.

limitations, we can still reliably recover from these less detailed years of the data, information on every other variable of interest.

For this study, we exploit the fact that the survey elicits responses regarding respondents' circumstances twelve months prior to the survey date and hence educe from these responses, information about the employment history of the respondents. Of particular interest to us are questions concerning the economic activity of the respondent, industry of employment and occupational status. Generating the dependent variable for this study, hinges crucially on our ability to identify whether the individuals have reported, having changed sectors, or industries, or labour market status in the months preceding the survey month.

One key aspect of preparing the labour market data for the analysis we carry out here is the matching of employment and demographic records of individuals with the trade flows corresponding to their industry of origin. Achieving this goal requires that two main tasks are achieved;

i. The harmonization of all industry and occupational codes over the period (1983-2006), since these codes have been revised over the period under review.
ii. The matching of industry level trade flow data with the corresponding labour market records.

The harmonization of the industry and occupational codes over the sample period is extremely vital since, in Jamaica, as is common to many jurisdictions, codes assigned to denote the various occupations and industries are subject to revision over time. The industrial code used to code the Jamaican labour data is referred to as the Jamaica Industrial Classification (JIC) and is based on various revisions of the International Standard Industrial Classification (ISIC). In the Jamaican case, there have been three revisions of the JIC which apply to the labour force micro-data. These are the 1968 version[40] of the JIC, the 1975 revision and finally the 1987 revision. Although there has been a 2005 draft revision of the JIC circulated by STATIN (which is based on Revision 3 of the ISIC), this draft has not yet been applied to the Jamaican Labour Force micro-data and hence does not bear any

[40] The first publication of the industrial classification in Jamaica was actually in 1967.

relevance to the empirical analysis carried out here. Since 1991 the April Labour force surveys used in this study have been coded using JIC 1987 but the pre-1991 surveys have been coded using JIC 1968. The concordance required to harmonize both codes to the 1987 revision was graciously provided by the Statistical Institute of Jamaica and was applied to the dataset.

There are two occupational coding conventions used in the data. The coding of the response to questions regarding occupational status (or past occupational status) questions in the data changes in 1993 to the Jamaica Standard Occupational Classification (JSOC) revision 1991 which is based on the International Standard Classification of Occupations (ISCO) revision 1988. Because of this inconsistency in the occupational codes[41], there was a need to harmonize the occupational codes in much the same way as the industrial codes were harmonized. As far as we are aware, no such concordance exists between the pre- and post-1993 occupational codes and so a detailed concordance matching the two codes containing all occupations in Jamaica had to be developed in the process of our research. This enables us to consistently record the occupation of the respondents over the sample period.

Detailed tariff data can be found in the World Integrated Trade Solutions (WITS) dataset. However the data is only available for a few years for which we have data[42]; and hence there is poor coverage for the entire period of interest. Furthermore, tariff data from the Statistical Institute of Jamaica and CARICOM were not accessible for the period. Due to this fact, this study uses data on import and export flows as the independent variables affecting labour market adjustment. For this reason, obtaining the appropriate trade flow data was the other major data requirement for our research is trade data for Jamaican manufacturing industries. Trade data for this study was downloaded from UN Comtrade database. The data was downloaded at the 5-digit level of the Standard International Trade Classification (SITC) revision 2. Recall, that information regarding labour market industries is coded using the JIC; an industry- based code whereas the SITC is a product-based code. Therefore a concordance is required in order to link industry trade flows with the related labour

[41] The pre- 1993 occupational coding system was organised along a sectoral theme in that jobs in the same sector or industry were grouped together, while JSOC 1991 was coded with a greater emphasis on skill levels.
[42] For example the WTO-IDB database contains data on Jamaica for years 1999-2001 and 2004 only.

market records. In order to achieve this we use the Maskus (1989)[43] concordance. This concordance uses a weighting schema to convert 2-digit SITC trade data into 3-digit ISIC. Recall however that the harmonized labour market data for Jamaica over the period 1983-2006 is coded in the 1987 revision of the JIC. This means that even with the trade data concorded to ISIC revision 2, we need a mapping between the ISIC revision 2 and JIC 1987 codes. Such a concordance was provided by STATIN and improved by the author. In this way, we were able to link the detailed product-coded trade data to industry-level micro-data from the Jamaica Labour Force Survey between the years 1983-2006.

Other sources of data used in this research are the International Financial Statistics (IFS) country data as well as the World Development Indicators (WDI) dataset. All values are adjusted to year 2000 Jamaican dollars using the Gross Domestic Product (GDP) deflator[44]. Wage data used was obtained from the Survey of Large Establishments which was carried out by the STATIN for the first time in 1986. The quality of the wage data collected in the Jamaican Labour Force Survey is notoriously unreliable. We provide a detailed listing in *Table A1* and *Table A2* of the Appendix; defining how the variables used in the estimation were constructed.

3.7 Definition of Mobility

In this chapter we will be modelling- using econometric methods, three types of mobility. They are; worker moves within the manufacturing sector, manufacturing worker moves to other sectors and finally worker moves from manufacturing employment into joblessness. We define a "sector" as the one-digit level of JIC 1987. There are nine (9) such sectors in the JIC 1987, one of which is manufacturing; the sector of interest in this chapter. An "industry" is defined at the two- digit level of the JIC 1987. There are fourteen (14) two- digit manufacturing industries within the manufacturing sector according to the JIC 1987. For the purposes of this analysis and because of cell size considerations we will use thirteen (13) groupings; a comprehensive listing of which is provided in *Table A3* of the Appendix. These thirteen, two-digit industries are further sub-divided into thirty-

[43]http://www.macalester.edu/research/economics/page haveman Trade.Resources Concordances FromISIC 3isic 2sitc.txt

[44] The GDP deflator is preferred to the CPI since it embodies information on the prices of commodities that may not be a part of the representative basket.

three (33) three-digit "sub-industries". In *Figure 3.5* we present a simple heuristic device in order to illustrate our sectoral, industry and sub-industry definitions.

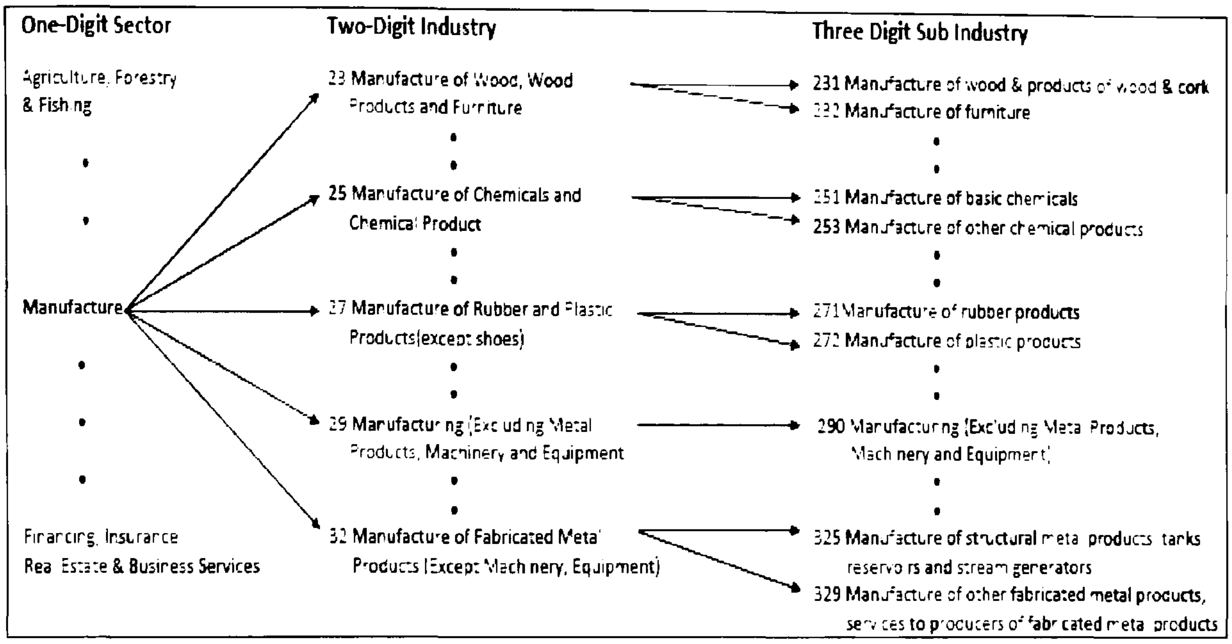

Figure 3.5 A Hierarchical System of labour Mobility Based on JIC 1987

The relatively high degree of disaggregation utilized in this chapter, allows for a richer picture of labour market mobility and adjustment. It is noteworthy that, as far as we are aware, Elliot and Lindley (2006b) aside, no other study has been carried out using data at this level of disaggregation. While the chosen level of disaggregation allows the labour market adjustment to be observed in greater detail there is also the disadvantage that, given cell size considerations, the number of movers in a given survey year, may not be large enough. In order to obviate these difficulties, we pool the QLFS over the period 1983-2006[45] and focus on three types of mobility, intra-sectoral, intersectoral and disemployment flows. Herein lies the essence of the justification for the level of disaggregation used- the sectoral and industrial definitions are disaggregated enough in a bid to unmask as much of the adjustment as possible, while ensuring that adequate cell sizes are preserved.

Having cleared sectoral and industry definitions we turn our attention to the specific types of mobility with which we are primarily concerned in this chapter. This study will focus on identifying the causal factors behind three main types of mobility flows; moves from manufacturing into unemployment, moves from manufacturing to other one-digit sectors and moves between jobs within the manufacturing sector

[45] Elliot and Lindley (2006b) pool the UK QLFS over 6 years.

itself. Of particular interest to us, is whether and to what extent trade flows played a causal role in these three types of worker reallocation.

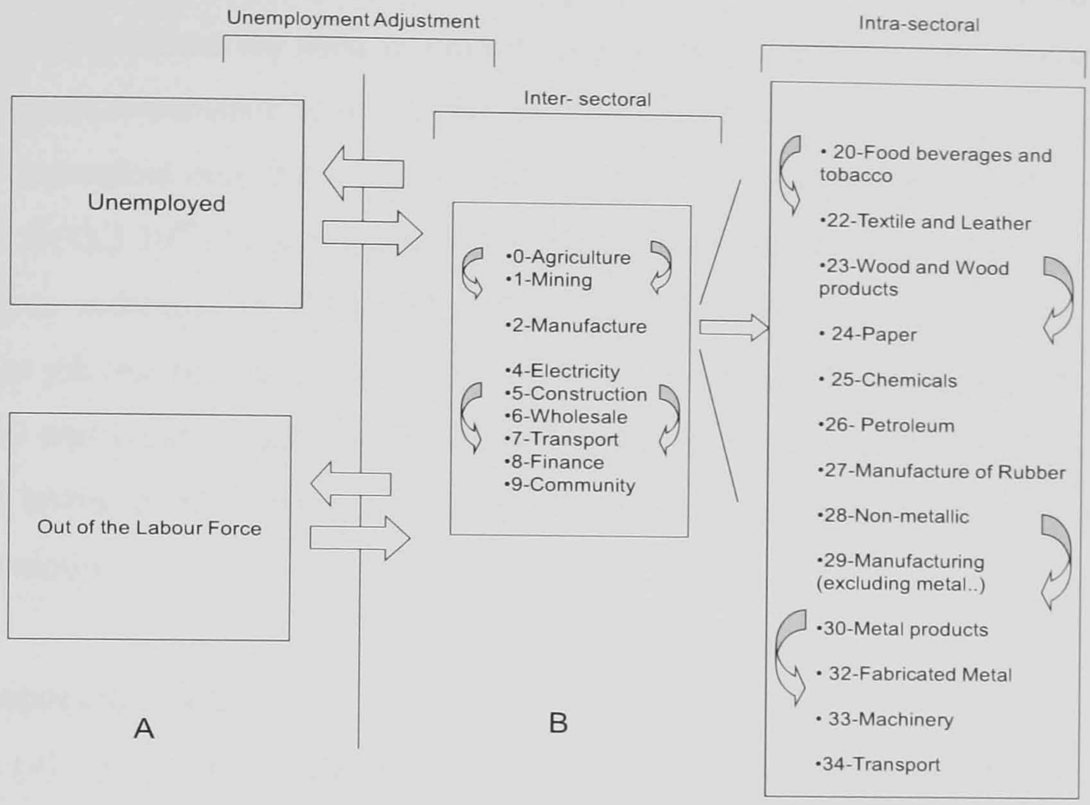

Figure 3.6 Labour Market Mobility Flows

In this sense, our study differs from the Elliot and Lindley (2006b) who consider only inter-industry and intra-industry moves. Consistent with our extension of the model therefore, a "status-mover" is defined as an individual who, within the 12 months before the survey date, moved out of manufacturing employment into unemployment/out of the labour force[46] or *vice versa*. An individual is referred to as an "inter-sectoral" mover if he/she has moved between one-digit JIC 1987 sectors. We regard as an "inter-industry mover" one who has moved two-digit manufacturing industry within the last 12 months. Finally, an "intra-industry mover" is defined as one who has moved firm and/or sub-industry at the three-digit level of the JIC 1987. Given our definitions anyone falling outside of this set is called a "stayer" and the union of all of the above sets is referred to as a "mover". Although in this paper we model intra-sectoral, inter-sectoral and manufacturing workers moving into disemployment, we provide descriptive statistics of all worker flow types in the following section. *Figure 3.6* above depicts the types of mobility defined.

[46] Note that in the Jamaican Labour Force Survey it is impossible to distinguish between those entering manufacturing employment from unemployment or out- of- the labour force.

Table A4 in the Appendix depicts key QLFS questions from which the mobility variables were derived in order to determine industrial and occupational characteristics of the respondents[47]. In general, for the mobility variables two important conditions are used in order to distinguish those who have changed their employment circumstances within the last year. Firstly, to qualify as a "mover", the QLFS respondent must have indicated having been in the current job for less than 12 months in Q.3.10[48]. In addition to this criterion however, the same respondent must also have indicated in Q3.14 of the survey he/she stopped working in his/her previous job less than a year before the time of the survey. By comparing the sector, industry and labour market status of the worker in the past with the respondents' current labour market status, we are able to generate the mobility variables used in our estimation.

3.8 Econometric Model

A four (4) regime (m) multinomial logit model is used to investigate the impact of individual characteristics, industry-specific information and trade on worker mobility within Jamaican manufacturing. In this specification, we distinguish between those manufacturing workers who experience job separations *(m=4)*, those who move sector *(m=3)*, workers who move jobs within sector *(m=2)*.Within the category *(m=2)* are manufacturing workers who change jobs within the same 2 or 3 digit industry or who change jobs between 2 or 3 digit industries within the manufacturing sector. Finally the base category *(m=1)* represents those individuals who have not changed jobs. This information is succinctly summarized in the following *Table 3.4*.

[47] Though the specific question numberings in the QLFS have changed over the period the survey question remains the same.
[48] The relevant question is numbered as Q3.11 since 1994. Details of the questions from the Jamaican LFS used to identify the labour market history of individuals are placed in *Table A4* in the Appendix.

Mobility Categories	Description
$m=1$ (Base category)	Stayers; respondents not reporting to have changed jobs
$m=2$	Intra-sectoral movers; individuals changing jobs within manufacturing sector
$m=3$	Inter-sectoral Movers; manufacturing workers moving jobs to alternative one-digit sectors
$m=4$	Unemployment movers; manufacturing workers exiting employment into either unemployment or out-of-the labour force categories

Table 3.4: Mobility Variables used in Multinomial Logit

The multinomial logit model was chosen for two main reasons. Firstly, the analytical convenience of the multinomial model as opposed to the multinomial probit is well-known. This problems associated with inference based on the multinomial probit is compounded by the fact that $m>3$ in this empirical framework. Under these circumstances, the restrictions required on the variance-covariance matrix for estimation of the multinomial probit model in order to avoid the "curse of dimensionality" have no theoretical or intuitive bearing on the issue being investigated. Results from the Hausman-Mcfadden (1984) tests suggest that the Independence of Irrelevant Alternatives (IIA) assumption was not violated for the Jamaican data. The results from the IIA test are presented in the table below;

Omitted	Chi-Square	Degrees of Freedom	p-value	Evidence
Intra-Sector *(m=2)*	-2.24	31	-	-
Inter-Sector *(m=3)*	16.844	31	0.982	for H_O
Unemployment *(m=4)*	-5.466	31	-	-

Table 3.5: Hausman Test of the IIA Assumption
Ho: Independent Irrelevant Alternatives assumption holds

Hausman and McFadden (1984, pg 1226) and Long and Freese (2006) note that when the test yields a negative chi-squared statistic this is usually evidence that the IIA assumption has not been violated. Moreover, *Table 3.5* shows that the null hypothesis of the existence IIA cannot be of the rejected when the values of the dependent variable for inter-sectoral movers are omitted for the constrained regression model. This finding, therefore, supports the use of the multinomial logit estimating mobility probabilities from the Jamaican data.

Underpinning the empirical approach adapted in this paper is the matching model of Jovanovich and Moffitt (1990) in which the types and magnitude of labour market flows realized, hinge crucially on the likelihood of an individual obtaining a good match, the mobility costs and shocks to one sector or industry relative to the other sectors. The likelihood of an individual obtaining a good match is dependent on two interconnected considerations: *i)* the extent to which the job or task meets the worker's expectations and *ii)* the extent to which the worker embodies skill requirements needed to complete the job. Within our model, qualifications and experience are used to capture this information. Furthermore, the extent to which the skills embodied in the worker are specific or general may well have implications for the type of adjustment. Moreover, mobility costs also depend on the age, gender and location of the worker. Sectoral and industry specific shocks are modelled using industry wage information and industry exposure to trade. Our model specification allows us to determine the relative effects of each of these factors in the types of adjustment we observe in the Jamaican labour market. We write the multinomial logit model, which will be used to estimate the model, in the familiar manner;

$$P_{ir} = \frac{\exp(Z_{ik} B_{rk})}{\sum_{m=1}^{4} \exp(Z_{ik} \beta_{mk})}, \; m = 1, 2, 3, 4 \qquad 3.15$$

Where P_{ir} is the probability of belonging to regime $r \in m$. Underlying the model is a latent variable formulation where the latent variable Y_{im}^{*} takes one of the four values and is determined by the relationship;

$$Y_{im}^{*} = Z_{imk} \beta_{imk} + \varepsilon_{im}, \qquad 3.16$$

Where Z_{imk} includes information on k regressors including human capital, occupational, industry-specific and trade related variables. The ith individual will experience a labour market transition if the latent variable takes on $Y_{im}^{*} > 1$. The disturbance term ε_{im} is assumed to be extreme value distributed and the condition $\beta_{ik} = 0$ is imposed to identify the remaining parameters in the equation.

3.9 Descriptive Statistics

Figure 3.7 shows the evolution of sectoral employment shares between 1983 and 2006[49]. The names of the nine one-digit sectors represented in the figure are: Agriculture, Forestry and Fishing (Agriculture), Mining Quarrying and Refining (Mining), Manufacturing (Manufacture), Electricity, Gas and Water (Electricity), Construction and Installation (Construction), Wholesale and Retail, Hotel and Restaurant Services (Wholesale), Transport Storage and Communication (Transport), Financing, Insurance, Real Estate and Business Services (Finance), Community, Social and Personal Services (Community). In *Figure 3.7* the abbreviated, bracketed, form of the sectors are used as labels[50]. The figure reveals that Jamaica has undergone significant sectoral transformation over the period. By 2006, the community and personal services sector had become the largest absorber of labour, accounting for 27% of total employment having surpassed the once dominant agriculture, forestry and fishing sector; which had been the largest sector up to the turn of the 1990's. In fact, the agricultural sector experienced a 10% decline in its employment share over the review period, having once stood at 32% in 1983.

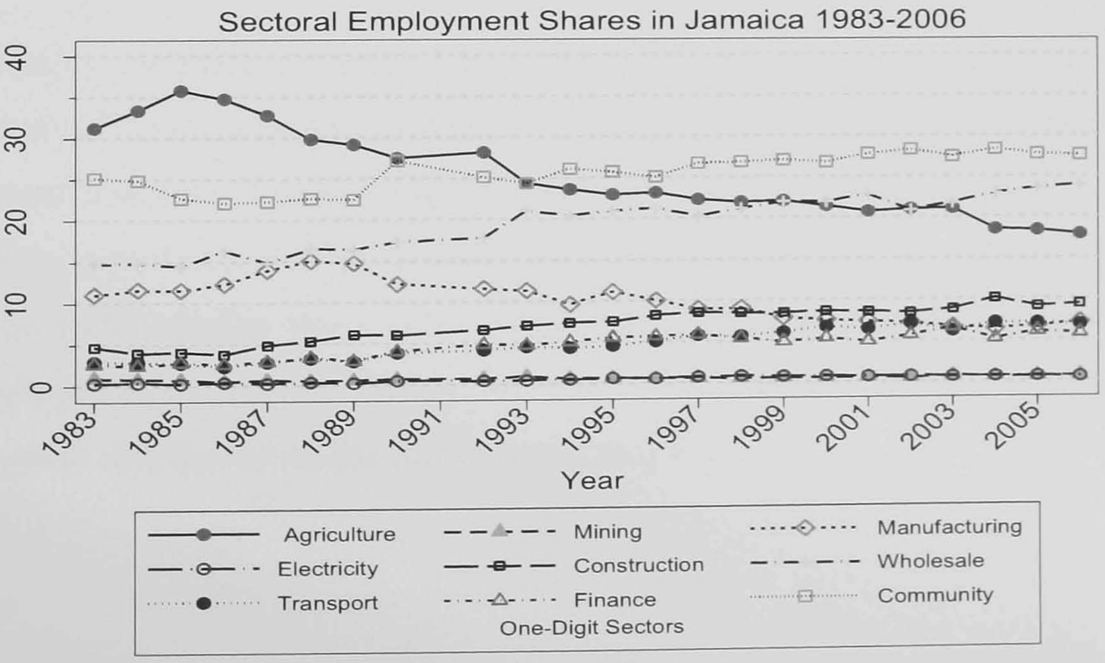

Figure 3.7 Sectoral Employment Shares in Jamaica 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

[49] The industry shares are calculated observing the JIC 1987. Because the JIC 1987 has only been applied by STATIN since 1991, QLFS data for pre-1991 period had to be harmonized using concordances. This study is the first to provide a consistent series for both pre- and post 1991 periods.
[50] The JSIC one-digit sector codes and Sector names are also found in *Table A8* of the Appendix.

In fact, closer inspection reveals that all other tradable, goods-producing sectors experienced a net decline in employment shares over the period. The manufacturing sector experienced a 4% decline over the sample period; from its 11% share in 1983, while mining, having accounted for 1% share of employment in 1983 dwindled closer to 0.6%. Note, however that the decline of these sectors was not continuous throughout the sample. Agriculture, for example, exhibited a trend increase in its employment share up to 1985, and manufacturing showed similar movement up to 1989 before experiencing secular decline to the end of the sample.

On the other hand, significant increases in the shares of employment across all the service sectors can also be observed in Jamaica over the period of analysis. The sectors exhibiting the fastest rate of growth were the transport, storage and communication sector (133%), finance, insurance, real estate and business sector (117%), construction and installation sector (99%), and then wholesale, retail, hotel and restaurant services sector (62%). Therefore, we can conclude that, phenomenal service sector growth coincided with secular decline in the goods producing sectors of the Jamaican economy.

The mobility variables constructed from the *QLFS* can be used to approximate the magnitude of the manufacturing unemployment flows. Three types of unemployment adjustment flows are shown in *Figure 3.8* below[51]. Firstly, the figure shows worker flows into manufacturing employment from unemployment or out- of- the- labour force. Secondly, worker flows from manufacturing employment into unemployment are displayed in the *Figure*. Finally, we show worker moves out of manufacturing employment into the out-of-the labour force category.

[51] It is not possible to distinguish between movers into manufacturing employment from unemployment and movers into manufacturing employment from out-of-the labour force in the Jamaica Quarterly Labour Force Survey.

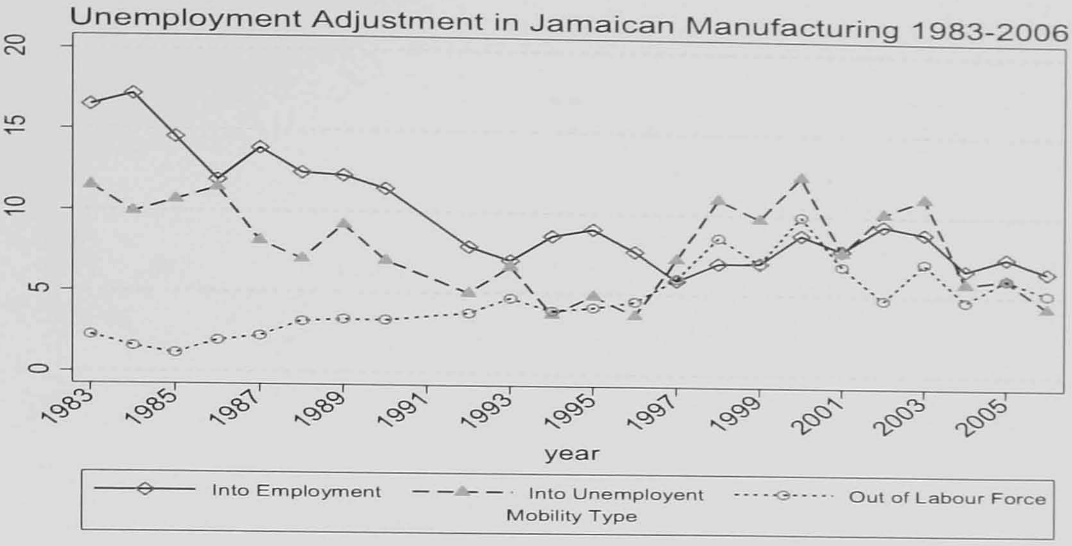

Figure 3.8 Unemployment Adjustment Flows in Jamaican Manufacturing 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

The flows are represented in the figure as a percentage of manufacturing employment. *Figure 3.8* makes it clear that there is significant manufacturing worker turnover in Jamaica. On average, annual worker moves from outside of employment into manufacturing account for 9.8% of manufacturing sector employment, worker moves from out of manufacturing jobs into unemployment represent 8% of manufacturing sector employment, while the smallest type of turnover is the average annual percentage of individuals- 4.6%, who exit manufacturing sector jobs and enter the out-of-the labour force category. All series exhibit a greater degree of variation and volatility than the net employment series, with the "into employment" and "into unemployment" declining over most of the sample period. This fact confirms the theoretical prediction that net employment series may potentially mask labour market dynamics. The increasing magnitude of worker outflows to the "out of the labour force" category; which increases for most of the sample period, is an indication that an increasing proportion of manufacturing workers tended to leave manufacturing employment for non-participation. Another striking characteristic of *Figure 3.8* is that there is convergence of all *3* labour market flows over the period. Towards the end of the sample therefore all labour market flows coalesce around the 6% mark; a development which implies a job exit rate of approximately double the rate of entrants into the sector from outside employment. Remarkably, throughout the entire sample period we observe exits into the out-of-the labour force category becoming increasingly dominant.

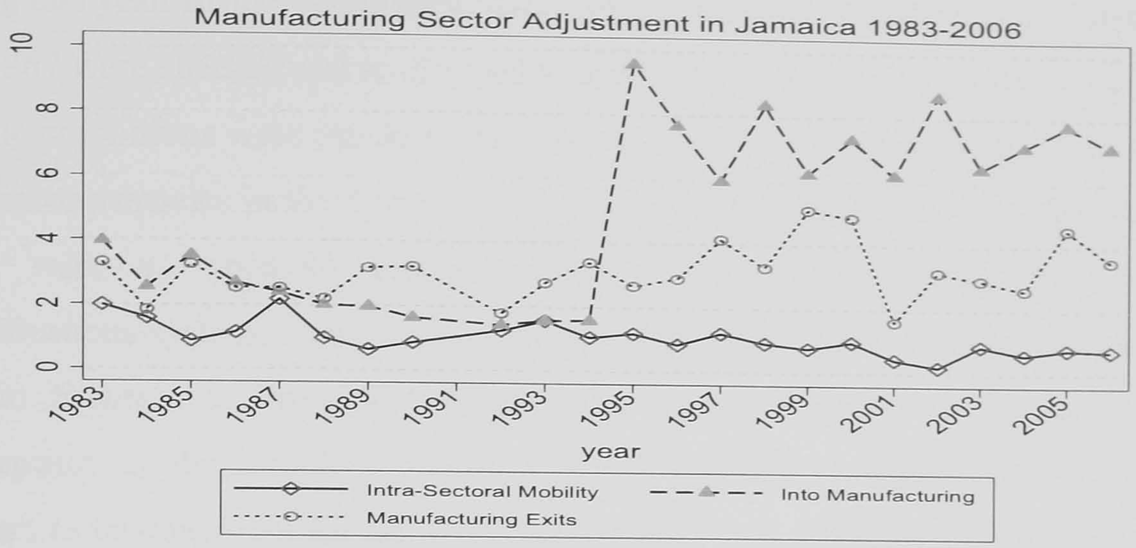

Figure 3.9 Inter- and Intra-sectoral Adjustment in Jamaican Manufacturing 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

Figure 3.9 depicts the degree of inter-sectoral and intra-sectoral mobility as a proportion of manufacturing employment. The *Figure* shows that, in general, intra- and inter- sectoral are relatively low compared to the unemployment adjustment depicted in *Figure 3.8.* Recall that inter-sectoral mobility refers to worker moves from within manufacturing sector to other one-digit sectors and vice-*versa*. The "into manufacturing" series portrayed in *Figure 3.9* depicts the proportions of inter-sectoral moves into the manufacturing sector whereas the "manufacturing exits" series is representative of the share of individuals who exit manufacturing sector employment for alternative employment in some other one-digit sector. Low levels of both intra- and inter-sectoral mobility in Jamaica were present on Jamaica during the first decade for which data is displayed. During this time all series exhibit a marginal decline.

On the other hand, between 1994 and 1995 there has been a sharp increase in worker moves into manufacturing from other one-digit sectors. This observation from the Jamaican data is remarkable for several reasons. Firstly the proportion of worker moves into Jamaican manufacturing sector registered in 1995 is almost four-fold the level registered in 1994 implying a significant change in the mobility patterns during that year. The second reason is that, as stated earlier; since 1991 the April Labour force surveys used in this study have been coded using JIC 1987 but the pre-1991 surveys have been coded using JIC 1968. There is a question as to whether the recently changes coding system might have affected how the data was recorded and therefore exaggerated the extent of the moves into Jamaican manufacturing sector during that year. In addressing these issues the concordance linking the JIC 1968 and JIC 1987 were checked and re-checked to guarantee its accuracy. Secondly, sectoral sample proportions were checked across samples in order to identify, if present, any time inconsistencies in the data across both series. This investigation confirmed that there were no apparent inconsistencies in the sample proportions across classifications systems over the two periods. The reader can see some evidence of this in *Figure 3.6*. From that figure there does not appear to be discernable discrepancy in the sample proportions across categories. Additionally the series appears to be consistent for the years immediately post 1991-the year in which the industrial classification system was changed and further, appears to be consistent though evolving with a noticeably greater variation. For completeness, however, sectoral transition probabilities were estimated for each year and in particular for 1994-1995 in order to identify the sectors of origin of the workers who entered the manufacturing sector during that year and results presented in *Section 3.10*; which follows. Moreover estimation results are provided for the sub-periods 1983-1994 and 1995-2006 in order to adduce whether there were differences in the explaining the manufacturing sector mobility over the two periods.

Shortly, thereafter inter-sectoral manufacturing exits also increase -reaching a level of 4% by 1997. Towards the end of the sample period however, the proportion of exits from the manufacturing sector to other one-digit sectors showed a marginal decline whereas the differential between inter-sectoral moves into manufacturing and moves of the same type out of the sector was more or less maintained. Intra- sectoral mobility remained relatively stable throughout the sample period though it is clear that as the size of the manufacturing sector declined, the extent of the intra-sectoral mobility also waned.

In *Figure 3.10* below, we super-impose an index of the manufacturing sector wage onto, the previously displayed, *Figure 2.7* which shows the evolution of key Jamaican labour market indices such as the real wage rate, unit labour cost and unit labour productivity.

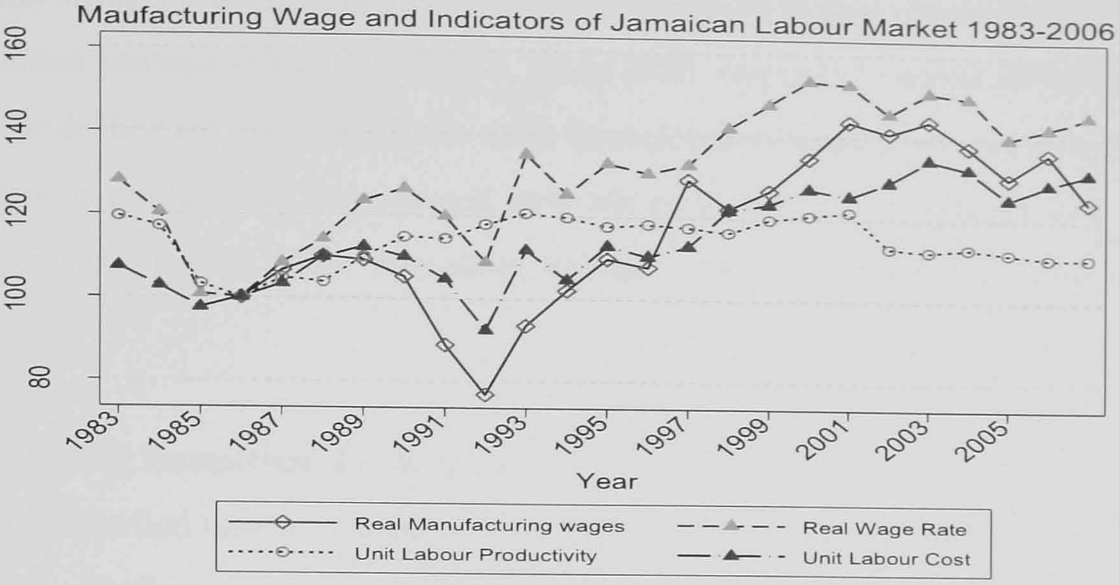

Figure 3.10 Manufacturing Wages with Jamaican Labour Market Indicators 1983-2006
Source: STATIN

The *real manufacturing wage* index shown in the *Figure* is derived from data taken from the Large Establishments Survey-a publication of the Statistical Institute of Jamaica (STATIN)[52]. From the figure, it is clear that both the economy-wide wage and manufacturing sector wages tend to move together over time. The real wage rate, real manufacturing wage, unit labour cost and labour productivity all begin to increase in the mid-1980s. However, real economy-wide wages rose at a faster pace than manufacturing wages over this period until the onset of the inflationary episode at the turn of the 1990's. This inflationary period at the turn of the 1990's disproportionately hurt manufacturing workers in real terms and caused a deterioration in the real-wage index in general. Only subsequently in 1997 did the manufacturing wage level recover to its 1990 level. In contrast, economy-wide wages appeared to have more than compensated for this decline from as early as 1993. After the recovery however manufacturing workers enjoyed relatively higher real wages economy-wide index. One interpretation of these stylistic facts when viewed against the background of the trends in gross worker flows between 1983-2006 in Jamaica, is that higher manufacturing wages may have led to significant worker outflows from that sector into alternative employment or disemployment. In general, over the period the manufacturing sector became a relatively higher wage sector compared to the beginning of the review period. In a sense, low wage

[52] This proxy was formerly adapted by Alleyne (2001), Gafar (1986) and King (2001) we simply extend these series to cover the sample period of interest. The full name of the statistical publication from which the data were derived is named Quarterly Survey of Employment and Earnings in Large Establishments.

manufacturing production in Jamaica was replaced by higher wage manufacturing production starting in the mid-1990's. From 2003 onwards however all real wages begin to decline slowly. Despite the wide fluctuations in wage levels over the period, unit labour productivity experienced only marginal decline towards the end of the entire review period, after remaining virtually constant throughout most of the 1990's.

3.10 Sectoral Transitions in Jamaica

Having identified unemployment and inter-sectoral adjustment as the main types of mobility affecting Jamaican manufacturing over the sample period it may be useful to identify the main sectors from which workers moved into manufacturing and alternatively, the sectors which attracted workers away from manufacturing. This type of analysis is important for two reasons. Firstly, for the academic purpose of providing a conclusive, historical account of the significant sectoral transformation which has occurred in Jamaica over the review period. Secondly, it may be the case that there are key linkages between certain sectors which could help to explain the labour market adjustment and to inform policy going forward. The extent of the similarity between the skill set requirements between sector pairs, the existence of compensatory wage differentials, geographical considerations as well as a host of other reasons may, in fact, be the proximate causes driving the worker moves. Although a causal analysis is not undertaken here, transition probability matrices are estimated, for the first time for Jamaica, in search of clues regarding the sectoral linkages driving the Jamaican labour market adjustment over the period. Before we review the transition tables however, it is useful to describe how these transition probabilities are calculated. We could write the simple formula used to calculate the transition probabilities concisely as;

$$\Pr ob_{ij} = \frac{\sum_{i} mover_{ijt}}{\sum_{i} Wor\ker_{ijt-1}} \qquad 3.17$$

Where $\Pr ob_{ij}$ is the probability of exiting row sector i to column sector j between year t-1 and t, and $mover_{ijt}$ is the respondent who reported exiting sector i to sector j

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.955		0.003		0.003	0.004	0.002	0.000	0.004	0.017	0.013	2758
Mining	0.034	0.816			0.011				0.011	0.069	0.057	87
Manufacturing	0.010		0.828		0.003	0.009	0.002	0.001	0.009	0.116	0.023	1050
Electricity	0.032			0.903						0.032	0.032	31
Construction	0.036		0.007		0.717	0.018	0.002	0.000	0.016	0.179	0.027	448
Wholesale	0.005		0.008		0.004	0.853	0.001	0.001	0.009	0.087	0.034	1393
Transport	0.007		0.007		0.003	0.003	0.896	0.003		0.066	0.014	288
Finance			0.004			0.007		0.937		0.030	0.022	271
Community	0.012		0.003		0.002	0.009	0.001	0.004	0.809	0.118	0.041	2386
NOT-Employed	0.030	0.001	0.017		0.011	0.027	0.004	0.003	0.036	0.871		8266

Table 3.6a Transition Probabilities between 1983 and 1984 at the JSIC-one-digit level

Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.956		0.002		0.002	0.002	0.001		0.003	0.016	0.018	3296
Mining		0.898	0.020							0.061	0.020	49
Manufacturing	0.007	0.001	0.840		0.004	0.005	0.001	0.001	0.007	0.115	0.020	1219
Electricity				0.872						0.128		39
Construction	0.037		0.008		0.676	0.008		0.003		0.251	0.017	355
Wholesale	0.006		0.003		0.001	0.858	0.001	0.001	0.007	0.093	0.030	1611
Transport	0.017		0.013		0.009	0.009	0.889		0.004	0.051	0.009	235
Finance			0.004			0.007		0.938	0.007	0.036	0.007	275
Community	0.007		0.003		0.002	0.008	0.001	0.001	0.840	0.101	0.037	2238
NOT-Employed	0.016		0.016		0.005	0.015	0.001	0.003	0.022	0.922		8230

Table 3.6b Transition Probabilities between 1986 and 1987 at the JSIC-one-digit level

Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.957		0.002		0.002	0.001	0.001		0.002	0.013	0.023	3189
Mining		0.879	0.015		0.015		0.030		0.015	0.015	0.030	66
Manufacturing	0.003	0.001	0.843		0.007	0.010	0.001	0.001	0.010	0.092	0.033	1569
Electricity				0.759						0.241		29
Construction	0.013		0.004		0.810	0.004			0.004	0.142	0.021	675
Wholesale	0.006		0.004		0.003	0.860	0.002	0.003	0.005	0.082	0.035	1727
Transport	0.016		0.006	0.003	0.006	0.003	0.881			0.066	0.019	318
Finance			0.003			0.007	0.000	0.927	0.010	0.026	0.026	303
Community	0.008		0.002		0.001	0.006	0.001	0.001	0.876	0.066	0.038	2425
NOT-Employed	0.015	0.001	0.022		0.011	0.016	0.002	0.002	0.023	0.909		7891

Table 3.6c Transition Probabilities between 1989 and 1990 at the JSIC-one-digit level

Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.965	0.001			0.001	0.002			0.002	0.009	0.019	3173
Mining		0.924			0.013		0.013	0.013			0.038	79
Manufacturing	0.004	0.001	0.895		0.003	0.004		0.001	0.006	0.050	0.038	1120
Electricity				0.941				0.020		0.020	0.020	51
Construction	0.012		0.001		0.881	0.003		0.001	0.001	0.077	0.022	674
Wholesale	0.002		0.003		0.002	0.901	0.001	0.002	0.007	0.040	0.043	1743
Transport	0.012		0.002		0.002	0.002	0.931	0.002	0.005	0.019	0.024	421
Finance	0.002		0.004			0.002		0.921	0.007	0.040	0.024	455
Community	0.005		0.002		0.001	0.002		0.002	0.911	0.033	0.044	2528
NOT-Employed	0.011		0.011	0.001	0.006	0.012	0.002	0.003	0.016	0.938		7009

Table 3.6d Transition Probabilities between 1992 and 1993 at the JSIC-one-digit level

Source: Jamaica Labour Force Survey (STATIN)

in time interval $[t-1,t]$. $Worker_{ijt-1}$ represents the worker employed within row sector *i*, in period *t-1*[53]who is a potential mover to any column sector *j*. Note that on the basis of this definition, the probabilities presented are therefore mere estimates of *ex-post,* empirical probabilities of moving between one-digit sectors.

Tables 3.6a to *3.6j* depict transition probabilities calculated for selected, consecutive years of the Jamaican data. The rows of the table represent JIC 1987 one-digit sectors or origin. On the other hand, the columns of the tables represent destination sectors[54]. The reader should note that transition probabilities for the unemployment and *out-of-the* labour force categories have also been included in the tables. The row in each table labelled "NOT-Employed" contains probabilities of escape from the composite of the unemployment and *out-of-the* labour force category. The aggregation of these labour market categories to form a single row is necessary because the Jamaican *QLFS* does not provide enough information to distinguish which of the two states is the origin for individuals exiting disemployment into sectoral employment. In contrast, worker exits into unemployment (Unemp) as opposed to exits into the out-of-the labour force (Out) category are easily distinguishable within the Jamaican QLFS data and, as such, are presented separately in the penultimate two columns of each table. The probabilities in row sector *i* are estimated exit probabilities into column sector $j \neq i$ for the survey years in question. On the other hand, probabilities contained in row sectors $i = j$ (the leading diagonal of each table) provide a sample estimate of the probability of remaining in the sector of origin across consecutive years. Empty cells represent zero sample transition probabilities. Sample sectoral totals are presented in the *rightmost* column.

.

[53] The underlying simplifying assumption used in the calculation of these probabilities is that workers who report having moved sector or labour market state must have been in the initial stock of workers in time period t-1. In reality this does not have to be the case since we know that even in equilibrium there is churning in the labour market involving workers in unemployment and out-of the labour force during the interval $[t-1,t]$.

[54] A listing of JSIC one- digit sectors is presented in *Table A8* of the Appendix.

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.960		0.001		0.002	0.003			0.002	0.005	0.026	2405
Mining	0.015	0.912								0.029	0.044	68
Manufacturing	0.002		0.866		0.002	0.010	0.003	0.002	0.012	0.056	0.048	945
Electricity			0.020	0.860		0.020				0.080	0.020	50
Construction	0.007		0.003	0.000	0.864	0.012	0.001	0.004	0.004	0.082	0.023	740
Wholesale	0.003		0.004	0.000	0.002	0.887	0.001	0.001	0.010	0.046	0.045	2001
Transport		0.002		0.002	0.005	0.009	0.905	0.002	0.009	0.029	0.036	441
Finance	0.002		0.002			0.008	0.004	0.899	0.017	0.031	0.037	483
Community			0.004		0.001	0.009	0.001	0.002	0.901	0.037	0.045	2549
NOT-Employed	0.009	0.001	0.013		0.010	0.019	0.004	0.005	0.024	0.915		

Table 3.6e Transition Probabilities between 1994 and 1995 at the JSIC-one-digit level
Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.955				0.003	0.002	0.003		0.003	0.009	0.027	2376
Mining		0.838				0.044			0.015	0.103	0.000	68
Manufacturing			0.905	0.001	0.002	0.010	0.004	0.004	0.005	0.031	0.039	1086
Electricity				0.938				0.031		0.031	0.000	64
Construction	0.007		0.003		0.885	0.005	0.003	0.003	0.005	0.061	0.029	755
Wholesale	0.001	0.001	0.002		0.003	0.891	0.001	0.001	0.007	0.040	0.052	2107
Transport	0.004		0.002		0.004	0.004	0.946			0.024	0.015	464
Finance		0.002	0.002		0.002	0.006	0.004	0.915	0.011	0.026	0.033	539
Community	0.002		0.002		0.001	0.006	0.002	0.003	0.908	0.033	0.043	2571
NOT-Employed	0.009		0.011	0.001	0.009	0.022	0.003	0.004	0.026	0.915		5956

Table 3.6f Transition Probabilities between 1995 and 1996 at the JSIC-one-digit level
Source: Jamaica Labour Force Survey (STATIN)

Examining *Table 3.6a* to *Table 3.6d* various general patterns from the data emerge. These four (4) tables, together depict transition probabilities representative of the period of the 1980's through to the early 1990's. Over this period, it is clear that the highest transition probabilities can be found in the leading diagonal. This characteristic is a persistent feature of the Jamaican QLFS data and implies that Jamaican workers are, as expected, far more likely to remain in their sectors of origin than to change sectors. Over the period, the agriculture and financial sectors tend to have the highest retention rates. On the other hand, the construction sector, consistently exhibits relatively low retention rates. In general, individuals within unemployment or out-of-the labour force are unlikely to exit this labour market state as can be evidenced by high retention rates in the bottom right of all tables. Notably, electricity, mining and finance sectors exhibit limited or no sectoral linkages with other one-digit sectors across the years examined-as measured by the exit rates or entry rates. Furthermore, there is some evidence that the ranking of sectors by order of magnitude of the escape probabilities from the "Not-Employed" categories into employment varies over time. However, these probabilities are generally low indicating the degree of difficulty involved in transitioning from disemployment into employment in Jamaica. Key sectors absorbing individuals, who were out of a job, over the period, were the agriculture, manufacturing, wholesale and the community sector. Throughout the 1980s, manufacturing workers exit into employment almost evenly across all sectors except for the electricity and mining and sector. This implies that adjustment costs between the manufacturing and the electricity or mining sectors were relatively very high.

Tables 3.6d, 3.6e and *3.6f* and *3.6g* provide a synopsis of the nature of the labour market adjustment in Jamaica during the 1990's. Firstly, from *Table 3.6d* we observe uniformly high probabilities in the leading diagonal; implying that mobility was again relatively low during this period- even for traditionally high exit sectors such as construction. The tables also reveal that manufacturing workers exited that sector, mainly into unemployment and out-of-the labour force as was the case during the 1980's. Looking closely at the worker job separations it becomes clear that throughout the earlier part of the decade of the 1990's, however, manufacturing worker outflows into unemployment no longer strongly dominate worker outflows into joblessness, contrasting the observations for the 1980's. This suggests that during the 1990's a relatively greater proportion of manufacturing workers exited that sector into inactivity rather than into unemployment. However, towards the end of the 1990's the previous status quo was restored. At the same time, during this period, manufacturing sector workers were more likely to exit to take up alternative employments in the wholesale and community services sector. Coincidentally, both these sectors were, marginally, the chief absorbers of labour out of the "Not-Employed" category throughout the entire decade of the 1990's. This can be observed is obvious from the consistently higher probabilities in the bottom row of the transition probability tables for that period.

Another important descriptor of the 1990's is that the probability of remaining in the "NOT-employed" category was relatively high throughout this period. In the 1992-1993 period a probability of 93.8% was registered, which is the highest such probability registered up to that period in the tables. After a slight improvement to the middle of the decade the probability of remaining without a job increased to its highest levels toward the end of the sample registering a high as a 95.2% probability of remaining within the ranks of the unemployed. This highlights the fact the unemployment problem in the 1990's as measured by *ex-post* estimates of the probability of escape represents a deterioration over the situation in the 1980's. Closely related to this development, is the fact that the probability of obtaining manufacturing employment from joblessness within Jamaican manufacturing was also relatively low compared to the magnitudes of the probabilities realized for the decade of the 1980's. Whereas, in the 1980's the manufacturing sector would consistently absorb between 1.6% to 2.5% of the "NOT-employed" workers on an annual basis, the reader can confirm that the comparable statistical estimates for the 1990's were at most 1.1%. Moreover, further inspection reveals that exit probabilities into unemployment and out-of-the labour force were, in general, higher in the 1990's. It is also clear from the tables that, in general, the wholesale, transport, finance and community services sectors were the key absorbers of inter-sectoral exits throughout the period. All these sectors benefited from the inter-sectoral exits from almost all other one-digit sectors, including manufacturing. During the 1990's

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.936	0.001	0.001		0.003	0.001			0.004	0.014	0.040	3349
Mining		0.831	0.026							0.013	0.130	77
Manufacturing	0.003		0.764	0.001	0.001	0.029	0.009		0.002	0.104	0.087	1273
Electricity				0.927						0.015	0.058	137
Construction	0.006		0.002		0.832	0.002	0.009	0.001	0.005	0.111	0.033	1236
Wholesale	0.005		0.001		0.006	0.794	0.003	0.003	0.006	0.096	0.087	3043
Transport	0.007		0.001		0.005	0.001	0.878	0.001	0.002	0.061	0.042	802
Finance			0.004			0.007	0.004	0.790	0.008	0.124	0.063	727
Community	0.002		0.002		0.001	0.007	0.001	0.003	0.862	0.063	0.060	3895
NOT-Employed	0.005		0.004		0.004	0.014	0.004	0.001	0.015	0.952		13708

Table 3.6g Transition Probabilities between 1998 and 1999 at the JSIC-one-digit level
Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.944	0.001			0.003	0.002	0.002		0.004	0.013	0.031	3006
Mining		0.879									0.121	66
Manufacturing			0.867	0.000	0.003	0.004	0.007			0.063	0.057	1036
Electricity				0.969						0.031	0.000	97
Construction	0.004			0.001	0.846	0.004	0.004		0.004	0.113	0.024	1181
Wholesale			0.005		0.001	0.822	0.001	0.002	0.012	0.086	0.071	2785
Transport	0.005		0.004		0.001	0.028	0.852	0.000	0.010	0.075	0.026	832
Finance					0.006	0.006	0.003	0.904	0.005	0.045	0.029	616
Community	0.002		0.001		0.001	0.008	0.001	0.001	0.877	0.056	0.054	3614
NOT-Employed	0.004		0.004		0.006	0.017	0.002	0.002	0.015	0.949		12913

Table 3.6hTransition Probabilities between 2000 and 2001 at the JSIC-one-digit level
Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.977				0.001	0.001	0.001		0.001	0.008	0.011	3503
Mining	0.010	0.933			0.010					0.019	0.029	104
Manufacturing	0.001		0.918		0.002	0.006	0.004		0.003	0.036	0.029	890
Electricity				0.914			0.000		0.011	0.022	0.054	93
Construction	0.003		0.002		0.868	0.009	0.002	0.001	0.005	0.087	0.024	1276
Wholesale	0.001		0.001		0.003	0.897	0.002	0.001	0.004	0.049	0.042	3037
Transport	0.001		0.002		0.005	0.008	0.912	0.002	0.004	0.033	0.033	854
Finance			0.001			0.007	0.001	0.936		0.030	0.026	745
Community	0.001		0.001		0.001	0.006		0.001	0.924	0.032	0.034	3741
NOT-Employed	0.003		0.002		0.004	0.011	0.002	0.002	0.007	0.969		14980

Table 3.6i Transition Probabilities between 2003 and 2004 at the JSIC-one-digit level

Source: Jamaica Labour Force Survey (STATIN)

Sector	Agri.	Min.	Manu.	Elec.	Const.	Whole.	Transp.	Fin.	Comm.	Unemp.	Out	Total
Agriculture	0.942		0.003		0.002	0.005	0.002		0.003	0.005	0.037	1662
Mining		0.942					0.019			0.038		52
Manufacturing	0.005	0.002	0.867		0.007	0.007	0.009		0.011	0.035	0.057	564
Electricity				0.917			0.021			0.042	0.021	48
Construction	0.009	0.001	0.004	0.001	0.860	0.013	0.001	0.001	0.010	0.065	0.034	774
Wholesale	0.001	0.001	0.001		0.005	0.865	0.003	0.001	0.012	0.045	0.063	2028
Transport	0.008	0.002			0.002	0.010	0.923		0.005	0.023	0.027	599
Finance			0.002		0.002	0.010	0.004	0.912	0.012	0.027	0.031	487
Community	0.004		0.002		0.003	0.009		0.002	0.896	0.034	0.050	2385
NOT-Employed	0.006		0.004		0.006	0.022	0.005	0.002	0.019	0.935		6927

Table 3.6j Transition Probabilities between 2005 and 2006 at the JSIC-one-digit level

Source: Jamaica Labour Force Survey (STATIN)

expanding sectors such as the transport sector, grew on the basis of workers exiting the manufacturing and construction sectors.

The inclusion of T*able 3.6e* showing the transition probabilities between 1994 and 1994 helps us to understand the spike in the "into manufacturing" series in *Figure 3.9* which shows a marked increase in inter-sectoral worker flows into the manufacturing sector during that year. Examination of the manufacturing column from *Table 3.4e* reveals that during the period 1994-1995 there were increased inter-sectoral flows from the expanding community services and wholesale sector into manufacturing employment during that year. Moreover, the year 1994-1995 represents the only year throughout the sample period where the QLFS data reveals that workers from the electricity sector, exited that sector into manufacturing employment. These extraordinary inflows coupled with the low uptake of unemployed workers into that sector and relatively high exit appear to have combined to cause the increase in the "into manufacturing" series observed in *Figure 3.9.*

From *Figures 3.6h, 3.6i* and *3.6j* we notice a continuation of labour market trends of the 1990's. Overall, probabilities of remaining within the "NOT-employed" category remain very high- staying, on average, higher than 90%. This suggests that poor job-finding conditions persist in Jamaica for the remainder of the sample period. Notwithstanding, by the last decade of our sample, the wholesale and community services sectors remain the sectors with the highest probabilities of escape for workers in the "NOT-employed" category. On the other hand, the sectors offering the poorest prospects for workers escaping unemployment and out of the labour force are the mining and electricity sectors. We refer to these sectors as *"enclave sectors"* for the reason that in addition to the fact that these two sectors exhibit very low or zero inter-sectoral transition probabilities, they also display very low entry probabilities for individuals escaping disemployment.

The decade of the 2000's represents the decade, of all the decades covered, in which the probability for escaping "NOT-Employed" into the manufacturing sector was the lowest. In fact, whereas in prior decades, on average, around 1 in every 100 workers in the "NOT-employed" category could reasonably expect to find manufacturing sector jobs in this period the ratio deteriorates to approximately *3* in 1000workers after year 2000. In fact, by 2006 the manufacturing sector had moved from being one of the most likely sectors in which non-employed workers would find jobs (in the 1980's) to one of the most unlikely sectors within which to find employment. Examining the probabilities of exit into unemployment or out-of-the labour force, confirms that the relatively high rate of exit from manufacturing sector employment continues toward the end of the review period.

In sum therefore, we can conclude from *Tables 3.6a to 3.6j* that there exists a great deal of interconnectedness in the labour market mobility between sectors and labour market states. Examining the worker transition probabilities, the picture of the Jamaican labour market that emerges is entirely consistent with the worker/job flow paradigm- as one in a constant state of flux with worker flows of different magnitudes across sectors and between labour market states. These flows appear to fluctuate by order of magnitude, over time. Throughout the sample period, the electricity and mining sectors exchange very limited worker flows with other one-digit sectors, unemployment and the out of the labour force category. One possible explanation for this phenomenon could be the fact that these sectors use skills sets which are not general and hence not easily transferrable to other one-digit sectors, implying higher adjustment costs.

What is clear from examining the tables is that the unemployment and out-of-the labour force adjustment flows dominate all other types of worker flows in the Jamaican labour market in general and the manufacturing sector worker flows in particular. This implies that explaining the unemployment adjustment is key to understanding the dynamics of labour market mobility in Jamaica. The adjustment flows, and in particular the flows out of employment were particularly high towards the beginning and end of the sample. The transition matrices confirm the fact that the service sectors, particularly the community services, wholesale, finance and transport sectors have benefited from the inter-sectoral mobility over the period at the expense of tradeable sectors such as manufacturing. Worker flows into Jamaican service sectors, however, were by no means unidirectional.

3.11 Sample Means

Table 3.7 displays descriptive statistics based on the sample of manufacturing workers between the ages 14 and 65 years[55] who: have not changed jobs *(stayers)*, changed jobs within their manufacturing industry *(intra-industry)*, or between industries *(inter-industry)* or who have moved to other JIC one digit sectors *(inter-sectoral)* or exited employment altogether *(out-of-job)*. To be clear, the sample omits those individuals whose labour market record reveals have originated outside of the manufacturing sector. Therefore, the sample proportions in *Table 3.5* are based on individuals who report either being employed in the manufacturing sector or formerly employed in the manufacturing sector within the last 12 months; irrespective of their labour market status at the survey date.

The upper rows of the table show the sample proportions for respondents within the sample who have attained the highest level of educational attainment. *Table 3.7* reveals that a mere 1.8% of the respondents in the sample have attained *higher* education as their highest qualification. A respondent is classified within the *higher* educational attainment category if he/she has achieved a degree and/or diploma or equivalent from a recognized, tertiary institution. A further 1.6% of the sample have attained *further* qualifications as the highest level of qualification, where *further* qualifications denotes having received at least a passing grade in at least three (3) Caribbean Examination Council (CXC) or General Certificate of Education (GCE) ordinary level examinations and/or GCE advanced ("A") level subjects. On the other hand, individuals in the *other* category are those persons who have passed less than three CXC or GCE subjects or similar local qualifying examinations[56]. Approximately 12.46% of the individuals within the sample have *other* qualifications. Of significance, however, is that- the *"none"* category; which includes those individuals which have no educational qualifications whatsoever- dominates the sample. In fact, we find that 78.6% of Jamaican manufacturing workers are unqualified, having received no educational certification[57]. This starkly

[55] In the Jamaican Quarterly Labour Force Survey data is gathered for individuals aged 14 years and above. Note further that, in Jamaica, the retirement age is 60 for women and 65 for men. These two facts guide our selection of the appropriate age range for our analysis.
[56] We detail these exams in the appendix in the table containing information on our variable definitions and construction.
[57] Percentages do not sum to 100% because of "not stated" option in Jamaican QLFS.

Key Char.	Total (1)	Stayers (2)	Movers (3)	Intra-Industry Mover (4)	Inter-Industry Mover (5)	Intra-Sectoral Mover (6)	Inter-Sectoral Movers (out) (7)	Out-of-Job Movers (out) (8)
Higher	0.0178	0.02	0.0062	0	0.0238	0.0082	0.0131	0.0044
Further	0.016	0.0156	0.0184	0.0063	0.0357	0.0165	0.0218	0.018
Other	0.1246	0.1275	0.1095	0.1006	0.1905	0.1317	0.1194	0.1054
None	0.7863	0.7815	0.812	0.8428	0.6905	0.7901	0.8006	08165
Skilled	0.021	0.0232	0.0093	0.0126	0.0595	0.0288	0.0234	0.0044
Professional	0.0555	0.0568	0.0487	0.0943	0.0595	0.0823	0.0626	0.0426
Clerical	0.0686	0.0665	0.0792	0.0566	0.0833	0.0658	0.1121	0.0726
Craft	0.4066	0.4636	0.3361	0.3836	0.2976	0.354	0.1412	0.3802
Personal	0.0557	0.0227	0.0508	0	0.0238	0.0082	0.1863	0.0225
Plant Operator	0.1274	0.1125	0.02061	0.1698	0.1190	0.1523	0.0393	0.2497
Manual	0.0836	0.0664	0.1745	0.1069	0.1786	0.1317	0.1674	0.1797
Urban	0.7254	0.7194	0.7574	0.7925	0.8571	0.8148	0.6870	0.7691
Observations	24237	20375	3862	159	84	243	687	2932

Table 3.7 Key Sample Means for Manufacturing Sector Adjustment

Source: Jamaica Labour Force Survey

contrasts the comparable proportion for the UK which Elliot and Lindley (2006b) have estimated (for the period 2000-2005) at 20%. Moreover, for every level of qualification above the "*none*" category, the UK data reveals significantly higher levels of educational preparation for workers attached to manufacturing.

The table also hints to differences in educational attainment between intra- and inter industry movers. Inter-industry movers are uniformly more educationally qualified than intra-industry movers with significant differences appearing in the *highest, other* and *none* category. To see this, note that no intra-industry movers were in the "*higher*" educational attainment category. Also, while 81.2% of inter-industry movers had no qualifications whatsoever, the corresponding percentage for intra-industry movers was 84.28%. Individuals in the "out-of-job" mover categories were also less educated than inter-industry movers as can be evidenced by the high proportion of individuals with no educational qualifications within this category. This is suggestive that workers without educational qualifications are more likely to exit the manufacturing sector than those who are more highly qualified. Jamaican manufacturing workers with relatively low levels of educational attainment also appear to dominate the inter-sectoral mover category. It is possible that workers without educational qualifications are more likely to seek low-level jobs in other industries due to the low opportunity costs they incur when changing sectors. It is also a possibility that, manufacturing firms may, more likely lay-off, relatively less-educated worker types at the margin when adjusting to economic shocks.

Examining the sample proportions relating to the occupational skills of the manufacturing workers, we observe that a mere 2.1% of individuals in the sample are managers. In order to give the reader an idea of how this compares to a developed country setting, we can compare the Jamaican results with estimates from the UK labour force survey provided in Elliot and Lindley's (2006b) study- who find 15% proportion of managers in their sample. *Professional* and *Personal* worker types account for approximately the same share of the sample-5.6% each. Manual workers account for 8% of our sample whereas clerical workers are in the minority. By far, the most significant occupational type of manufacturing workers in Jamaica is the *craft/trade* category. This worker type accounts for 41% of the sample. In this regard, there is a significant degree of similarity with the UK data. Elliot and Lindley

(2006b) identify craft/trade workers and plant operators as being the most common occupational types in the UK, with both these categories together accounting for over 50% of their similarly constructed sample, with sample shares being almost evenly split between the two categories. In Jamaica the, joint proportion of workers in the sample who are craft/trade workers and plant operators is 53%. However, in the Jamaican case, the *plant operator* category, though a significant manufacturing occupational grouping, accounts for only 12.74% of the sample. This stylized feature of the data is indicative of the difference in the type of manufacturing carried out in both countries, with UK manufacturing being more automated and industrialized; contrasting sharply the more labour intensive manufacturing in Jamaica.

Results concerning the sample proportions for the occupational skills variables are more complicated. For example, although there are significantly greater proportions of *skilled managers, clerical*, *personal* and *manual* workers who move between two-digit industries, relatively greater proportions of *professional*, *craft workers* and *plant-operators* make intra- industry moves. These results reinforce our hypothesis that there may be a relationship between skill-specificity and the type of mobility observed. A relatively greater proportion of the industry-specific skill sets such as the professional, craft and plant workers tend to move intra-industry; while the relatively more general skill sets seem to move more freely across 2-digit industries. The high turnover of the *manual* workers across the mobility categories is not surprising because of the generic nature of these skills and the relative abundance of this particular occupational worker category.

The most significant differences between intra- and inter-sectoral movers can be observed in their occupational characteristics. There are far more *personal* and *clerical* workers who move *inter*-sectorally than those who move *intra*-sectorally. At the same time, there are far less craft and *plant-operators* that move *inter*-sectorally than those who move *intra*-sectorally; confirming that the latter pair of occupational skills are highly utilized in the manufacturing sector in Jamaica. Also, a greater proportion of *skilled* and *professional* workers tend to move *intra*-sectorally. Sector-specific skill sets such as *craft* and *plant- operators* represent the most significant worker types comprising worker outflows from manufacturing employment over the sample period. The fact that sector-specific skills are exiting the sector in significant magnitude is highly suggestive, that in the Jamaican labour market adjustment, sector specific human capital may well have been destroyed. The coincidence of *out-of-job* movers, possessing generally low levels of educational attainment as well as sector-specific skills makes it very likely that human capital was destroyed in this adjustment; suggesting significant adjustment costs.

Throughout this thesis we will define *urban* area in the Jamaican context to include the capital of Jamaica- Kingston, and the neighbouring parishes of St. Andrew and St. Catherine. Also included in the set of urban parishes is St. James which is the second capital of Jamaica which contains the second-largest city called Montego Bay as its capital. We also include St. Ann because of its size and importance in commerce in Jamaica[58]. We see from the table that by choosing these five (5) out of the total of fourteen (14) parishes we have accounted for over 72.5% of all the manufacturing workers in the sample. *Table 3.7* shows that a greater proportion of rural workers make *inter*-industry rather than *intra*-industry moves. These two facts, taken together, suggest that locating in urban areas might, on the one hand, place the exiting manufacturing worker at an advantage in finding a new job within that same sector. On the other hand, urban workers appear more likely to exit manufacturing jobs into unemployment and out-of the labour force. So that, while there are benefits to locating in urban areas in terms of replacing the manufacturing job that is lost, this benefit is counterbalanced by the fact that a greater proportion of workers with this attribute will likely lose their jobs. Thus, a mere preliminary analysis of sample proportions of the worker flow data suggests nuances in the labour market behaviour of different groups of workers.

Table 3.8 reveals trade information for the JIC two-digit industries into which the Jamaican manufacturing workers are categorized. The table contains information on industrial imports, exports and IIT as measured by the Grubel-Lloyd index. The Grubel-Lloyd index is a popularly used measure of intra-industry trade which involves the simultaneous exchange of similar but differentiated goods (or services) of the same industry or broad product group. This measure of IIT can be written;

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[58] St. Ann is a noted parish for food manufacturing and processing activities (for export) and is also one of, if not, the most important tourist parishes in Jamaica.

Industry	1983-1988	1989-1994	1995-2000	2001-2006
Food				
Export :	2.123	7.593	16.813	21.932
Imports:	0.908	3.574	12.377	21.832
IIT:	0.619	0.544	0.674	0.6316
Text.				
Export:	0.2523	0.846	0.7706	0.9042
Imports:	0.3405	1.718	3.735	4.6354
IIT:	0.7068	0.6378	0.3157	0.297
Wood				
Export:	0.003	0.02308	0.1046	0.1812
Imports:	0.1005	0.60622	1.916	3.5852
IIT:	0.0658	0.072	0.1037	0.0917
Paper:				
Export:	0.0174	0.033	0.0702	0.1408
Imports:	0.1039	0.4179	1.391	3.9517
IIT:	0.3221	0.1405	0.0868	0.0688
Chem.:				
Export:	0.1315	1.0009	3.6162	4.1879
Imports:	0.4301	2.6212	6.4109	12.881
IIT:	0.469	0.4731	0.7234	0.5045
Petrol.:				
Export:	0.0568	0.0853	0.0975	2.3497
Imports:	0.7347	2.98	7.5972	25.108
IIT:	0.1386	0.0691	0.0267	0.1343
Rubber:				
Export:	0.02989	0.1429	0.1586	0.5108
Imports:	0.1486	0.8226	2.699	5.467
IIT:	0.3356	0.2862	0.1115	0.1699
Non-metal:				
Export:	0.0058	0.0387	0.0675	0.0563
Imports:	0.0628	0.2925	1.0308	2.6617
IIT:	0.1586	0.2271	0.1310	0.0434
Metal-excl.:				
Export:	0.0003	0.00	0.0163	0.00009
Imports:	0.0031	0.00	0.355	0.0041
IIT:	0.0302	0.00	0.01464	0.007
Metal:				
Export:	0.0019	0.009	0.01828	0.0169
Imports:	0.0218	0.1163	0.3382	0.6483
IIT:	0.1670	0.1537	0.1029	0.04214
Fab-Met.:				
Export:	0.0011	0.0028	0.0011	0.0161
Imports:	0.0159	0.0467	0.1383	0.2749
IIT:	0.146	0.1262	0.0148	0.074
Mach.:				
Export:	0.1015	0.2523	0.762	0.833
Imports:	0.5107	2.7608	9.6777	23.35
IIT:	0.3378	0.1789	0.1529	0.0687
Transp.:				
Export:	0.0579	0.312	0.312	0.4537
Imports:	0.4577	3.735	3.7351	12.439
IIT:	0.2022	0.1599	0.1599	0.07299

Table 3.8: Key Sample Means for Industrial Trade

Source: Author's calculations based on UN Comtrade Data

Notes: Imports and Exports reported in real Billions of Jamaican dollars (year 2000 prices)
IIT is the Grubel-Lloyd Index which measures intra-industry trade within the industry

$$IIT_i = \frac{[(X_i + M_i) - | X_i - M_i |]}{(X_i + M_i)} \times 100 \qquad 3.18$$

Where X_i and M_i represent imports and corresponding exports respectively for industry i, at a particular level of aggregation, valued at the same currency. The numerator of the formula measures the level of intra-industry trade which is; total industry trade less inter-industry (net) trade. It should be noted that $0 \leq IIT_i \leq 100$. The closer the index lies to 100 per cent, the higher the extent of intra-industry trade. On the other hand if the index lies close to zero then this implies that the degree of intra-industry trade is lower and thus the higher the magnitude of inter-industry trade. We present in the table the first IIT estimates for Jamaican manufacturing as far as we are aware. The table reveals that the major export industry in the Jamaican manufacturing sector in terms of real value of exports is, by far, the food, beverage and tobacco manufacturing industry. Other industries which contribute relatively significantly to the sectoral exports are, chemical and chemical products manufacturing, and the petroleum products manufacturing industry. On the other hand, leading import industries are the petroleum products manufacturing industry, food, beverages and tobacco manufacturing industry and the machinery and equipment manufacturing (except transport equipment) industry. By the end of the review period, each these industries would account for, an average of, over 20 billion Jamaican dollars of real imports. Other industries which contribute roughly half of this magnitude to manufacturing imports are chemical and chemical products manufacturing and the transport equipment manufacturing industries. In general then, Jamaica's chief manufacturing imports are machinery and machinery equipment, oil, food and drink and chemicals.

The analysis of sample means reported in *Table 3.8* reveals that Jamaica's manufacturing export performance over the review period has been dismal. Between 1983-2006, the only industry in which the small, island economy realized a real trade surplus over the period was in the food, beverages and tobacco manufacturing industry. However since 1983 and with the liberalization of the economy the surplus has been eroded. In other areas such as textile, wearing apparel and leather manufacturing and in every other industry the real trade deficit has been widening over the period.

The Grubel-Lloyd measure of IIT is, by far, highest in the food, beverages and tobacco as well as the textile, wearing apparel and leather manufacturing industries. Although in the latter industry the index has experienced a significant decline over the review period. Most of the trade in Jamaican manufacturing as a whole is therefore inter-industry in nature and the highest IIT measures are realized in the country's few, import- competing industries.

3.12 Estimation Results

Table 3.9 below provides multinomial logit estimates for intra-sectoral, inter-sectoral and non-employment movers. Column *1* of the table contains the coefficient estimates, standard errors and marginal effects for intra-sectoral movers. Column *2* contains corresponding regression estimates for inter-sectoral exits and the final column contains estimates for the sub-sample of workers exiting manufacturing jobs into disemployment. Included as regressors in the model are educational attainment, occupational and other socio-economic variables reflecting characteristics of Jamaican workers. In addition, we include variables measuring the trade exposure of the workers' industry of origin. The base category used in the estimation is; the unskilled, female, rural manufacturing worker who possesses no educational certifications and who did not change her job situation for the 12 months leading up to the survey (*stayer*). Year dummies were included in the model to control for annual shocks which could affect mobility probabilities in Jamaica.

Examining the estimation results from the intra-sectoral mover category, it is clear that very few of the variables in the model are statistically significant. In fact, an examination of the estimation results reveals that the variables: relative industry wage and the occupational skill level of the worker are the only statistically significant factors driving manufacturing sector, intra-sectoral mobility. Intuitively, workers employed in industries in which there is a higher relative wage are less likely to change jobs intra-sectorally than workers in low average wage industries. As regards occupational skills, craft workers are significantly less likely to change jobs within sector relative to the base category; a result that could be related to the skill-specificity of workers employed within this occupation. Clerical workers are

	Intra-sectoral (1)		Inter-sectoral (2)		Unemployment (3)	
Variable	**Coefficient (Standard error)**	**Marginal Effect**	**Coefficient (Standard Error)**	**Marginal Effect**	**Coefficient (Standard Error)**	**Marginal Effect**
Age	-0.0063(0.048)	0.0003	-0.0318(0.0253)	-0.0003	-0.1092(0.0118)***	-0.0098
Age-squared	-0.0004(0.0007)	0.0000	-0.0000(0.0004)	0.0000	0.0012(0.0002)***	0.0001
Male	-0.0076(0.1892)	0.0002	0.1321(0.1088)	0.0028	-0.3882(0.0548)***	-0.065
Urban	0.216(0.2056)	0.0012	-0.1666(0.1103)	-0.0034	0.2837(0.0608)***	0.0246
Higher	-0.6414(0.768)	-0.0029	-0.6736(0.4118)	-0.0077	-1.095(0.3277)***	-0.0654
Further	-0.2445(0.7412)	-0.0014	-0.3947(0.3812)	-0.0055	0.0204(0.2049)	-0.0026
Other	-0.0522(0.2812)	-0.0002	-0.4792(0.1654)***	-0.0065	-0.2103(0.0897)**	-0.0172
Skilled	0.3201(0.5059)	0.0031	0.1448(0.3209)	0.004	-1.196(0.3339)***	-0.0698
Professional	0.0487(0.3615)	0.0002	0.0448(0.2151)	0.0005	0.1382(0.1393)	0.0130
Clerical	-0.8682(0.4589)*	-0.0042	0.3983(0.1837)**	0.0071	0.3309(0.1178)***	0.0331
Craft	-0.9578(0.219)***	-0.0061	-1.7927(0.1485)***	-0.0308	0.1726(0.0718)**	0.0195
Personal	-0.7929(0.7258)	-0.004	1.8072(0.1501)***	0.0715	0.3507(0.1566)**	0.0267
Plant Oper.	-0.2816(0.2921)	-0.003	-2.112(0.3354)***	-0.0196	1.643(0.0872)***	0.2452
Imports	0.0085(0.0321)	0.00005	-0.0241(0.0151)	-0.0004	0.017(0.0078)**	0.0016
Exports	0.0048(0.017)	0.00003	-0.0067(0.0093)	-0.0001	0.0037(0.0045)	0.0003
Rel. Industry wage	-1.258(0.3244)***	-0.0079	-1.1575(0.1772)***	-0.0185	-0.4061(0.0888)***	-0.034
Rel. Unemploy. rate	0.1380(0.1189)	0.0008	0.0436(0.0647)	0.0005	0.1006(0.0335)***	0.0089
Constant	-1.5961(0.8595)		-0.7147(0.4962)		-0.0661(0.2402)	
N	15470					
Pseudo R -squared	0.099					

Table 3.9: Multinomial Logit Estimation Results-Trade Levels

Notes: Dependent variable= 1 if the worker has not moved.
Dependent variable=2 if the worker has moved job-job intra-sectorally
Dependent variable 3 if the worker has moved inter-sectorally from manufacturing to other one- digit sectors (continued on next page).

Dependent variable=4 if the worker has moved from manufacturing into non-employment (continued from preceding page)
-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 99 degrees of freedom) has a critical value of 1683.45

also less likely to change jobs intra-sectorally, however this variable is only significant at the 10% level. It is also noteworthy that the levels of imports and exports do not appear to have significant effects on intra- sectoral mobility but recall from *Figure 3.9* that intra-sectoral mobility in Jamaica over the period is both relatively small in magnitude in comparison to other worker flow categories but also remains fairly constant over the period.

For the inter-sectoral move category we find that the empirical model does better at explaining the worker moves as can be evidenced by the statistically significant marginal effects. Workers possessing sector-specific skills such as craft workers and plant-operators are less-likely to exit the manufacturing sector relative to the base category- a fact evidenced by the negative and statistically significant marginal effects on these variables. This intuitive result is somewhat similar to that obtained for the intra-sectoral mobility category. On the other hand, more general occupational skill types such as workers in the clerical and personal categories are, in a statistical sense, significantly more likely to exit their manufacturing jobs into alternative employment within other one-digit sectors. Furthermore, the estimation results show that workers located within relatively high-wage manufacturing industries are less likely to exit the manufacturing sector for employment in other one-digit sectors. There is also somewhat weaker evidence that the educational attainment of the worker plays a role in inter-sectoral labour market adjustment since "other" educated workers are significantly less likely to move sector when compared to educationally unqualified individuals in the base category; implying that more educated workers are less likely to move jobs across sectoral boundaries.

Column 3 contains the coefficients for the unemployment adjustment category. This column reveals statistically significant marginal effects of age and experience of workers at the 1% level. Older and more experienced workers are rewarded with a lower probability of exit into disemployment, however beyond a certain age/experience threshold; these workers are more likely to exit manufacturing employment as can be seen from the positive and statistically significant marginal effect on the age-squared variable. In addition, we find that the geographical location of the worker causally affects the probability of manufacturing job sector exit. *Urban* workers are therefore more likely to exit manufacturing employment in Jamaica, counterbalancing the lure of locating themselves in the urban centres where it is clear that most of the Jamaican manufacturing production is chiefly concentrated.

Less-educated workers are also more likely to experience job separations than those possessing educational qualifications. Furthermore, it would appear that the higher the educational qualifications achieved by the worker the more unlikely his/her chances of exiting into disemployment. In fact, by comparing the magnitudes of with *higher* educated workers representing three times larger marginal probability of remaining in manufacturing employment than "*other*" educated workers. Put differently, it is the uneducated manufacturing workers that are generally more likely to lose their jobs and to join the ranks of the disemployed.

By far, the occupational skill category with the highest marginal probability of employment exit is the *plant operator* category. Indeed, the marginal probability on this variable is 24.5%. The fact that this skill is specific to the manufacturing sector implies that it is highly likely that sector specific skill was destroyed in the labour market adjustment. By order of magnitude the next most likely worker types to exit manufacturing over the sample period are; *clerical personal* and *craft* workers. The fact that the marginal probabilities across all these categories are both positive and statistically significant indicate that a wide skill cross-section of workers-types were affected by the labour market adjustment in manufacturing over the period under review.

Moreover, the estimation results reveal that the level of imports is also a causal factor influencing manufacturing dislocation in Jamaica. The positive marginal effect on the import variable is statistically significant at the 5% error level. A straightforward interpretation of this result is that import competition has had an adverse effect on manufacturing employment over the sample period. On the other hand, a marginal effect of 0.16% implies a relatively nominal response. In particular, the result implies that an extra billion Jamaican dollars of manufacturing imports leads to an increase in the sectoral job-separations with a marginal probability of 0.16%. This relatively low marginal effect taken together with the relatively high marginal effects on the occupational variables and especially the plant operator category implies that the loss of manufacturing jobs in Jamaica were partly but not mostly destroyed by import competition *per se* but rather the eventual lack of demand for workers of particular skill types.

The familiar result on relative wages also holds for the unemployment adjustment subsample; relatively high-waged sectors have lower worker outflows into unemployment and into the out-of-the labour force category. The industry-level, relative unemployment rates are also statistically significant at the 1% level and indicates that higher the relative unemployment in the industry, the greater the probability that a worker within that industry will experience a job separation. The explanation for this result is similar to that for the coefficient on the indicator variable for the geographic location of the worker "*urban*". Higher industrial exit probabilities effectively moderate the greater search activity (unemployment rates) within Jamaican manufacturing industries.

Table 3.10 below shows odds ratios, standard errors and levels of significance from the multinomial logit estimated on the Jamaican manufacturing data. Odds ratios are helpful additions to the analysis of the Jamaican data since, *ceteris paribus*, they quantify the change in the relative risk ratios for a unit change in the independent variable. The results and statistical tests from the odds ratios presented in the table fully corroborate all the results from the multinomial logit model discussed above. An increase in the workers' 2 digit industry wage relative to the average manufacturing sector wage significantly reduces the relative risk of *staying* rather than making a intra-sectoral job move decreased by a factor of 0.28. It is also clear from *Table 3.10* that skills along with the relative industry wage play a statistically significant role in changing the relative risk of changing jobs inter-sectorally for workers in Jamaican manufacturing over the review period. Personal workers are 6 times more likely to change jobs inter-sectorally relative to the reference category while for clerical workers the relative risk of changing sectors relative to not changing jobs, relative to the referent category increases by a factor of 1.4. As observed before from the analysis of marginal effects from the multinomial logit, we observe contrasting results for craft and plant operator categories. In fact, for both

	Intra-sectoral (1)	Inter-sectoral (2)	Unemployment (3)
Variable	**Odds Ratio (Standard error)**	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**
Age	0.9936(0.04767)	0.9687(0.0245)	0.8965(0.0105)***
Age-squared	0.999(0.0007)	0.9999(0.0035)	1.0012(0.0002)***
Male	0.923(0.18779)	1.1411(0.1242)	0.6782(0.0372)***
Urban	1.241(0.2551)	0.8466(0.0934)	1.328(0.0807)***
Higher	0.5265(0.5265)	0.5098(0.5098)	0.3345(0.1096)***
Further	0.7831(0.7831)	0.6739(0.6739)	1.0206(0.2091)
Other	0.9492(0.9492)	0.6193(0.6193)	0.8104(0.0727)**
Skilled	1.3774(1.3774)	1.1558(1.1558)	0.3024(0.101)***
Professional	1.0499(1.04995)	1.0459(1.0459)	1.1482(0.16)
Clerical	0.4197(0.4197)*	1.4892(0.2735)**	1.3923(0.1641)***
Craft	0.3837(0.3837)***	0.1665(0.0247)***	1.1886(0.0854)**
Personal	0.4525(0.4525)	6.0935(0.9148)***	1.4199(0.2223)**
Plant Oper.	0.7545(0.7545)	0.121(0.0406)***	5.1702(0.451)***
Imports	1.009(0.0324)	0.9762(0.0147)	1.0172(0.008)**
Exports	1.005(1.0048)	0.9933(0.0092)	1.0037(0.0045)
Rel. Industry wage	0.2841(0.2841)***	0.3143(0.0557)***	0.666(0.0592)***
Rel. Unemploy. rate	1.1477(1.1478)	1.0445(0.0676)	1.106(0.037)***
N	15470		
Pseudo R -squared	0.099		

Table 3.10: Odds Ratios from Multinomial Logit -Trade Levels

-Standard errors are in parenthesis.

* Denotes statistical significance of the marginal effect at the 10% significance level.

**Denoted statistical significance of the marginal effect at the 5% significance level.

***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 99 degrees of freedom) has a critical value of 1683.45

these skill types the odds of remaining in the same job as compared to that of changing sectors decreases by factors of 0.17 and 0.12 respectively, relative to the base category.

Table 3.10 also shows odds ratios for the unemployment adjustment category. Examining the table, it becomes immediately clear that the highest odds are associated with the plant operator category. Plant operators appear to be more than 5 times more likely to separate from their jobs than manual workers. Similar, statistically significant effects are observed on the craft indicator variable, although the estimated odds ratios are comparatively of a lesser magnitude. The generality of the skills of clerical and personal workers, within a manufacturing sector context, mean that these types of manufacturing workers also face a relatively higher risk of worker-job separation compared to manual workers. Examination of the odds ratios also confirm the statistical significance and non-linear effects of age on mobility probabilities and that respondents from urban areas, who have received higher education, or who were employed in relatively higher skilled occupations, in relatively high wage industries faced a reduced relative risk of mobility into unemployment of the "out-of-the-labour force" category.

3.13 Robustness Checks

To verify the robustness of the results, the model is re-estimated using alternative trade measures. The first alternative trade measure that is included within the model is the proxy of intra-industry trade (IIT) as measured by the Grubel-Lloyd Index. The results from the re-estimation are shown in *Table 3.11* below. Including IIT among the regressors allows for a direct test of the Smooth Adjustment Hypothesis (SAH) described earlier. This hypothesis suggested by various writers implies that the nature of trade shocks and therefore the implied factor adjustment required to accommodate the shock has implications for the nature of the labour market response that occurs under trade liberalization. Given that the magnitude and signs are similar for both models we specifically examine the coefficient and marginal effects on the newly introduced trade variable. Remarkably, we find that higher IIT increases the probability of intra-sectoral mobility; a result which is weakly consistent with the Smooth Adjustment Hypothesis since it implies that the factor requirements for the labour market adjustment in response to trade changes are found by reallocation of labour within the manufacturing sector itself whenever trade shocks are intra-industry in nature. Moreover, the coefficient and marginal probability estimates are highly statistically significant at the 1% level. The reader should note, however, that we regard this as broad evidence of the Smooth Adjustment Hypothesis since intra-sectoral mobility comprises two types of mobility categories- workers who have made either intra-industry or inter-industry moves over the sample period, at the JIC 2-digit level. Our multinomial logit model, however, does not distinguish between these two types of mobility due to limitations due to cell-size considerations.

	Intra-sectoral (1)		Inter-sectoral (2)		Unemployment (3)	
Variable	**Coefficient (Standard error)**	**Marginal Effect**	**Coefficient (Standard Error)**	**Marginal Effect**	**Coefficient (Standard Error)**	**Marginal Effect**
Age	-0.0084(0.048)	0.00002	-0.031(0.0253)	-0.0003	-0.1096(0.0118)***	-0.0099
Age-squared	-0.0004(0.0007)	0.0000	-0.00001(0.0004)	0.0000	0.0012(0.0002)***	0.0001
Male	0.1036(0.193)	0.0009	0.1162(0.1100)	0.0025	-0.3679(0.0558)***	-0.0347
Urban	0.2000(0.2056)	0.0011	-0.1547(0.1102)	-0.0032	0.2748(0.0608)***	0.024
Higher	-0.6764(0.7699)	0.0029	-0.6648(0.4116)	0.0076	-1.0816(0.3273)***	-0.0651
Further	-0.2720(0.7414)	-0.0015	-0.3606(0.3810)	-0.0051	0.0134(0.2044)	0.0019
Other	-0.816(0.2813)	-0.00034	-0.4708(0.1651)***	-0.0064	-0.2158(0.0898)**	-0.0177
Skilled	0.2956(0.5081)	0.0028	0.1382(0.3205)	0.0039	-1.1877(0.3337)***	-0.0698
Professional	-0.0008(0.3612)	-0.0001	0.0382(0.2154)	0.0039	0.1350(0.1392)	0.0128
Clerical	-0.8733(0.4588)*	-0.0041	0.3865(0.1833)*	0.0068	0.3322(0.1178)***	0.0334
Craft	-0.905(0.2192)***	0.0056	-1.7637(1484)***	0.0302	0.1442(0.0712)**	0.0168
Personal	-0.8225(0.7256)	-0.004	1.7885(0.1494)***	0.0697	0.3749(0.1561)**	0.0297
Plant Oper.	-0.3332(0.2919)	-0.0031	-2.1061(0.3361)***	-0.0196	1.606(0.0865)***	0.2382
IIT	0.8927(0.3422)***	0.0056	-0.2371(0.1921)	0.0045	0.2621(0.0994)***	0.0236
Rel. Industry wage	-1.0253(0.3261)***	-0.0062	-1.306(0.1821)***	-0.2112	-0.3192(0.0894)***	-0.0261
Rel. Unemploy. rate	0.1547(0.1219)	0.0009	0.063(0.0626)	0.0009	0.0895(0.0339)***	0.0079
Constant	-2.422(0.9204)		0.4798(0.5192)		0.2667(0.2572)	
N	15470					
Pseudo R -squared	0.098					

Table 3.11 Multinomial Logit Estimation Results-IIT

Notes: Dependent variable=1 if the worker has not moved.
Dependent variable=2 if the worker has moved job-job intra-sectorally
Dependent variable=3 if the worker has moved inter-sectorally from manufacturing to other one- digit sectors.
Dependent variable=4 if the worker has moved from manufacturing into non-employment-(continued on next page)

Standard errors are in parenthesis. (continued from preceding page)
* Denotes statistical significance of the marginal effects at the 10% significance level.
**Denoted statistical significance of the marginal effects at the 5% significance level.
***Denoted statistical significance of the marginal effects at the 1% significance level.
The χ^2 of the regression (with 90 degrees of freedom) has a critical value of 1672.25

Further evidence on the effect of IIT on intra-sectoral mobility within Jamaican manufacturing is provided in *Table 3.12*. This table contains the odds ratios for the model estimated with IIT included as the measure of trade. *Table 3.12* shows an odds ratio of 2.44 on the IIT variable which implies that increased IIT makes it more than twice more likely that a stayer will change jobs *within* the manufacturing sector sector. In fact, in terms of magnitude, the IIT variable included in the estimation becomes one of the key determinants leading to intra-sectoral turnover in Jamaican manufacturing. The odds ratios attached to other statistically significant variables such as the "craft" occupational skill category as well as the relative industrial wage category are all less than 1; implying that these factors have a negative effect on the probability of the Jamaican manufacturing worker making an intra-sectoral job moves, over the review period. The magnitudes of the odds ratios on the statistically significant non-trade variables are very similar to the results shown in *Table 3.10*; suggesting that the results are robust across econometric specifications.

From the results discussed so far therefore it would therefore appear to be the case that adjustment observed in Jamaica implies that worker reallocation precipitated by increased intra-industry manufacturing imports has significantly increased worker flows *within* the manufacturing sector itself. With this result one could reasonably infer that factor adjustment has been less costly since the factor requirement to complete the adjustment was found within the particular, firm, industry or sector-implying a less costly adjustment. On the other hand however, the positive and highly significant coefficient and marginal effects on the IIT variable for the unemployment and out-of-the labour force adjustment in *Table 3.12* suggests that, along with the increased probability of intra-sectoral mobility, increased IIT also increased the probability of worker-job separations in the Jamaican case. Therefore it would appear that although presumably less costly adjustment was occurring *via* worker mobility within the manufacturing sector in response to the trade shocks, on the other hand, some workers exited their manufacturing sector jobs into unemployment and the out-of-the labour force category. The odds ratio taken from

Table 3.12 corroborates this finding. *Table 3.12* shows that, ceteris paribus, an increase in IIT leads to an increase in the relative risk of the worker moving out of employment into unemployment and out-of-the labour force category by a factor of 1.3 compared to the "*stayers*". This outcome complicates the issue of evaluating the costs of the adjustment since it brings into stark relief the possibility that costs

	Intra-sectoral (1)	**Inter-sectoral (2)**	**Unemployment (3)**
Variable	**Odds Ratio (Standard error)**	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**
Age	0.9915(0.0476)	0.9695(0.0245)	0.8661(0.0105)***
Age-squared	0.9996(0.0007)	0.99998(0.0004)	1.0001(0.0002)***
Male	1.1092(0.2140)	1.1232(0.1236)	0.6822(0.03862)***
Urban	1.221(0.2511)	0.8567(0.0944)	1.3162(0.08004)***
Higher	0.5084(0.3915)	0.5144(0.2117)	0.3391(0.111)***
Further	0.7618(0.5649)	0.6973(0.2657)	1.0135(0.2072)
Other	0.9216(0.9216)	0.6245(0.1031)***	0.8059(0.0724)**
Skilled	1.3439(0.6827)	1.1483(0.3680)	0.3049(0.1018)***
Professional	0.9992(0.3609)	1.0389(0.2238)	1.1446(0.1593)
Clerical	0.4176(0.1916)*	1.4718(0.2697)**	1.394(0.1642)***
Craft	0.4046(0.0887)***	0.1714(0.0254)***	1.1551(0.0822)**
Personal	0.4394(0.3188)	5.9804(0.8940)***	1.4548(0.4309)**
Plant Oper.	0.7166(0.2091)	0.1217(0.0254)***	4.9819(0.4309)***
IIT	2.4417(0.8357)***	0.7889(0.1516)	1.2997(0.1291)***
Rel. Industry wage	0.3587(0.1169)***	0.271(0.0494)***	0.7267(0.065)***
Rel. Unemploy. rate	1.1673(0.1423)	1.065(0.06668)	1.0935(0.0371)***
N	15470		
Pseudo R -squared	0.098		

Table 3.12: Odds Ratios from Multinomial Logit -IIT

-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 99 degrees of freedom) has a critical value of 1672.25

associated with unemployment directly resulting from the intra-industry trade shock be added to the presumably, relatively less significant factor adjustment costs contained within the affected firm, industry or sector. Overall this implies that in the Jamaican case the adjustment to trade shocks might not have been "smooth" since both the costs of intra-sectoral reallocation and unemployment adjustment need to be considered. As expected the magnitudes and level of significance of the marginal effects and coefficients displayed when the model is estimated in terms of odds ratios, accords with earlier results shown in *Table 3.11*.

	Intra-sectoral (1)		Inter-sectoral (2)		Unemployment (3)	
Variable	**Coefficient (Standard error)**	**Marginal Effect**	**Coefficient (Standard Error)**	**Marginal Effect**	**Coefficient (Standard Error)**	**Marginal Effect**
Age	-0.0067(0.048)	0.00003	-0.0318(0.0253)	-0.0003	-0.1091(0.1092)***	-0.0098
Age-squared	-0.0004(0.0007)	0.0000	0.0000(0.0004)	0.0000	0.0012(0.0002)***	0.0001
Male	-0.0104(0.1896)	0.0002	0.1264(0.1086)	-0.0028	-0.3918(0.0548)***	-0.0369
Urban	0.2155(0.2056)	0.0012	-0.1678(0.1103)	-0.0034	0.2827(0.0608)***	0.0246
Higher	-0.6313(0.7679)	-0.0028	-0.6844(-0.412)*	-0.0078	-1.0773(0.3275)***	-0.0648
Further	-0.2539(0.7409)	-0.0015	-0.3656(0.3811)	-0.0052	0.0125(0.2104)	0.0018
Other	-0.0502(0.2813)	-0.0002	-0.4820(0.1653)***	-0.0052	-0.2043(0.0897)**	-0.0168
Skilled	0.3211(0.5057)	0.0031	0.1367(0.3209)	0.0039	-1.1978(0.3337)***	-0.0700
Professional	0.0527(0.3615)	0.0002	0.0376(0.2151)	0.0004	0.1381(0.1392)	0.0130
Clerical	-0.8694(0.4590)**	-0.0042	0.3964(0.1836)**	0.0071	0.3223(0.1178)***	0.0322
Craft	-0.9678(0.2191)***	-0.0061	-1.7871(0.1487)***	-0.0307	0.1457(0.0714)**	0.0170
Personal	-0.7853(0.7256)	-0.004	1.7857(0.1487)***	0.0697	0.3678(0.1562)**	0.0289
Plant Oper.	-0.291(0.2917)	-0.003	-2.094(0.3356)***	-0.0196	1.6148(0.08656)***	0.2397
UMCIT	0.0916(0.2506)	0.0005	-0.2971(0.1321)**	-0.0050	0.1702(0.0672)**	0.0163
Rel. Industry wage	-1.2428(0.1189)***	-0.0078	-1.1726(0.1786)***	-0.0188	-0.405(0.0889)***	-0.0339
Rel. Unemploy. rate	00.1280(0.1189)	0.0008	0.0659(0.0626)	0.0009	0.0893(0.0336)***	0.0079
Constant	-1.5829(0.8599)		-0.7274(0.4951)		-0.0264(0.2399)	
N	15470					
Pseudo R -squared	0.0981					

Table 3.13 Multinomial Logit Estimation Results-UMCIT

Notes: Dependent variable=1 if the worker has not moved.

Dependent variable=2 if the worker has moved job-job intra-sectorally

Dependent variable =3 if the worker has moved inter-sectorally from manufacturing to other one- digit sector

Dependent variable=4 if the worker has moved from manufacturing into non-employment (continued on next page)

-Standard errors in parenthesis. (continued from preceding page)
* Denotes statistical significance of the marginal effects at the 10% significance level.
**Denoted statistical significance of the marginal effects at the 5% significance level.
***Denoted statistical significance of the marginal effects at the 1%v significance level.
The χ^2 of the regression (with 90 degrees of freedom) has a Critical value of 1668.96

Table 3.13 re-estimates the model using an alternative measure of trade. A variable capturing the unmatched changes in trade (UMCIT) is used in this new specification of the model in order to understand how the Jamaican labour market has adjusted to the unbalanced nature of the changes in trade flows occurring over the period under review. We could write UMCIT as;

$$UMCIT_i = | \Delta imports_i - \Delta exports_i | \qquad 3.19$$

Where $\Delta imports$ and $\Delta exports$ represent a change in imports and exports for sector i respectively. The UMCIT variable measures the unmatched trade that requires inter-industry rather than intra-industry factor re-allocation and according to Menon and Dixon (1997), is the measure of trade that is of greater relevance in studies evaluating adjustment costs to trade liberalization rather than alternative trade measures of "matched trade". In fact, the use of the UMCIT measure to capture trade information flows directly from the intuitive observation of Hamilton and Kniest (1991) -that factor adjustment to trade liberalisation depends on *changes* in trade flows rather than the level of trade exposure; since it is the unmatched trade changes that are the proximate cause of the factor adjustment. In the estimation carried out the Jamaican data it is the change in exports that is subtracted from the change in imports which is a modification of Menon and Dixon's (1997) formulation. This was done in order to reflect the fact that it is imports and not exports that are more dominant and dynamic in the Jamaican case. It should be noted however that the results are consistent across both formulations.

Table 3.13 reveals that the additional robustness check of using the UMCIT measure of trade within the multinomial logit does very little to change the substantive results on the non-trade variables. To see this, the reader can examine the table to verify that that non-linear effects of age and experience on worker exits from manufacturing employment into disemployment, the higher likelihood of exit of urban workers into unemployment and out-of-the labour force categories urban workers are all familiar features of earlier specifications of the model. Furthermore, we see familiar results of lower probabilities of mobility for relatively more highly educated workers and similar results for workers with industry-specific skill. Moreover, we again observe significantly higher sectoral exit probabilities into unemployment and out-of-the labour force for individuals who have sector specific skills; most notably, workers in the plant operator category. Higher UMCIT significantly reduces the probability of inter- sectoral worker exits from the manufacturing sector, while on the other hand,

	Intra-sectoral (1)	Inter-sectoral (2)	Unemployment (3)
Variable	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**
Age	0.9933(0.0477)	0.9686(0.0245)	0.8966(0.0105)***
Age-squared	0.9996(0.0007)	0.999(0.0004)	1.0011(0.0002)***
Male	0.9896(0.1876)	1.134(0.1233)	0.6758(0.03703)***
Urban	1.2405(0.2551)	0.8455(0.0933)	1.3267(0.0807)***
Higher	0.5319(0.4084)	0.5044(0.2078)*	0.3405(0.1115)***
Further	0.7757(0.5748)	0.6937(0.2644)	1.0125(0.2072)
Other	0.9511(0.2675)	0.6175(0.1021)***	0.8153(0.0732)**
Skilled	1.3786(0.6971)	1.1465(0.3679)	0.3019(0.1007)***
Professional	1.0542(0.3811)	1.0383(0.2234)	1.1481(0.1599)
Clerical	0.4192(0.1924)*	1.4864(0.273)*	1.3803(0.1627)8***
Craft	0.3799(0.0833)***	0.1675(0.0249)***	1.1568(0.0826)**
Personal	0.45599(0.3309)	5.9642(0.891)***	1.4445(0.2257)**
Plant Oper.	0.7475(0.2180)	0.1232(0.0413)***	5.0269(0.4352)***
UMCIT	1.0959(0.2746)	0.743(0.0981)**	1.1856(0.0797)**
Rel. Industry wage	0.2886(0.0942)***	0.3096(0.553)***	0.667(0.0593)***
Rel. Unemploy. rate	1.1368(0.1351)	1.0684(0.0668)	1.0934(0.0368)***
N	15470		
Pseudo R -squared	0.098		

Table 3.14: Odds Ratios from Multinomial Logit -UMCIT

-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 99 degrees of freedom) has a critical value of 1672.25

UMCIT increases the probability of worker-job separations. Odds ratios are also estimated for the model estimated with UMCIT. These odds ratios are presented in *Table 3.14*. The Table shows that the relative risk of exiting the manufacturing sector to another 1-digit sector in response to an increase in UMCIT is 0.743 times the odds of remaining in the same job. On the other hand, the Table also shows that, *ceteris paribus*, the increase in relative risk of job-separation compared to remaining in the same job as a result of an increase in UMCIT is 1.19. The results therefore show that all variants of the model estimated, point to higher trade flows, increasing the exit probabilities of workers out of the Jamaican manufacturing.

This result is robust to all measures of trade used in the estimation. However, the effects of increased trade on the intra- and inter-sectoral mobility are more nuanced depending on the trade measure used in the estimation. Overall, the model proves relatively robust whether it is elaborated in terms of industry trade levels or in terms of changes in trade flows occurring over the period. However, one consistent finding is that higher trade levels increased the probability of job-separation in Jamaica. This result holds true whether increased trade is measured in terms of higher imports, higher IIT or greater UMCIT. Furthermore, the signs and coefficients on other non-trade related variables are remarkably similar notwithstanding the changes in the specification of the model.

3.14 Estimation Results-"Before" and "After" with Trade Flows

The noticeable increase in mobility, and in particular, the sharp increase in mobility flows into manufacturing sector in 1995, raises the possibility that there might have been a significant change in the economic circumstances between the sub-periods; 1983-1994 and 1995-2006. Of course, yet another possibility is that there are inconsistencies in the classification schema over the two periods. For this reason, separate regressions were estimated on the Jamaican sample over the sub-periods 1983-1994 (before) and 1995-2006 (after) in order to investigate whether there are differences in the coefficient estimates and significance levels between the two sub-periods. We therefore present below, odds ratios for multinomial logit models estimated on the before and after periods stated above. *Table 3.15* shows odds ratios for a multinomial logit estimated on the first subsample (1983-1994). Again, the base category used in the estimation is; the unskilled, female, rural manufacturing worker who possesses no educational certifications and who did not change her job situation for the *12* months leading up to the survey (*stayer*). The odds ratios found in *Table 3.15* paint a picture of the Jamaican labour market generally consistent with the results found in the model estimated on the total sample.

The statistically significant independent variables affecting worker flows in the intra-sectoral mover category are worker location, worker skills and the relative wage in the workers' industry of employment. Higher relative industry wages reduce the multinomial log-odds of a worker remaining in their current manufacturing employments as opposed to moving jobs intra-sectorally would decrease by 0.37 times. In general, the intuitive result of the diminished, statistically significant effect of relatively higher manufacturing industry wages on worker turnover is evident accross all mobility categories and specifications of the Jamaican data. As before, craft and clerical workers represented relatively lower risks of moving jobs intra-sectorally. However, ceteris paribus, during this earlier sub-period, personal workers were also less prone to making intra-sectoral moves. On the other hand urban workers were twice more likely to change jobs intra-sectorally than rural workers relative to the base category.

	Intra-sectoral (1)	**Inter-sectoral (2)**	**Unemployment (3)**
Variable	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**
Age	0.926(0.0698)	0.9498(0.0397)	0.828(0.0186)***
Age-squared	1.0002(0.0011)	1.003(0.0005)	1.002(0.0003)***
Male	0.7210(0.1991)	0.8381(0.1481)	0.5131(0.0515)***
Urban	2.0241(0.6688)**	0.9342(0.1598)	1.1437(0.1118)
Higher	3.4485(2.8401)	0.3972(0.4114)	0.000(0.0002)
Further	1.8510(1.4372)	0.9292(0.5089)	0.8508(0.3504)
Other	1.4334(0.5074)	0.6253(0.1675)*	1.131(0.1593)
Skilled	0.8510(1.4372)	0.000(0.00008)	0.40007(0.2126)*
Professional	0.9847(0.4847)	0.7379(0.2348)	0.6951(0.1649)
Clerical	0.2325(0.1536)**	0.7907(0.2348)	0.5064(0.1063)***
Craft	0.4950(0.1502)**	0.11006(0.0228)***	0.6346(0.0712)***
Personal	0.5467(0.5663)**	2.6004(0.6978)***	0.6059(0.2206)
Plant Oper.	0.7457(0.2851)	0.1028(0.0364)***	1.099(0.1492)
Imports	1.533(0.3445)*	0.9798(0.1193)	1.0479(0.0911)
Exports	0.9838(0.0624)	1.001(0.043)	1.04302(0.0261)*
Rel. Industry wage	0.3698(0.1782)**	0.2562(0.0726)***	0.5206(0.06888)***
Rel. Unemploy. rate	1.1262(0.1772)	1.1241(0.0882)	1.0749(0.0528)
N	7097		
Pseudo R -squared	0.0879		

Table 3.15: Odds Ratios from Multinomial Logit –Trade Levels-Before

-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.
The χ^2 of the regression (with 66 degrees of freedom) has a critical value of 651.23

Table 3.15 corroborates the results from the multinomial logit estimations in *Table 3.9* for the inter-sectoral mover category. The results presented confirm that odds ratios are in general relatively greater for manufacturing workers possessing more general skill sets and relatively lower for workers possessing sector specific skill sets. From column *2* of *Table 3.15* it is clear that personal workers, in manufacturing face relatively greater odds of moving jobs compared to manual workers across 1-digit sectors compared to stayers. The opposite, however, is true for workers possessing skills more specialized to manufacturing such as plant-operators and craft workers. These workers face comparatively lower relative risks of mobility. Carefully examining column *3* of *Table 3.15* reveals the first substantive difference between the model estimated on the sub-period: 1983-1994 and the full model presented in *Table 3.9*. The major difference between these two tables is the statistical significance of the educational attainment variables. Whereas these variables play a statistically significant role in the model estimated on the full sample, they do not play a statistically significant role in the sample estimated on data from 1983-1994. This result suggests that educational attainment was not as important in the early sub-period in explaining manufacturing sector adjustment in the earlier sub-period.

Another difference in the findings from *Table 3.15* is that trade variables included within the model framework had very little discernable statistical impact on affecting worker adjustment in Jamaica over the 1983-1994 sub-period. However this result is starkly contrasted by the results in *Table 3.16* below. *Table 3.16* depicts odds ratios for the multinomial regression estimated on the sub-sample over the years 1995-2006. The major difference in these results lie in statistical significance of the educational attainment related variables in the unemployment adjustment category in the statistical significance of the trade variables in affecting the adjustment observed. The base categories used are the same across all regression estimates provided in this Chapter. The *Table* shows that relatively higher educated workers are less likely to exit the manufacturing sector into unemployment (or out-of-the labour force). For example, we find that workers having attained "higher" education face relatively lower odds of job-separations than manual workers compared to the referent group.

	Intra-sectoral (1)	Inter-sectoral (2)	Unemployment (3)
Variable	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**
Age	1.069(0.0725)	0.9975(0.033)	0.9315(0.014)***
Age-squared	0.9987(0.001)	0.9996(0.0005)	1.0008(0.0002)***
Male	1.465(0.4119)	1.386(0.2059)**	0.8309(0.062)**
Urban	0.8236(0.2346)	0.798(0.1198)	1.2879(0.1061)***
Higher	0.000(0.0001)	0.3898(0.1941)*	0.3916(0.133)***
Further	0.000(0.0002)	0.5738(0.3080)	0.9332(0.2422)
Other	0.6159(0.2912)	0.5986(0.1292)**	0.6378(0.0792)***
Skilled	2.8263(1.818)	3.137(1.0849)***	0.2631(0.1154)***
Professional	0.8902(0.5605)	1.3076(0.3954)	1.486(0.2611)**
Clerical	0.7682(0.4926)	2.2309(0.5726)***	2.281(0.3342)***
Craft	0.3131(0.1235)***	0.2138(0.0499)***	1.6941(0.1695)***
Personal	0.3989(0.4086)	9.849(1.892)***	2.066(0.3704)***
Plant Oper.	1.2214(0.6366)	0.000(0.00005)	36.44(5.89)***
Imports	1.0006(0.0354)	0.9729(0.0153)*	1.024(0.0084)***
Exports	1.0065(0.0181)	0.9928(0.0095)	1.0023(0.0048)
Rel. Industry wage	0.1847(0.13)**	0.3572(0.1083)***	1.3229(0.1825)**
Rel. Unemploy. Rate	1.1436(0.2975)	1.0464(0.1304)	1.3983(0.093)***
N	8034		
Pseudo R –squared	0.165		

Table 3.16: Odds Ratios from Multinomial Logit Estimation Results-After

-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 75 degrees of freedom) has a critical value of 1520.42

The same is true for workers who have achieved "other" educational qualifications. In the occupational skill category, the results from *Table 3.16* emphasize the fact that it was precisely during the later sub-period of the analysis: *1995-2006* that personal workers and plant operators faced significantly greater odds of exiting manufacturing sector employments into alternative employments in other *1*-digit sectors or into unemployment (or out of the labour force) category, respectively. This finding is consistent in all estimations undertaken for the 1995-2006 sub-period. Another important conclusion drawn from the results of our estimation for the later sub-period is the finding that, *ceteris paribus*, higher manufacturing industry wages now increases the odds of a manufacturing worker exiting employment compared to the base category by a factor of 1.32. This result suggests differential impact effects of wages over time and that manufacturing wages may have gotten relatively high towards the end of the sample period effectively contributing to worker-job separations.

3.15 Estimation Results-"Before" and "After" with IIT

In this section we repeat the analysis using a multinomial regression estimated on each sub-sample. However the trade measure used in the estimation of the model in this section is the IIT variable. The odds ratios from the multinomial logit estimated on the sample 1983-1994 are presented in *Table 3.17* below. The results are generally familiar. Again very few of the independent variables included in our model explain intra-sectoral mobility. Worker skills and relative wages however do continue to play role. Recall, that in the earlier estimation of the multinomial logit with IIT we had discovered that IIT was an important variable in increasing the probability of worker turnover at the intra-sectoral level of Jamaican manufacturing.

	Intra-sectoral (1)	**Inter-sectoral (2)**	**Unemployment (3)**
Variable	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**	**Odds Ratio (Standard Error)**
Age	0.9186(0.0693)	0.9479(0.0397)	0.8260(0.0186)***
Age-squared	1.0004(0.0011)	1.0003(0.0006)	1.0021(0.0003)***
Male	0.8595(0.2452)	0.8854(0.1612)	0.5504(0.059)***
Urban	1.931(0.6384)**	0.9243(0.1585)	1.1213(0.1098)
Higher	3.2104(2.6410)	0.3885(0.4023)	0.000(0.0003)
Further	1.6589(1.2879)	0.9043(0.4959)	0.804(0.331)
Other	1.3612(0.4813)	0.6200(0.1661)*	1.1089(0.156)
Skilled	0.7871(0.6415)	0.000(0.0001)	0.399(0.2114)*
Professional	0.9136(0.4482)	0.7206(0.2209)	0.6844(0.1622)
Clerical	0.2351(0.1553)**	0.795(0.2209)	0.5125(0.1075)***
Craft	0.4958(0.1406)**	0.1124(0.0231)***	0.6345(0.0704)***
Personal	0.5089(0.5271)	2.551(0.6861)***	0.5935(0.2160)
Plant Oper.	0.652(0.2494)	0.1016(0.0358)***	1.0499(0.1433)
IIT	3.5715(1.764)**	1.3212(0.3894)	1.4787(0.2476)**
Rel. Industry wage	0.7537(0.3535)	0.277(0.08105)***	0.6531(0.1126)**
Rel. Unemploy. rate	1.0835(0.1979)	1.1234(0.0888)	1.0596(0.0533)
N	7097		
Pseudo R -squared	0.881		

Table 3.17: Odds Ratios from Multinomial Logit -IIT-Before

-Standard errors are in parenthesis.

* Denotes statistical significance of the marginal effect at the 10% significance level.

**Denoted statistical significance of the marginal effect at the 5% significance level.

***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 63 degrees of freedom) has a critical value of 652.95

Table 3.17 corroborates this finding; indicating that with a unit increase in IIT, the odds that a manufacturing worker will change jobs within that same sector increases by a factor of 3.57, relative to stayers. This result provides strong evidence that even before 1995 intra-industry trade played an important role in determining the extent of intra-sectoral mobility.

Recall that is was also the case from the results presented in *Table 3.12*, that there was no statistical evidence that IIT had a statistically significant effect on inter-sectoral mobility in Jamaica. We find identical results when the multinomial logit is estimated on the Jamaican manufacturing data for the sub-sample 1983-1994. In fact the major difference between the results presented in *Table 3.17*-estimated on the 1983-1994 sub-sample and the earlier *Table 3.12*-which was estimated on the entire dataset lies in the fact that there is an absence of statistically significant coefficient effects on the educational attainment and certain occupational skill variables in the unemployment adjustment column. In fact, a similar finding was also observed when carrying out the analysis on the "before" and "after" sample using trade flows as measures of trade found in *Section 3.14* where and analysis of "before" and "after" import and export flows were presented. This finding is generally reflective of the markedly greater variability in manufacturing worker flows toward the end of the sample period; such that in the results for the multinomial logit model estimated on the first sub-sample there are fewer statistically significant coefficients.

In this respect, *Table 3.18* differs from the results found in *Table 3.17*. *Table 3.18* contains odds ratios for the multinomial logit estimated on the sub-sample for the period 1995-2006. Examining the significance levels of the odds ratios in column 3 of the *Table* makes it clear that worker's age and experience, geographic location educational attainment, occupational skills, industry information all affect the odds of worker mobility in a statistically significant manner. Furthermore, not only do these factors affect worker mobility in a statistically significant manner but all of these factors have a similar effect to that observed from our estimation on the total sample shown in the earlier presented *Table 3.12* which contains results for the multinomial logit estimated on the entire sample. Interestingly, the only variable which registers a different sign and significance than those found in the earlier *Table*

	Intra-sectoral (1)	Inter-sectoral (2)	Unemployment (3)
Variable	Odds Ratio (Standard Error) (1)	Odds Ratio (Standard Error) (2)	Odds Ratio (Standard Error) (3)
Age	1.069(0.0725)	0.9969(0.0330)	0.9317(0.0139)***
Age-squared	0.9987(0.001)	0.9996(0.0005)	1.0008(0.0002)***
Male	1.4559(0.4089)	1.3959(0.2069)**	0.8253(0.0609)***
Urban	0.8324(0.2372)	0.7969(0.1196)	1.278(0.0608)***
Higher	0.000(0.0001)	0.4134(0.2052)*	0.3938(0.1337)***
Further	0.000(0.0003)	0.5896(0.3161)	0.93335(0.1337)
Other	0.6147(0.2907)	0.6073(0.1309)**	0.6362(0.0792)***
Skilled	2.8856(1.851)*	3.0196(1.0414)***	0.2827(0.1225)***
Professional	0.89(0.561)	1.2656(0.3831)	1.5091(0.2648)**
Clerical	0.7633(0.4895)	2.2232(0.5699)***	2.310(0.3387)***
Craft	0.3313(0.1298)***	0.2121(0.0492)***	1.5482(0.1545)***
Personal	0.4058(0.4158)	9.4967(1.8126)***	2.1888(0.39)***
Plant Oper.	1.241(0.6473)	0.000(0.0001)	34.951 (5.632)***
IIT	2.2189(1.4831)	0.3651(0.1107)***	1.2711(0.186)
Rel. Industry wage	0.166(0.1256)**	0.3122(0.0909)***	1.3527(0.1833)**
Rel. Unemploy. rate	1.0987(0.3049)	1.0884(0.1277)	1.3292(0.0879)***
N	8034		
Pseudo R -squared	0.1632		

Table 3.18: Odds Ratios from Multinomial Logit Estimation Results-IIT-After

-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 66 degrees of freedom) has a critical value of 1503.83

3.12 is, in fact, the IIT variable. We observe from the results in *Table 3.18* that rather than significantly increasing the probability of mobility in the intra-sectoral and unemployment adjustment categories as in the earlier estimation IIT, in fact, reduces mobility in the inter-sectoral mobility category. In fact, the Table clearly shows that one unit increase in IIT reduces the odds of the Jamaican manufacturing worker changing 1-digit sector by a factor of 0.365. This result suggests that IIT has had a differential impact on the Jamaican manufacturing worker mobility over the period under review. Although the overall effect of greater IIT over the entire period was to increase the probability of worker mobility in the intra-sectoral and unemployment adjustment mobility categories. It might have had a mitigating effect on worker mobility toward the latter years of the sample. This is an important result since it implies that trade variables can have differential effects on labour market adjustment over different time periods.

3.16 Estimation Results-"Before" and "After" with UMCIT

Finally, *Table 3.19* contains estimation results from a multinomial regression estimated on the sub-sample taken from 1983-1994. The measure of trade included as an independent variable in this model however is the UMCIT variable. Results on the signs and significance of the variables shown in this *Table* are very similar to those presented in *Table 3.13* and *Table 3.14* based on the multinomial regression model estimated for the estimation using data from the entire sample. For this reason, we will only discuss the key differences in the results presented here. In fact, for the intra-sectoral mobility category the signs and levels of significance shown in *Table 3.17* results are identical to those shown in earlier Tables except for the weaker levels of significance on some variables.

	Intra-sectoral (1)	**Inter-sectoral (2)**	**Unemployment (3)**
Variable	**Odds Ratio (Standard Error) (1)**	**Odds Ratio (Standard Error) (2)**	**Odds Ratio (Standard Error) (3)**
Age	0.9287(0.070)	0.9495(0.0397)	0.8281(0.0185)***
Age-squared	1.000(0.0011)	1.0003(0.0006)	1.002(0.0003)***
Male	0.6714(0.1844)	0.8437(0.1483)	0.5049(0.0503)***
Urban	1.9939(0.6588)	0.9357(0.16)	1.1439(0.1118)
Higher	3.635(2.9785)	0.3999(0.4141)	0.000(0.0002)
Further	1.8388(1.424)	0.9294(0.5089)	0.8291(0.3413)
Other	1.4287(0.505)	0.6266(0.1678)*	1.1271(0.1586)
Skilled	0.8502(0.6876)	0.000(0.0001)	0.3989(0.2116)*
Professional	0.9842(0.4833)	0.7356(0.234)	0.6908(0.1638)
Clerical	0.2301(0.1519)**	0.7901(0.2196)	0.4982(0.1048)***
Craft	0.4651(0.1407)**	0.1115(0.023)***	0.6374(0.071)***
Personal	0.5544(0.5746)	2.6131(0.7019)***	0.6107(0.2224)
Plant Oper.	0.7057(0.2724)	0.1029(0.0363)***	1.0679(0.1455)
UMCIT	1.285(0.5078)	1.0796(0.2527)	1.3543(0.1906)**
Rel. Industry wage	0.47(0.2105)*	0.2492(0.0687)***	0.5454(0.0911)***
Rel. Unemploy. rate	1.0868(0.1784)	1.1237(0.08799)	1.0629(0.0526)
N	7096		
Pseudo R -squared	0.0871		

Table 3.19: Odds Ratios from Multinomial Logit -UMCIT-Before

-Standard errors are in parenthesis.

* Denotes statistical significance of the marginal effect at the 10% significance level.

**Denoted statistical significance of the marginal effect at the 5% significance level.

***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 63 degrees of freedom) has a critical value of 645.01

Turning our attention to the inter-sectoral mobility category, we observe that unlike in the earlier, comparable regressions estimated the UMCIT variable is not a statistically significant determinant of inter-sectoral mobility. Note that this is similar to the finding when the regression model was estimated using trade flow levels among the regressors. This information implies that when trade is measured using the level of trade flows or unmatched changes in trade (UMCIT) statistically significant effects of trade on inter-sectoral mobility in Jamaica appears to be absent in the Jamaican data for the years 1983-1994. At the same time, the statistically significant effects of educational attainment and occupational skills, observed in *Table 3.17* are generally consistent with the results found when the regression model was estimated on the full sample displayed in Tables *3.13* and *3.14*.

	Intra-sectoral (1)	**Inter-sectoral (2)**	**Unemployment (3)**
Variable	**Odds Ratio (Standard Error) (1)**	**Odds Ratio (Standard Error) (2)**	**Odds Ratio (Standard Error) (3)**
Age	1.0687(0.0725)	0.9968(0.0329)	0.9319(0.0139)***
Age-squared	0.9987(0.008)	0.9996(0.0005)	1.0008(0.0002)***
Male	1.4753(0.4151)	1.3676(0.2027)**	0.829(0.0611)**
Urban	0.8224(0.2345)	0.7967(0.1195)	1.281(0.1054)***
Higher	0.000(0.0001)	0.3820(0.1906)*	0.3956(0.1343)***
Further	0.000(0.0002)	0.6031(0.3238)	0.9221(0.2389)
Other	0.6181(0.2923)	0.5875(0.127)	0.6443(0.08)***
Skilled	2.7892(1.7891)	3.1555(1.0927)***	0.2677(0.1168)***
Professional	0.8975(0.5648)	1.295(0.3914)	1.5007(0.2634)**
Clerical	0.7659(0.4912)	2.2573(0.5801)***	2.2608(0.3317)***
Craft	0.3062(0.1188)***	0.2193(0.0508)***	1.596(0.1575)***
Personal	0.4007(0.4104)	9.8124(1.8813)***	2.119(0.3783)***
Plant Oper.	1.2097(0.6286)	0.000(0.0001)	35.55(5.732)***
UMCIT	1.1768(0.43001)	0.5887(0.0987)***	1.293(0.1069)***
Rel. Industry wage	0.187(0.134)**	0.381(0.1163)***	1.2789(0.1762)*
Rel. Unemploy. rate	1.1318(0.2888)	1.081(0.1349)	1.3473(0.0883)***
N	8034		
Pseudo R -squared	0.1638		

Table 3.20: Odds Ratios from Multinomial Logit -UMCIT-After

-Standard errors are in parenthesis.
* Denotes statistical significance of the marginal effect at the 10% significance level.
**Denoted statistical significance of the marginal effect at the 5% significance level.
***Denoted statistical significance of the marginal effect at the 1% significance level.

The χ^2 of the regression (with 72 degrees of freedom) has a critical value of 1508.78

The same can be said of the results in the unemployment adjustment category; with *Table 3.17* showing that a unit increase in UMCIT leads to an increase in the odds of the manufacturing worker job-separation relative to remaining (staying) within the manufacturing job by a factor of 1.35.

Table 3.18 contains multinomial logit estimates for the model with UMCIT estimated on the sub-sample 1995-2006. The results from the *Table* accord with earlier findings that the determinants of intra-sectoral mobility are relative manufacturing industry wages and occupational skills. In particular, we can see from column 1 of the *Table* that the odds of craft workers changing jobs within manufacturing rather than remaining in their current manufacturing job has decreased over the later sub-period by a factor of 0.306. Familiar results on the educational attainment variables and within the occupational skills category are also observed in *Table 3.18*. However, a key difference in the results in *Table 3.18* and those represented in *Table 3.17* is the fact that the UMCIT variable in the former Table is statistically significant. This finding accords with the results for the full sample; where UMCIT contributed to a decrease in manufacturing worker mobility. Across both periods however the results from all our estimations point to increased UMCIT increasing the probability of manufacturing worker job separations. Like all earlier estimations on the 1995-2006 sub-sample, we find statistically significant effects of educational variables than was the case in the earlier sub-sample. From this result, it can be concluded that educational attainment therefore can be seen to take on an increasingly important role in affecting unemployment adjustment outcomes in the Jamaican manufacturing sector in the later sub-period. Over the period under review therefore, more educated workers are less at risk to face manufacturing job separations. The opposite is true for plant-operators and personal workers. Whereas personal workers tend to make job-to-job mover into other 1-digit sectors, the relatively more manufacturing skill-specific plant-operators tend to exit into the ranks of the unemployed (or out-of-the labour force).

The empirical results from the Jamaican data accord with the findings from other microeconometric studies on developing countries. Firstly this study provides evidence that trade does affect the type of labour market adjustment observed within the economy. Developing country studies such as Leite and Wai-Poi (2007) highlight the role of trade liberalization in affecting the inter-sectoral distribution of of labour. Similar findings have been reported from developed country studies such as Klein et al (2003) and Kletzer (1998, 2000) in that the extent of trade liberalization appears to have had statistically significant effects on labour market outcomes including increased the probability of worker flows. The Jamaican study, however, appears to be consistent with earlier studies that the direct effects of trade liberalization on the labour market adjustment in Jamaica seems relatively small. Studies such as Ravenga (1997) and Currie and Hanson (1997) also found relatively weak unemployment effects for Mexico and Morocco respectively. Microeconometric evidence from transition countries is also consistent with the findings from the Jamaican data. For example, Christev, Kupets and Lehman (2005) show that in the case of the Ukraine, trade is of some, but minor, importance in determining labour market dynamics within manufacturing and the job flows are mainly driven by idiosyncratic factors within industries. Moreover, Akhmedov *et al* (2005) present similar findings for Russia.

One significant result from the empirical results from the Jamaican data is that the type of trade flows have an effect on the labour market adjustment. For example, while studies like Elliot and Lindley (2006b) find some evidence of the Smooth Adjustment Hypothesis for UK, results from the Jamaican data suggest that while IIT can lead to relatively "smooth" labour market adjustment within the affected sector and industry, there are additional costs related the related unemployment adjustment that could also result from this type of trade flow and hence contribute, in some way, to labour market adjustment costs.

3.17 Conclusion

This chapter attempts to analyze the effects of trade liberalization on labour market adjustment within the Jamaican manufacturing sector over the period 1983-2006. The analysis reveals that, over the period, significant sectoral transformation has accompanied the structural adjustment and liberalization reforms and that together; these developments have had far-reaching labour market implications. In this study we have quantified the extent of the manufacturing sector adjustment as well as the adjustments in the industrial trade in Jamaica's manufacturing sector. The study reveals that the greatest worker flows in the manufacturing sector over the period are unemployment adjustment flows followed by inter-sectoral and then intra-sectoral mobility flows. Manufacturing trade flows have over the period of liberalization have been unbalanced and in favour of imports with all but one Jamaican manufacturing industry- the food, beverages and tobacco manufacturing industry. The trade surplus in this industry, however, has been greatly diminished by the end of the sample period by the growth in industrial imports.

The analysis of, *ex-post* transition probabilities reveals that during the first decade of the review period the manufacturing sector, along with the agriculture, wholesale and community sectors were the most likely to absorb workers. In stark contrast, by the end of the sample the manufacturing sector was among the least likely to provide employment for individuals out of work by the end of the sample period. Notably, very little of the inter-sectoral mobility over the entire 24 year period involved the electricity and mining sector implying significant adjustment costs between these sectors and other JIC 1-digit sectors. Overall, one-digit sectors in the Jamaican labour market exhibit high retention rates and very low transition probabilities from unemployment but there is a great deal of temporal fluctuation in the *ex-post* transition probabilities calculated.

Standardization of sectoral and occupational codes over the entire sample period facilitates a more in-depth analysis of the industrial dimensions of the manufacturing sector labour adjustment. We find that the greatest proportion of movers for the entire sample period, flow between manufacturing and disemployment. In particular, the magnitude of worker outflows from manufacturing employment into the out-of-the labour force category becomes increasingly dominant towards the end of the sample period. We estimate that the gross proportion of manufacturing workers moving out of employment by the end of the sample is in the order of 12% (annually) of the employment within the sector itself. Counterintuitively, most of the manufacturing related inter-sectoral mobility is generated by workers moving into manufacturing while intra-sectoral mobility is trivially small.

Matching QLFS data with industry-level trade data within a multinomial logit framework, we find a significant role for demographic, educational, occupational, trade and industry-specific variables in explaining manufacturing labour market adjustment in Jamaica. Some of these effects are highly nuanced and complicated. For example, workers possessing manufacturing sector-specific skills such as plant-operators were the most likely to exit the industry and sector into the ranks of the disemployed but were at the same time less likely to move jobs intra and inter-sectorally. Workers possessing more generic occupational skills also exhibit a relatively high propensity to exit manufacturing employment but were still yet less likely to exit the sector than those possessing sector-specific skill sets. These results are consistent with the hypothesis that there were significant shifts in the demand for certain sector-specific skills over the period. On the other hand, more educated workers were more likely to avoid inter-sectoral moves and job separations; with higher educated workers enjoying a greater level of job security. In general, lower industrial relative wages and higher relative unemployment rates within industries were found to have robustly positive effects on worker outflows.

Furthermore, using an empirical model based on worker heterogeneity and the job creation and job-destruction paradigm, we provide evidence that increased trade exposure has affected manufacturing sector, labour market adjustment in Jamaica. Increased levels of exposure to trade, and in particular, the surge in manufacturing imports have likely had a negative effect on the employment prospects within the local manufacturing sector. There is some evidence that trade expansion caused worker-job separations over the period. This finding was robust across all trade measures used. While increases in both types of trade flows caused job separations, intra-industry trade is associated with relatively greater intra-sectoral reallocation while UMCIT is associated with inter-sectoral worker adjustment. On the one hand, there is weak evidence consistent with the SAH since IIT appears to have influenced the level of intra-sectoral adjustment. On the other hand, the fact that IIT has caused job-separations in addition to the intra-sectoral worker flows implies that IIT may have incurred additional costs. The coincidence of intra-sectoral adjustment with worker outflows into unemployment and out-of-the labour force makes the SAH rather doubtful in the Jamaican case. There is also some evidence that trade liberalization has also affected the inter-sectoral allocation of labour.

Estimating the empirical model on Jamaica Labour Force Survey data over two sub-periods 1983-1994 and 1995-2006 we discover that there are distinct differences in how the independent variables affect manufacturing sector related labour market mobility over time. For one, we observe across all models estimated that educational attainment became a more important determinant of mobility in the latter period. In particular relatively better educated manufacturing workers were found to be less likely to face job separations than in the earlier sub-period. We also find evidence that unlike in the 1983-1994 sub-samples, where higher relative industry wages were associated with reduced mobility across all mobility types investigated, in the latter period there is some evidence that higher manufacturing wages led to an increased likelihood of job-separations. Moreover, it was discovered that while the various measures of trade had a generally consistent effect on worker turnover in manufacturing in most cases the effect of trade on worker flows in manufacturing was more pronounced towards the later sub-period 1995-2006. This "before" and "after" analysis also emphasised the finding that manufacturing sector exit rates for personal workers and plant-operators were greater in the later sub-period with the more manufacturing sector skill-specific plant-operators tending to exit the sector into unemployment or out-of-the labour force category. This finding implies that some sector-specific skills were destroyed in the Jamaican adjustment.

In sum therefore, trade liberalization in a small, open economy with a highly unskilled and uneducated workforce can possibly incur significant adjustment costs even when skills are general. This is because in these environments workers are acutely susceptible to demand shifts which significantly affect their labour market experiences. If general skill sets are in use in high demand in some other industry or sector then the costs can be alleviated and minimized. However, if not workers will be forced to bear these costs themselves. To the extent that sector specific skill-sets which have somehow been accumulated by workers have been destroyed, it is extremely difficult for workers to transition smoothly, especially in instances where they have low levels of educational attainment and have no means of distinguishing themselves from other job-seekers in the labour market. This can have deleterious consequences and costs on any economy where there are no provisions made to re-engage these workers within the sphere of economic activity. Although there appears to be some uptake in the services sectors in Jamaica's case, a simple analysis of escape probabilities from disemployment reveals that employment prospects are minimally low. For this reason, further research and economic policy focussing specifically on the re-engagement of these workers in the Jamaican case should be an important priority.

Chapter 4

Labour Market Transformation: Occupational and Sectoral Dimensions of Mobility in Jamaica

4.1 Introduction

This Chapter attempts to investigate occupational mobility and to measure its magnitude over the period 1983-2006 using micro-data from the Jamaica Quarterly Labour Force Survey. In analyzing occupational mobility within the Jamaican context, a distinction is made between "*simple*" and "*complex*" moves; where *simple* moves involve a worker changing either occupation or sector while *complex* moves involve changing both sector and occupation simultaneously. In this respect, the study carried out here follows in the tradition of Parnes (1954), Neal (1999) and Elliot and Lindley (2006a) which address the idea of the "complexity" of labour mobility along similar lines as we will pursue here; pulling together two strands of the literature on i) sectoral and ii) occupational mobility. Disaggregating labour market mobility into *simple* and *complex* moves, not only allows for measurement of the extent of the labour market transformation in Jamaica over the period, but also allows for the identification of the relative effects of various socio-economic factors associated with each mobility type. In so doing, inferences can be made regarding the role of skill specificity in explaining the mobility within a low-skilled, developing economy such as Jamaica and thus arrive at a clearer understanding of the nature of adjustment costs within that economy.

We have already provided some evidence in *Chapter 3* that Jamaica has undergone significant sectoral transformation. Over the period of interest-1983-2006, employment shares in agriculture, manufacturing and mining experienced declines of 31%, 36% and 40% respectively while, in aggregate, the service sector of the economy expanded by 46%. Furthermore, we showed that over the same period the aggregate of manufacturing sector mobility (mobility between manufacturing and other 1-digit sectors in addition to manufacturing worker moves to and from unemployment and out of the labour force adjustment) was never less that 18% of total manufacturing sector employment per year over the 24 year period. The salient question posed in this chapter in light of this significant sectoral adjustment is: was there also an accompanying occupational transformation over the period and, if so, what was its nature and magnitude? This line of questioning represents a natural progression since, it is entirely possible that labour market mobility over the period was not merely confined to workers moving sectorally but might also have extended to mobility within and between occupations; whether or not this mobility occurs within the same firm *via* promotion or demotion or between firms, industries and/or sectors.

In recognition of these possibilities, we broaden the analysis in this chapter to take into account occupational mobility while focussing specifically on *job-to-job* mobility. In addition, for this chapter, unlike the preceding one, we do not limit our focus to manufacturing sector adjustment only, given the insufficiency of manufacturing sector to describe conditions across the labour market as a whole. Instead we will be using data from across all sectors encompassing the entire Jamaican labour market. Examining occupational mobility is an important dimension to the empirical analysis of labour markets for three main reasons.

Firstly, it is more intuitively appealing to think that the individual worker will decide at each stage of his "career", whether or not to remain within his present occupation given the possibility of promotion and the attraction of the occupational move, as opposed to whether to change sector or industry. Moreover, although significant changes in the distribution of wages across sectors may lead the rational worker to "shop" for a suitable match in some relatively higher wage sector, a subsequent move may be less likely if that worker cannot find an occupation that suits the educational and other human capital and skill-level that he embodies. It is from this perspective therefore, that adding the occupational dimension seems a natural progression, if not, the more intuitive approach to be taken in analyzing the causal factors determining mobility. But despite its intuitive appeal how well does this hypothesis explain adjustment in a low-skilled setting? Our analysis of the Jamaican manufacturing sector has revealed that the majority of workers (78.63%) have little or no educational qualifications, possess low levels of skill, but at the same time, were remarkably important to the churning in and out of the sector; providing willing hands and facilitating whatever little local manufacturing that was taking place. Our goal in this Chapter, therefore, is to be in a position to make statements about the extent of the sectoral and occupational mobility in all sectors of the Jamaican economy, and ask whether the results vary given the skill content of human capital resources utilized within those sectors.

Secondly, it is by now well established that the "*brain-drain*" effect is a real phenomena in small-island economies like Jamaica; more so than in the developed, or transition economy context. Indeed, Carrington and Detragiache (1998) in a World Bank-commissioned study, state that between 25-30% of Jamaica's secondary graduates and over two-thirds of its tertiary graduates were living in the United States of America[59]. The more recent OECD (2008) study on immigration corroborates this finding while also highlighting the fact that outside of small developing island states like Jamaica[60] the concept of "*brain-drain*" is basically a myth; adding that over 40% of Jamaica's skilled labour are immigrants abroad. Within this context, it would be interesting to understand how countries like Jamaica cope with this type of adjustment. How do the workers left behind adjust? What is the level of skill that remains in the various sectors within the economy? Although we will not use data on migration in this study we demonstrate, for the first time, how skills of differing types and levels can be measured and hence monitored over time from Jamaican Labour Force Survey data. No doubt, this type of information will be critical to policy formation –especially where judicious spending in key developmental areas such as education are so necessary while resources are so scarce due to binding fiscal constraints.

Finally, no study of this type has been carried out for Jamaica, and we have seen no other such study for any small developing country- the very type of economy most susceptible to the types of shocks which we expect to precipitate significant labour market adjustment. In one sense then, Jamaica can be viewed as a realistic depiction of the "small-open economy" so famously mentioned in numerous theoretical economic models. *Section 4.2* reviews the theoretical and empirical literature. *Section 4.3* describes how the dataset was constructed. The data is then examined in *Sections 4.4 to 4.6* after which the empirical model employed to carry out the analysis is outlined in *Section 4.7, Sections 4.8* and *4.9* provide the results of our

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[59] Their study is based on census data which we expect to be an underestimate for a variety of reasons into which we do not enter.
[60] Also mentioned are Fiji, Haiti, Mauritius and Trinidad and Tobago

estimation after which follows the robustness checks in *Section 4.10* and then the conclusion in *Section 4.11*.

4.2 Literature Review

4.2.1 Theoretical Literature

In this section we present a brief overview of what is an extensive literature on labour market mobility. Our reading of the literature reveals four fundamental approaches used to understand labour market mobility within the theoretical literature. The four fundamental approaches are 1) job-matching models 2) job-search models 3) human capital models and 4) implicit contract theory. Despite the differences in the modelling strategies used in the literature, these approaches are, in general, non-competing and, in some cases, have been combined in order to explain common labour market phenomena[61]. In fact, one of the most striking consistencies among them is the assumption of imperfect information and heterogeneity within the labour market. Labour market heterogeneity manifests in these models in assumptions regarding job type and on key worker characteristics such as ability or heterogeneity. Initially, therefore, workers are not necessarily employed in jobs that are most suited to them and are only able to achieve a more suitable job through the mechanism of mobility. The essence of this phenomenon is perhaps captured best in an early quote from Slichter (1919): "The wastefulness of this try and try again process of advancing to a better position is self-evident. The worker does not know in detail the nature of the job he is obtaining nor does he know his own capacities. Nevertheless it is the principal method by which workers at the present time improve their condition on their own initiative".

The job-matching approach is exemplified in Jovanovic's (1979) model. In this model the worker does not know *ex-ante* what his actual productivity in a particular job will be. This actual productivity level is what defines the quality of the worker-job match. With increasing tenure comes an updating of prior expectations of the quality of the match, and where this quality is worse than expected, then mobility will result. This model leads to the result that job tenure is negatively related to the

[61] Jovanovich (1984) combines both the search and matching model in order to explain labour market turnover; an idea which was later developed further in Jovanovich and Mofitt (1990). See Mortenson and Pissarides (1999) for a synthesis incorporating search and matching frictions in equilibrium labour market models.

probability of mobility. The worker will seek to move to jobs which represent higher quality matches and where the return they are paid for their aptitudes and abilities are greater. As pointed out by Bergin (2009), this model predicts a positive relationship between wages and mobility although this relationship is not direct but rather is conditional on the improved quality of the resulting match. Miller (1984) and Shaw (1984) both developed labour market models based on the concept of occupational matching, realizing that the challenges facing this approach to understanding mobility was the idiosyncratic nature of the defining an "occupation" and the lack of interest on this issue by economists and policy-makers alike. This theory would later be broadened by McCall (1990) who presents a model in which; matching information contains both job and occupation-specific components. In this paper, McCall (1990) tests the resulting hypothesis that increased tenure in the previous job lowers the likelihood of separation from the current job and that this likelihood should decrease with increased tenure in the previous job only for those individuals who do not switch occupations when switching jobs (employers).

The original wage search model presented by Stigler (1961, 1962) formulated the worker's decision problem as that of selecting a random wage sample of some size, say *n*, at a cost of *c*. The worker then accepts employment from the firm offering the highest wage. Subsequently, the search literature adapted the sequential "stopping" approach borrowed from statistical decision-making literature in which the worker samples wage offers one at a time deciding on the basis of the sample whether or not to stop the search or to continue (McCall, 1970; Mortensen, 1970). Job search models also emphasize the heterogeneity of the workers in their ability to perform certain jobs. Burdett's (1978) model is an example of this approach. In this model, workers face a distribution of productivities and wages *ex -ante,* which reflects their ability to perform certain jobs. Burdett's (1978) model allows for the worker's continued job search even after he has found employment; with the intensity of the search positively related to the arrival rate of offers. Any job offer with a higher wage adjusted for "job-changing costs" will be accepted by the worker. In this type of model, as labourers gain more labour market experience, they have more opportunities to search for, evaluate and accept superior job offers. Burdett's (1978) and Johnson's (1978) contributions exemplify the "job-shopping" literature. Johnson (1978) describes the "job shopping" approach as a rationale for job mobility as distinct from search theory which provides an explanation for unemployment since job search theory implies that the worker can find out about the characteristics of a job by searching implying that a new job is an "inspection good" while the "job shopping" model implies that certain features if the job cannot be fully discovered until the worker is actually employed. In this sense, the job is seen as an "experience" good. Consequently, as experience increases, so too does the worker's reservation wage for changing jobs with the effect that the probability of changing jobs will decline with one's experience.

Thirdly, the human capital approach pioneered by Becker (1962) and Oi (1962) stresses the importance of job specific skills; which includes elements of human capital investment such as training, on-the-job experience and any formal training undertaken by the worker. The core theme of these models (Mincer, 1962, 1974; Jovanovic, 1979) is that over years of employment, workers accumulate valuable firm-specific human capital, therefore changing jobs and having to start over in a different firm reduces the worker's efficiency thus incurring a pecuniary cost. In order to avoid this cost the worker will therefore tend to be less likely to change employments. Now, wages earned from changing jobs are determined, in part, by the degree of transferability of the skills gained from on-the-job training. If specific human capital is an important determinant of worker's earnings, then switching jobs may well result in wage losses to the worker. The idea of human capital specificity has spawned research distinguishing firm-specific, industry-specific and general accumulated human capital (Lynch, 1991; Cingano, 2003). Distilling human capital investments into firm-specific and general components allows for a more detailed investigation of the effects of types of training programmes and educational qualifications on worker mobility and labour market dynamics and also allows for an investigation of the role of the transferability of skills on labour market outcomes. Making use of this distinction Johnson (1979) was able to create a link between attitude towards risk, occupational mobility and the demand for education. On the other hand, Sicherman and Galor (1990), in modelling the interaction between human capital acquisition and career choices, suggest that there are indirect returns to human capital investment that accrues to the worker through increased mobility to better jobs either through the higher probability of promotion within the firm or the probability of moving to a better paying job.

Finally, applying implicit contract theory in analyzing the issue of labour market mobility, Lazear (1979) points out that one of the causes of the observed relationships in the data such as decreased mobility with increased age and tenure is that firms are engaged in an implicit contract contracts with seniority wages and that this contract implies a wage profile which is steeper than the worker's productivity profile. Leaving these jobs therefore essentially represents a forfeiture of the contract at the very point where it is least advantageous to do so. Such a theory predicts increased wages and decreased mobility with tenure.

There are other models of labour market mobility which may not fit neatly into any of the above, four main categories. Blumen *et al* (1955) introduces a movers- stayers model where workers possess an unobservable characteristic such as the capacity to remain within a job. In this model it is assumed that high productivity workers will avoid mobility while low-productivity workers will be relatively more mobile. In this model, mobility is correlated with wages precisely because it is correlated with the unobservable characteristic possessed by the individual worker. In contrast to this model, consider the *raiding* model of Lazear (1986). In the *raiding* model, mobility within the labour market acts a positive signal of productivity. Therefore previous wages are used as a symbol of worker quality. High productivity workers experience a greater degree of mobility than low productivity workers and are effectively poached by high wage firms which *raid* firms which pay lower wages.

4.2.2 Empirical Literature

During this section we will provide a brief survey of the empirical literature in an attempt to uncover whether and to what extent the factors highlighted in the theoretical models of mobility have been shown to be significant determinants of labour market outcomes. Our reading of the empirical literature on mobility reveals the following key empirical results.

4.2.2.1 Labour Market Conditions

We expect turnover rates to vary over the business cycle. In upturns we expect new jobs to be created which lead to increased vacancies in sectors of the economy. Within a job search model this could be modelled as an increase in the arrival rate of new jobs. Under these circumstances, workers will tend to have a higher probability of quitting if there is an increased likelihood of finding an available job or if the expected search time needed to find a job is expected and/or known to be shorter. On the other hand, job matching models would view this phenomenon as an increase in the number of workers who may potentially switch to jobs representing a relatively more suitable and productive match. In any case, one would expect higher quit rates when labour market conditions are tight and hence a greater degree of mobility in an upturn (Hamermesh *et al*, 1996). These behavioural patterns have been corroborated by numerous empirical analyses which show that quits and inter-sectoral flows tends to be procyclical (Davis and Haltiwanger, 1992; Burda and Wyplosz, 1994; Blanchard and Diamond, 1990; Greenaway, Upward and Wright, 2000).

Conversely, layoff rates tend to be anti-cyclical. This implies that whenever there is a decline in demand employers will tend to lay off workers. On the other hand, Burgess *et al* (2000) argues that the cyclical behaviour of turnover is more complicated. Though these authors agree that during an upturn there is a surge in hiring by firms they also argue that there is an increase in the number of workers becoming available for and entering employment with unknown abilities and productivities. This leads to increased subsequent separations. Similarly, employers may use downturns as an opportunity to shed their least productive workers thus reducing the need for the subsequent downsizing of the workforce.

Jovanovich and Moffit (1990) develop a model of labour market mobility taking into account the effect of sectoral shocks which may arise either because of shifts in demand or changes in technology[62]. This paper essentially combines the view of labour market mobility as essentially a frictional phenomena as workers adjust to sectoral labour demand shocks (Lucas and Prescott, 1974; Long and Plosser, 1983) while at the same time incorporating the author's twin observation for the US data that 1) workers tend to move mostly within rather than across sectors and 2) that net labour mobility is of a greater magnitude than gross mobility between sectors. Similarly Lilien (1982) estimated an empirical model in which dramatic shifts in

[62] The interested reader can consult Acemoglu (2002), Ahgion (2002) and more recently Hornstein, Krusell and Violante (2005) for excellent surveys of the closely related skill-biased technical change literature.

labour markets across different segments occur over relatively short intervals. Lilien (1982) viewed this phenomenon as evidence that the natural unemployment rate itself changes over time, in much the same way that the quantity of labour reallocation required within the economy changes over time. These changes in labour reallocation flows caused by shifts in demand at the sectoral level could affect labour market turnover between jobs and between sectors.

4.2.2.2 Effects of Age, Tenure and Experience

The effect of age and experience on labour market mobility has also been addressed in the empirical literature on job-to-job mobility in the labour market. Stigler (1962) explains this phenomenon by using a term known as "job shopping". This term is used to refer to the tendency of younger workers to "try out" a variety of jobs in an attempt to acquire knowledge of the labour market and to discover jobs that are in line with their own preferences. This argument implies greater turnover among younger workers which declines over time. This phenomenon of declining turnover rates results because- as workers grow older and as their labour market experience increases then they tend to find better matches. In job search models for example, with each job change the worker moves up the wage offer distribution leaving him with fewer worthwhile jobs into which it would be profitable for him to move in the future. Within this framework, mobility will tend to decline with experience. Topel and Ward (1992) find that for young men, two-thirds of their lifetime job-mobility occurs within the first ten years of their careers. Hence these authors conclude that job mobility is a phase in a worker's career progression to stable and more long-term employment relationships.

Furthermore, job tenure will likely also play a role in determining the probability of mobility. We know from job matching, job search and human capital models that mobility can decline with tenure. In job matching models for instance, when the quality of the match is revealed, workers in a successful match will be rewarded with higher wages and/or match-specific rents. If increased tenure is explicitly one such benefit or if tenure indicates the existence of a successful match then it is reasonable to expect that with these rents mobility will be reduced for workers with a longer tenure. Similarly, in human capital models, the relative value of a particular job measured in terms of wages or productivity increases with tenure because of the acquisition and accumulation of specific human capital and this reduces the probability of mobility as well.[63]

Groot and Verberne (1997) present an alternative explanation. They argue that mobility is likely to be higher for younger persons or those with less labour market experience and tenure because of the costs associated with mobility. They argue that there are social and psychological costs to mobility in addition to the financial costs of changing jobs. Younger (older) individuals are less (more) likely to have made investments in housing are also less (more) likely to be settled and attached to their environment. The costs of changing jobs are therefore likely to be less (more) for younger (older) workers. Moreover, to the extent that length of tenure reflects the quality of the match, then older and more tenured workers will face higher psychological costs of changing jobs because of their attachment to their colleagues and organizations. Groot *et al* (1997) argue further that even if the preceding arguments were wrong and mobility costs were the same for both older and younger workers; it is the younger workers that will have more time to recover the costs of mobility making them more willing candidates for job change. Furthermore, if changing jobs results in a better and more rewarding career path the younger workers again have more time to benefit. Another argument is that since older workers have a greater time preference they tend to apply a greater discounting factor to future earnings causing the probability of mobility to decline with age. There is therefore no shortage of theoretical arguments linking age, tenure, experience to job-to-job mobility. However it must be stated that empirically isolating and measuring the distinct impact of each of these individual factors is quite difficult to do since they are most likely correlated.

4.2.2.3 Gender

The issue of gender also arises in studies on the mobility of individual workers. Barron *et al* (1993) develop a matching model where workers differ in terms of their attachment the labour force. Workers possessing a low attachment to the labour force are therefore sorted into jobs that require less job-specific training and therefore have

[63] Increased wages in the tenured job may lead to higher reservation wages by the employee. These higher reservation wages may be unlikely to achieve in alternative employments especially because of the lack of job-specific skills in those jobs.

less to lose in the eventuality of a job-switch. If women have lower attachment than male workers then they would likely lose less specific human capital and hence would be expected to be more mobile than their male counterparts. On the other hand, Royalty (1993) argues that women will be less likely to change jobs if they are constrained by non-market variables such as partner's location and the rearing of children or motherly responsibility. Studies such as Blau and Kahn (1981), Loprest (1992) and Booth and Francesconi (1999) corroborate these findings; showing that after controlling for certain characteristics including labour market experience, the differences in gender turnover rates tend to disappear.

4.2.2.4 Education

A link between educational qualifications and the degree of mobility has also been established in the empirical literature. However the literature is split as to whether the effect of education on mobility is positive or negative. Some human capital models, for example, suggest a positive relationship between education and job duration and suggest that it is through this channel that educational attainment reduces labour mobility. On the other hand, one may argue from the perspective of these same models that the accumulation of specific human capital may well be favoured by employers compared to education because of the realization that specific human capital embodied within the worker may not be of significant use to some other firm. However, Connolly and Gottschalk (2006) argue that less educated workers have invested less in human capital and therefore may have less to lose in changing jobs. According to these authors this causes less-educated workers to have a lower reservation wage, making them more likely to accept an alternative job offer.

Weiss (1984) introduces the idea of an unobservable characteristic called "stick-to-itiveness" which, he argues, affects both the value of staying in education and the value of staying in an existing job. Barron *et al* (1993) holds that workers that are more highly educated qualify for higher training jobs or capital-intensive jobs and so incentives are actually needed to decrease the number of expected quits for better educated workers. In Neal's (1999) model of job search which includes both employment matches and career matches, less educated workers, it is suggested, tend to experience mobility due to both influences while more educated workers tend to minimize the type of mobility due to searching for the ideal career match because the time spent in education is used as a type of pre-market search.

Other writers have argued on the other hand that there would be a positive relationship between education and mobility. Weiss (1984) argues that educational qualifications increase the opportunity set of workers and in this way might lead to increased mobility. Whether or not this explanation applies in Jamaica where the workforce is, to a large extent, uneducated remains to be seen. Johnson (1979) adds another dimension to the argument by noting that more educated workers may experience higher mobility due to increased variability and hence greater expected wage return to mobility for such workers. Greenwood (1975) suggests that highly educated individuals may be more efficient job searchers and in this way are able to minimize the transaction costs of changing jobs. This facilitates less costly moves by educated workers leading to increased probability of mobility among them. Another perspective offered by Borsch-Supan (1987) is that education essentially speeds up the career development of these types of workers and as such highly educated workers will tend to have "faster careers" and hence will change jobs more frequently as they ascend the career ladder. Bartel and Lichtenberg (1987) hold that highly educated workers have a comparative advantage in learning and implementing new technologies and so firms provide incentives to reduce the number of job quits for these worker types.

4.2.2.5 Trade and Mobility

The Smooth Adjustment Hypothesis from the trade literature provides predictions regarding how the labour market adjusts under trade and the costs incurred. This hypothesis distinguishes between trade based on differences in factor endowments, as suggested by the Heckscher-Ohlin, and intra-industry trade which is based on economies of scale. The hypothesis proposes that if, as a result of trade liberalization and/or further integration, trade expansion is intra industry rather than inter-industry in nature, the factor adjustment will be less costly. Balassa (1966), Krugman (1981), OECD (1994) and Cadot *et al* (1995) are a few of the studies that either address or allude to the SAH. We provide a more detailed discussion of this theory in the preceding chapter, however we note here that underpinning this hypothesis is the notion that whenever there is an expansion in trade this will affect the (derived) demand for factors used in the production of the good or service. The hypothesis merely seeks to relate the nature of the incipient trade flows (whether inter or intra-industry trade) to the extent to which the factor adjustment needed to support the trade expansion can be met at the firm-, industry or as a natural extension, at the sectoral level. Davidson and Matusz (2000, 2001) relate trade with labour market adjustments and stress the roll of individual characteristics such as skills attained in determining the nature of the adjustment and its accompanying costs.

Authors such as Rodrik (1997) and Slaughter (1997) have pointed out that, in instances where there are labour market imperfections, openness to trade could very well lead to an increase in the elasticity of labour demand. The link between the factor demand elasticities and product market elasticities is well established through Hick's well known fundamental law of factor demand which implies that; the demand for anything is likely to be more elastic, the more elastic the demand for any further thing which it contributes to produce. This therefore implies that if product market elasticities are likely to rise with trade liberalization, greater trade openness could, in turn, actually cause an increase in labour demand elasticities. This is important for labour market turnover because as Rodrik (1997) points out those higher elasticities trigger more volatile responses of wages and employment to any exogenous shocks to labour demand. Empirical attempts to investigate the magnitude of these effects have so far produced mixed results (see Krishna, Mitra and Chinoy, 2001; Haouas and Yagoubi, 2004; Akhter and Ali, 2007).

This study follows closely along the lines of Elliot and Lindley (2006a) in which the the sectoral and occupational dimensions of job-to-job mobility were examined using UK Labour Force Survey data between the years 1985 and 2000. Similar to these authors use we apply occupational definitions to the data in order to add to the analysis of occupational change and to investigate the effects of accumulated human capital and skill on mobility in a developing country setting. The analysis carried out here uses analogous definitions of occupational and sectoral qualifications to that used by Elliot and Lindley (2006a). Throughout this study we are very cognizant of the fact that any economically meaningful measure of occupational, or for that matter, sectoral mobility hinges crucially on the how we define an occupation or sector. In practice, there is a trade-off to be made between maximizing the economic meaning of the classification system employed and econometric considerations relating to cell size considerations and sample size and the subsequent interpretation of the interactions between sectors and occupations (Elliot and Lindley, 2006a; Shaw, 1984). Therefore, the idiosyncratic nature of the definition of occupations has to be taken into account in the categorization of the data and subsequent estimation of the model. Secondly, although we use definitions that are as detailed as our data allows, we are constrained to identify even more subtle forms of labour mobility such as intra-firm mobility or a move into a different production line in a given firm. We also do not make a distinction between worker promotions and demotions since the Jamaican data does not provide sufficient detail about this dimension of the mobility. These additional dimensions would yield greater information in understanding the adjustment costs associated with the mobility. Despite these constraints we are still able to make statements about the mobility types (as a function of our classification schema) and will hopefully be able to make inferences about adjustment costs in the Jamaican environment with the convenient advantage of being able to tentatively compare our findings to those produced from similarly treated UK data.

4.3 The Data

Micro-data from the April quarters of the Jamaican Labour Survey collected by the Statistical Institute of Jamaica (STATIN) is used for this study. This is the same dataset that formed the basis for the dataset used in the first empirical chapter of the thesis. In that chapter our specific focus was how the Jamaican labour market adjusted under trade between the years 1983-2006. In the current chapter, however, we do not include information on the trade variables as it was not possible to match detailed trade data to the service sectors of the economy. Furthermore, whereas the last chapter focussed solely on mobility within the manufacturing sector, the sample utilized in this chapter includes employed individuals from all other one-digit sectors of Jamaican Industrial Classification (JIC). This dataset is, to our knowledge, the most detailed source of labour market data for Jamaica and contains information on every respondent interviewed over the period in the applicable quarter. Conveniently, it contains information on employment as well as social and economic characteristics of the individuals surveyed including information on workers' current and past sector and occupation of employment.

Again, the period of interest runs from 1983 to 2006 inclusive. It is important to recall that the April survey for 1991 does not appear in our analysis since this is the only year during the period of interest that the Labour Force Survey was not carried out by STATIN. Also note that micro-data for the intervening years 1995 to 1997 could not be provided by STATIN even though surveys were carried out during those years. Consequently, the labour force micro-data had to be sourced from the Derek Gordon Databank; a data depository unit within the Sir Arthur Lewis Institute at the University of the West Indies (UWI). Unfortunately, the quality of the data for this period (1995-1997) was not detailed enough for our analysis and could not be used.

The most important aspect of preparing the labour market data for the analysis undertaken in this chapter was the harmonization of the industry and occupational codes over the period 1983 to 2006. This was extremely vital since, as is common to many jurisdictions, the codes which are assigned to denote the various occupations and industries are subject to revision and may change from time to time as they did in the Jamaican case.

The industrial codes used to code the Jamaican labour data are referred to as the Jamaica Industrial Classification (JIC) which is based on various revisions of the International Standard Industrial Classification (ISIC). In the Jamaican case, there have been three revisions of the JIC which apply to the labour force micro-data. These are the 1968 version[64] of the JIC, the 1975 revision and finally the 1987 revision. Even though there has been a 2005 draft revision of the JIC (which is based on revision 3 of the ISIC) that has been circulated by the Statistical Institute of Jamaica, it has not yet been applied to the Jamaican Labour Force micro-data and so does not bear any relevance to the empirical analysis carried out here. Since 1991 the April Labour force surveys used in this study have been coded using JIC 1987 but the pre-1991 surveys have been coded using JIC 1968. The concordance required to harmonize both codes to the 1987 revision was graciously provided by the Statistical Institute of Jamaica and was applied to the dataset. We define a "sector" as the one-

[64] The first publication of an industrial classification in Jamaica was actually in 1967.

digit level of JIC 1987. By this measure, there are nine (9) such sectors in the JIC 1987, this level of disaggregation allows one to get a richer picture of the degree of labour market mobility and adjustment. More detailed disaggregation could not be used for the Jamaican data for the reason that, given cell size considerations, the number of moves in any given year would not be large enough. This problem is more acute for smaller sectors. Furthermore, economic analysis at this level of disaggregation has never been achieved in any in prior studies on Jamaican data.

Two occupational coding conventions are used in the Quarterly Labour Force data. The coding of the response to questions regarding occupational status (or past occupational status) questions in the data changes in 1993 to the Jamaica Standard Occupational Classification (JSOC) revision 1991 which is based on the International Standard Classification of Occupations (ISCO) revision 1988. Because of this inconsistency in the occupational codes, there was a need to harmonize the occupational codes as well. Unfortunately, no such concordance exists between the pre- and post-1993 occupational codes and so a detailed concordance matching the two codes had to be developed during the process of our research. The 1457 codes of the old JSOC codes were paired with codes from the 1991 revision of the JSOC. The creation of this concordance allows for the creation of our occupational mobility variables from the consistently coded dataset.

In general, two important conditions are used in order to identify respondents reporting to have changed their employment circumstances within the last year (the last 12 months) in order to create the mobility variables. Movers must not only have explicitly reported to have been in the current job for less than twelve (12) months in question Q3.10 (Q3.11 for survey years post-1994) but must also have explicitly indicated in Q3.14 that he/she did not stop working in his/her previous job more than a year before the time of the survey (that is must have stopped working in the previous job less than a year ago). In order to ascertain whether the respondent has changed sectors we need to combine this information with survey information about the individual's current and past occupational and industrial status[65]. Restricting the

[65] Admittedly, our measure of mobility may underestimate total job mobility if more than one job change occurs between subsequent interview periods. This is a feature of stock-sampled data.

sample to respondents who have been unemployed or did not participate in the labour force for a relatively short period or essentially less than a year (or more precisely less than the length of time between surveys), is consistent with the notion that there are fundamental differences between the decision to transition from non-participation/unemployment to employment as opposed to the decision to change jobs.

As can be expected, defining the occupational mobility variables hinges crucially on the definition of occupations. There is *ex-ante*, no guarantee that the JSOC classification in which the data is coded captures what we have in mind when we refer to the distinct skill sets required for particular jobs. Conceptually therefore, before undertaking the analysis one must first ask the question: What is ideal occupational classification schema and, more importantly, what is the underlying conceptual motivation behind the definition of an occupation?

The definition of skills and, in particular, the definition of occupational skills is the main thrust of our paper. As Shaw (1984) recognizes "the problem associated with studying occupational change is that the term is inherently difficult to measure, due to the idiosyncratic nature of occupational skills". Various definitions of this term have been provided in the literature. Of note, the Organisation of Economic Cooperation and Development (OECD) defines a skill as "the qualification needed to perform certain tasks in the labour market (OECD, 1996). Wolf (1995) extends this definition by adding that "skill" is a multidimensional concept that includes physical, numerical, verbal, interpersonal and cognitive abilities. To arrive at an economically meaningful occupation classification, industry codes were grouped using the classification of Dolton and Kidd (1998). Under this schema, each three- digit code is recoded into one of the 43 occupational categories. This classification system is also used by the British Department of Employment in officially coding labour market occupational data and represents the UK government's attempt to classify occupations by their skill requirements and has been adopted as a reasonable approximation of the "distance" between occupational groupings. We use various refinements of this general schema in this paper, for example the 43 group

Furthermore Faber (1999) states that on of the central facts about job change is that there is a high hazard of jobs ending within the first year of an employment relationship.

classification is later broken down into fewer, broader categories to investigate aspects of the dataset or to summarize findings. A similar approach has been used by other researchers on these issues, notably Elliot and Lindley (2006a) and Upward *et al* (2004)[66]. The relevant tables containing the concordances between these occupational and skill groupings are available in *Tables A5-A7* in the Appendix.

One might question the logic of applying an occupational classification schema similar to that used by the UK on the Jamaican data. Such an approach may seem to be unappealing because of the clear differences between the countries since both economies are clearly at different stages of development. One advantage of the approach we pursue is to be able to compare the results from prior studies with the results from the Jamaican data. However, comparability of the results is neither the only nor most compelling reason for our choice. Any inspection of the economic literature making use of occupational groupings categories used by Dolton and Kidd (1998) or Elliot and Lindley (2006a) will reveal that the definitions are quite general and applicable despite the fact that the technology levels, capital and hence productivity levels would be expected to be different. In retrospect, this similarity is not surprising when one considers that a wide range of occupations would tend to be common across many communities. In fact, a consistent theme within the development literature is not that the occupations themselves are fundamentally and distinctly different in the developed as opposed to the developing country settings but rather that occupations in these two environments differ in the extent to which capital and technology are spread thickly or thinly over them. For example, though there are doctors in both types of economies the major difference between the jobs in a developed rather than a developing country setting would be the extent to which types of equipment and technology used in the conduct of the doctor's function. The same concept applies to other occupations such as teacher, policeman or cook etc. So that while we do not deny that additional skills may be required in order to incorporate and apply the technology and capital to the job function (the developed country worker may need training to take advantage of the new technology and machinery were it made available to him) this does not mean that, in general his job

[66] Upward et al (2004) differentiate between upward and. downward mobility in modelling mobility using a duration model on panel data. We do not make this distinction in this chapter. We pursue the causal factors to mobility (in general) in Jamaica.

role has changed, or that he is in a new occupation. The developed country worker is simply reaping the productivity benefits of the availability of more capital to increase productivity in the original job function

Therefore, in our opinion, the criticism of our approach in favour of applying different definitions to occupations in the UK as opposed to Jamaica is analogous to *"an objection to measuring both the tall and the short with the same ruler"*. This is an unnecessary objection since, in our opinion; we require only two necessary and sufficient conditions to establish the applicability and suitability of any occupational classification. These two pre-requisites are *i*) it should be possible to classify the occupational groupings in the Jamaican data using the proposed classification scheme with reasonable accuracy and *ii*) the occupational classifications of the scheme should be "wide enough" so as to ensure that the skill sets required for distinct occupational classifications are sufficiently different such that movements can be thought of as an occupational change. We are satisfied that both criteria were satisfied with the method employed to analyze the Jamaican data.

A similar argument applies to our choice of sector. In this case we use the one-digit level of the JSIC code as the definition of a sector. Moreover, although relatively aggregated, our choice was carefully chosen to match the occupational classifications so that most sectors had a range of occupations and we were able to interact the two (e.g. there may be no teachers in the mining industry). We have used the most disaggregated level of analysis for this study that was econometrically viable. For reasons related to robustness, the reader will note that various levels of aggregation were employed in this paper and were consistent with the finding presented here. As far as was we are aware, Gittleman and Howell (1995) and Elliot and Lindley (2006a) are the only papers employing comparable levels of disaggregation used in this paper.

Having established the definition of an occupation we are now able to discuss what is meant by an occupational move and how we arrive at the description of the occupation mobility measures with which we are central to our analysis here. The diagram below presents a schematic of the types of mobility we try to explain in this chapter.

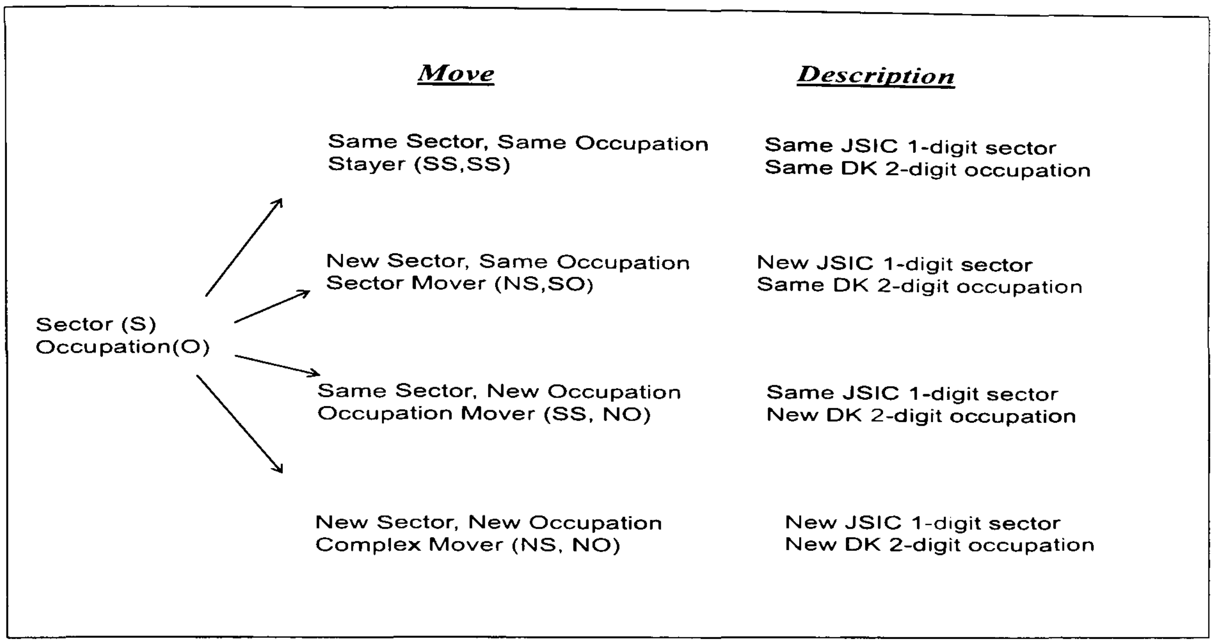

Figure 4.1 Occupational and Sectoral Mobility: Definitions

Figure 4.1 shows the dimensions of the mobility we attempt to analyze within the Jamaican labour market. An employed respondent who has moved sector, occupation or both during the 12 months prior to the survey is considered a "mover". An individual who has not moved sector or occupation is regarded as a stayer (SS, SO)[67]. We are therefore, in the broadest sense, considering moves that we expect, *a priori*, to incur some degree of short-run adjustment cost.

An individual is classified as a simple occupation mover (SS, NO) if she has remained in the *same sector* (SS) but moved to a *new occupation* (NO). An individual is known as a simple sectoral mover (NS, NO) if she has moved to a *new sector* (NS) but remained employed within the *same occupation* (SO). Finally an individual is classified as a complex sector occupation mover (NS, NO) if he/she has moved to a *new occupation* and a *new sector*. All of the aforementioned categories are displayed in the schematic of *Figure 4.1*.

Simple occupation moves (SS, NO) can either represent promotions or demotions, a distinction which we do not make in this chapter. These moves may also involve horizontal moves within the same sector. We would not expect such moves to incur a loss of sector specific skills. On the other hand simple sector moves are expected to

[67] SS means same sector. SO means same occupation.

represent a greater adjustment for the very reason that in these types of moves it is likely that sector specific skill is lost. However this type of mobility does not require transferability of occupational skills since, for this type of move the worker remains within the same occupation. Finally, complex sector occupation moves are arguably the most costly since for these moves the worker requires a distinctly different occupational and sectoral skill set. Despite these *a priori* expectations, in the end, we expect the actual costs of these moves to depend on the characteristics of the individual worker, his attendant skills and a comparison between the requirements of the new job relative to that of the old.

4.4 Descriptive Statistics

In this section we try to set the background for the empirical analysis by examining the labour market data. We pursue a deeper understanding of the nature and dimensions of the transformation that took place within the Jamaican labour market over the sample period 1983-2006. To begin with, we wish to measure the extent of sectoral adjustment that has occurred.

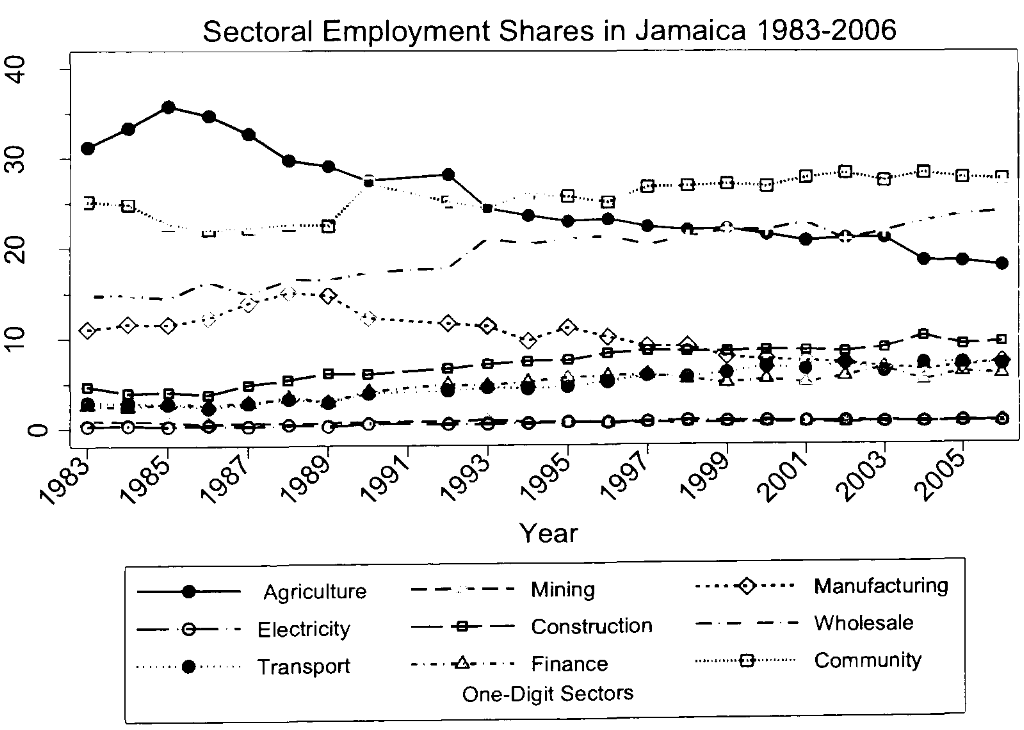

Figure 4.2 Sectoral Employment Shares in Jamaica: 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

Figure 4.2 shows the evolution of sectoral employment shares over the sample period. Since we have discussed this figure before in the preceding chapter, we will not allow ourselves to be detained for too long with *Figure 4.2* as it has been presented and discussed elsewhere and is reproduced here solely for the reader's convenience. Here, it suffices to say that this figure highlights the sectoral transformation that has occurred in Jamaica over the period. Firstly, it is clear that the share of employment in all goods- producing sectors; agriculture, mining, manufacturing have declined over the period. In particular, the proportion of workers employed in agriculture, mining and manufacturing has decreased over the years of our sample. The most dramatic decline can be observed in the agricultural sector. Employment within this sector almost halved over the period; starting in 1983 at 31.2% and declining over the majority of the sample years to 17.9% in 2006. Declines in manufacturing and mining were less dramatic with these sectors seeing declines of 3.9% and 0.4% respectively. Notably, the level of decline in manufacturing is equivalent to one-third of the share of the sector in 1983. On the other hand, the service sector share of employment has experienced significant growth with the finance and transport sectors increasing their share of employment by 217% and 233% respectively, with the wholesale sector showing a significant increase in its share of employment having increased its share from 14.79% in 1983 to 23.92% in 2006. Over the sample period, the Jamaican economy also experienced significant growth in the employment shares of other non-goods producing or secondary sectors.

The econometric analysis undertaken in *Chapter 3* provides evidence that, in the case of the secularly declining manufacturing sector, these changes were-to various degrees- triggered by various socio-economic characteristics of the Jamaican manufacturing workers such as changes in the demand for certain skill sets within manufacturing, distribution of relative wages, location of the worker, demand shocks year-to-year and to a lesser extent trade flows and in particular import flows into the economy. Extending this analysis to include occupational adjustment, however we would like to investigate whether there was also a concomitant adjustment which was absorbed through occupational mobility.

Figure 4.3 shows the evolution of employment shares by skill level in the Jamaican economy between the years 1983-2006. We remind the reader that in order to generate the figure all the occupations recorded in the Jamaican Quarterly Labour

Force Survey were grouped into two general skill groups; details of which can be found in *Table A7* in the Appendix[68]

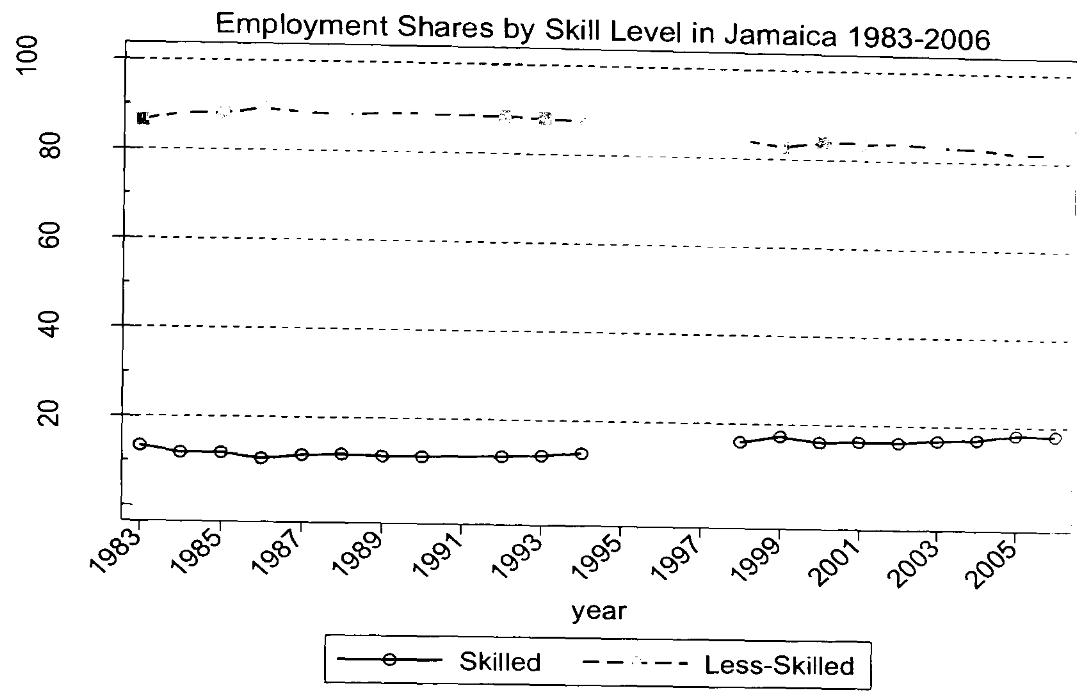

Figure 4.3 Employment Share by Skill Level in Jamaica
Source: Jamaica Labour Force Survey (STATIN)

Skilled professionals and skilled managers together constitute the skilled worker category while less-skilled non-manual workers and less-skilled manual workers together form the less-skilled category. Firstly, we can see that over the entire sample period, on average 86% of the employed labour force fall in the category of the less-skilled leaving mere 14% of the population within the skilled category. Over the period, there is some evidence of increased employment of skilled individuals at the expense of the unskilled. This increase- however nominal- was a mere 5%. In contrast, Elliot and Lindley (2006a) report a significant increase in the share of skilled workers employed in the UK labour market between the years 1985-2000. Using a classification schema similar to ours they find that over the 6 year period, the percentage of skilled workers in employment increased from 30% to 38% with a corresponding decrease in the percentage of unskilled workers in employment during a time period when there is sufficient evidence in the economic literature of a rapid move by rest of the world notably Asia, Europe, and the Americas to a more highly skilled labour force. The failure of the Jamaican economy to register significant success in the area of economic growth over the period may well be related in some

[68] Recall that the missing years correspond to years for which the Jamaica Labour Force Survey was not available with sufficient occupational detail allowing classification.

way to its failure to improve, in a more substantially manner, the skill-level of its labour force. In addition, the immigration of skilled workers and university graduates alluded to before could also be an explanation behind the slow rate of increase in the proportion of skilled individuals employed in Jamaica especially since 1999.

Other possible reasons to explain the evolution of the skill content of the Jamaican labour force is that there has been overall, limited growth in the demand for skilled labour by Jamaican firms (demand-side factor). This is a possible outcome if the Jamaican firms are, on the whole more traditional, and lack the dynamism needed to take advantage of workers possessing relatively higher skill levels. While declining probabilities of skilled workers (relative to the unskilled) in finding a successful match is a possible explanation for the results of *Figure 4.3,* it is an unlikely possibility since one would expect, that given their advantage over their less skilled counterparts in finding employment, these workers would not only be better able to obtain information on job opportunities but better equipped to take advantage of such opportunities. Furthermore, from *Figure 4.3* we observe that the proportion of skilled workers employed increases as at a slower rate towards the last 7 years of the sample.

In sum, *Figure 4.3* makes it clear that Jamaica has made little progress in improving the skill content of its employed labour force over the period of study and therefore the skill content of employed labour force is one dimension of labour market activity which has not transformed significantly over the period especially when compared to significant labour market adjustments observed elsewhere.

Figure 4.4 shows the proportion of the employed labour force in Jamaica changing occupation or sector over the sample period. Again there are gaps in the series between the years 1995-1997 because the data received from STATIN for these years were not provided in sufficient detail to allow for the construction of mobility series. Sectoral moves are measured using the JSIC one-digit classification and the comparable occupational classification based on Elliot and Lindley (2006a). Note that the level of inter-occupational mobility as a percentage of the employed labour force is roughly averaging 1.45% over the entire sample period. In contrast the level of sectoral mobility was significant and averaged 3.2% of the employed labour force over the period.

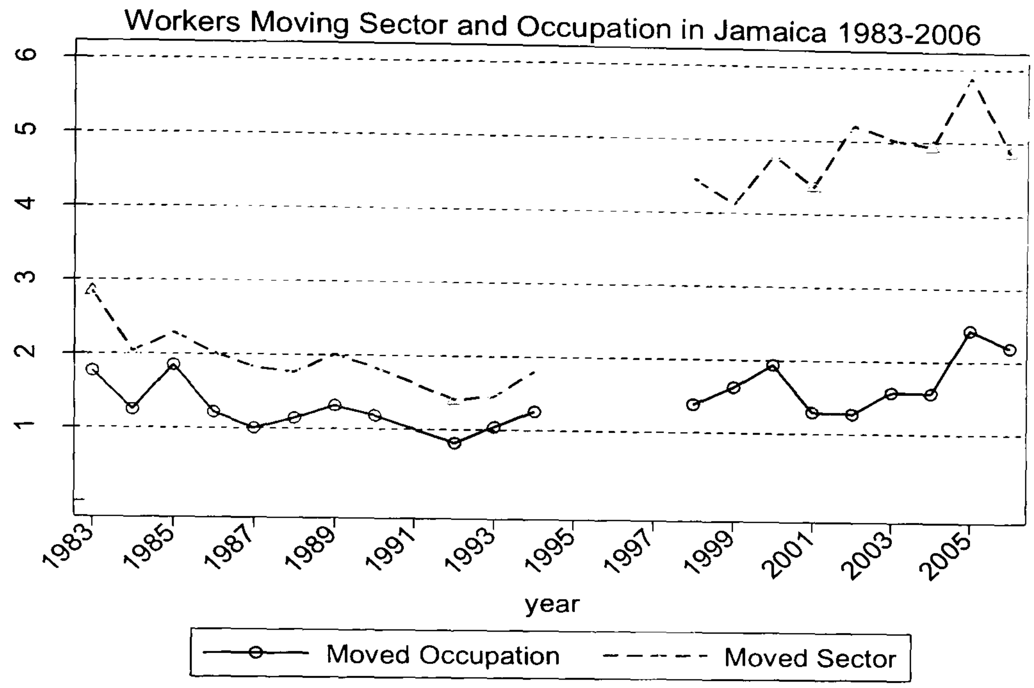

Figure 4.4 The Scale of Sectoral and Occupational Mobility 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

This would seem to imply that some Jamaican workers may have been moving sectors without changing occupations or to jobs with comparable skill levels; a type of flexibility in the labour market that may well be indicative of the basic and transferrable nature of skills possessed by the movers within the Jamaican labour market economy. Comparing the Jamaican mobility measures with the results for the UK reveals that for both occupational and sectoral mobility, the UK economy has experienced higher levels of mobility than was experienced in the Jamaican labour market with both the occupational and sectoral mobility series ranging between 4% and 7.5%. Another major difference between the Jamaican and UK series is that; in the Jamaican case, sectoral mobility dominates the occupational mobility series whereas the opposite is true for the UK. Moreover, in the Jamaican case the "spread" between the two series is greater each year than is the case in the UK where the magnitude of the difference between both series is never greater than 1%. Despite these differences there is apparent co-movement in the sectoral and occupational mobility series; a phenomenon that is also evident in the UK data. This suggests that there may be common factors driving both occupational and sectoral mobility and that these factors could share the same direction of causation in influencing both occupational and sectoral mobility-albeit to varying degrees.

Both series in *Figure 4.3* appear to move anti-cyclically. Mobility of whatever type experienced a trend decline from 1983 until the late 1980's. Towards the end of the decade the Jamaican economy experienced relatively high levels of economic growth. The anti-cyclicality of the mobility measures could be a signal that lay-offs dominate quits in the Jamaican labour markets; since it is well known from the empirical literature that layoffs tend to move anti-cyclically while quits tend to vary positively with the business cycle.

The trend declines in both sectoral and occupational mobility in Jamaica during 1980's differ starkly with the trend in the mobility estimates from the 1990's onward. Since 1992, the Jamaican labour market has experienced increased levels of mobility. For example, *Figure 4.4* shows that after registering sectoral mobility of 4.5% in 1998, the series increases to as high as 6% in 2005 before declining by 2006. On the other hand, occupational mobility increases up to year 2000, returns to its former level for the next two years before increasing to 2.4% in 2005, before declining marginally in the last year for which we have data. Notably, the proportion of the employed labour force adjusting inter-sectorally increases at a faster rate than the proportion changing occupations over this later period[69]. On the other hand both experience declines in the last year.

It is remarkable that the latter period (for which data is available) which is marked with higher mobility was characterized by reduced tariffs, financial market liberalization and subsequent financial sector collapse which had a significant effect on the economy. There were episodes of high interest rates and significant inflation during this period which no doubt could have affected in some way the higher mobility outcomes, and the greater volatility in the mobility series which we observe in the figure.

[69] There were no changes in either the survey design or the coding of the occupational or sectoral codes during this later period which completely rules out the possibility that the difference in the behaviour of both series over the later period could have been caused by measurement change or error.

		Moved Occupation		
		Same(SO)	New(NO)	Total
	Same(SS)	**207466**	**1073**	208539
		99.49%	0.51%	100.0%
		97.88%	27.46 %	96.61%
Moved Sector	New (NS)	**4487**	**2835**	7322
		61.28%	38.72%	100.0%
		2.12%	72.54%	3.39%
	Total	211953	3908	215861
		98.19%	1.81%	100.0%
		100.0%	100.0%	100.0%

Table 4.1 Cross Tabulation of Sectoral and Occupation Movers
Source: Jamaica Labour Force Survey (STATIN)

We show in *Table 4.1* simple cross tabulations of occupational and sectoral movers. This table allows us to analyse mobility within the Jamaican labour market as a percentage of the total sample (including unemployed and out-of-the labour force[70]) that are simple or complex movers. *Table 4.1* shows that movers (whether of occupation or sector) make up 3.88% of the sample. Of these 8395 movers, 1073 moved occupation but not sector (SS, NO), 4487 moved sector but remained within the same occupational category (NS, SO) whereas 2835 individuals moved both sector and occupation (NS, NO). Therefore we have the majority of moves being attributable to simple sectoral moves corroborating the results in *Figure 4.4* above. Ranking the types of moves in order of magnitude reveals that, within the Jamaican labour market, simple sectoral moves dominate, with complex moves of a smaller magnitude. Simple occupational moves represent the minority. In contrast Elliot and Lindley (2006a) find that in the UK data simple occupational moves dominate followed by complex moves and simple sectoral moves respectively. These contrasting results highlight the differences that can exist between labour markets and evokes the question: what are the characteristics of the Jamaican labour market that makes movers more likely to move sectors than to change occupations?

These preliminary results cause us to take a critical look at the framework adopted by Parnes (1954) and Elliot and Lindley (2006a) regarding what is meant by the "complexity" of the job change. From our results here as well as the recent results for the UK it is clear that the term used to describe a worker's simultaneous change of sector and occupation ("a complex move") should be interpreted solely as a

[70] A revised version of *Table 4.1* excluding the unemployed and non-participating workers is presented below.

descriptive term. Within this framework then a "complex" move, we have seen, may not necessarily represent the most costly move to a worker. To the individual Jamaican worker a complex move, as we have defined it in this Chapter, may well represent an easier, smoother and less costly transition than simply moving sector or occupation only. Moreover to the extent that this particular worker type dominates the population (or sample) we may well expect that in different environments, economies and labour markets differences in the nature of adjustment costs will affect the relative costliness of making; complex, simple occupation and simple sectoral moves. Following this line of reasoning implies that there may be features of the Jamaican labour market which make simple sectoral moves less costly than simple occupational moves; factors which may not be present or may work differently in the UK labour market.

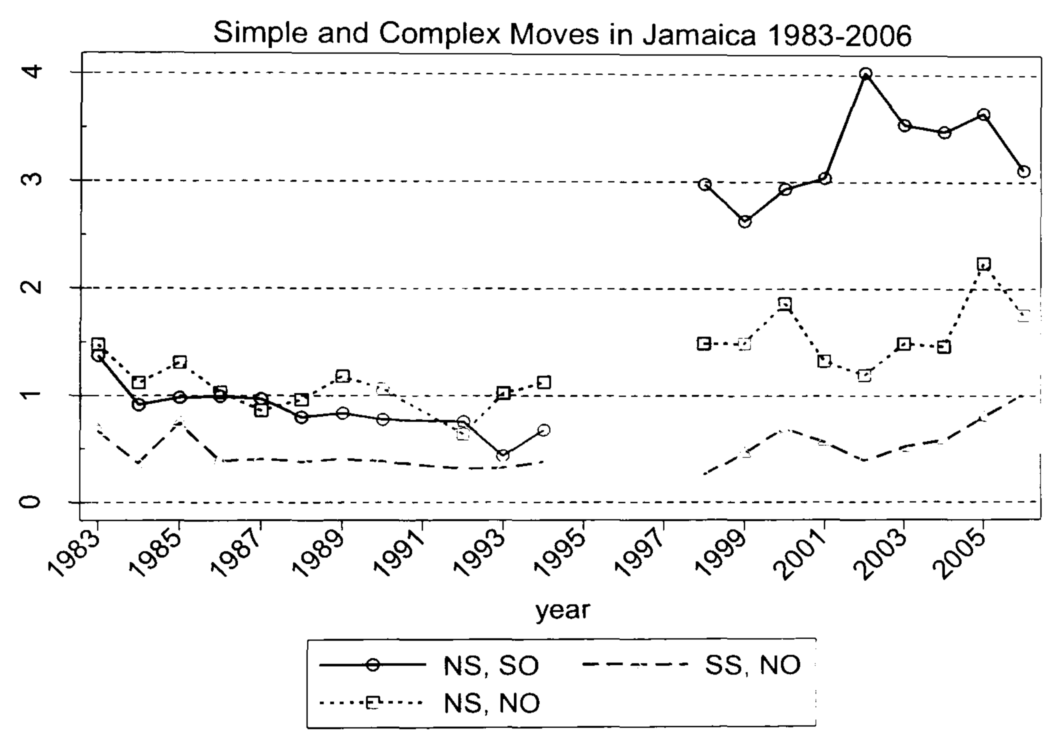

Figure 4.5 Simple and Complex Moves in Jamaica
Source: Jamaica Labour Force Survey (STATIN)

Figure 4.5 disaggregates types of moves further into the two types of simple moves (simple occupational and simple sectoral) and complex moves as a percentage of the employed labour force. As expected, the results from *Table 4.2* and *Figure 4.4* are corroborated. The figure reinforces the fact that there has been a marked change in mobility trends since the 1990's but reveals further that simple sector moves (NS, SO) have not always been the most dominant type of mobility. In fact, up to 1994 the most significant type of mobility fell under the "complex" mobility category. Up to this point, it should be noted that although complex movers always accounted for a marginally greater percentage of the employed, both complex and simple sectoral movers were always realized at similar magnitudes fluctuating around 1% of the workers employed. Meanwhile simple occupational moves remained relatively constant at 0.5 % of the employed. As we have seen, from 1990's onwards the Jamaican Labour market underwent an obvious shift. The labour market quickly moved from the declining mobility rates experienced in the 1980's to increasing mobility rates in all categories but especially in the simple sectoral and complex mover categories. In fact, simple sectoral mobility as a proportion of the employed increased to a high of 4% in 2001, but since then experienced a decline to 3% at the end of the sample. The proportion of complex movers increased in the 1990's but remained, for most of this sub-period, between 1% and 2% of the employed labour force peaking briefly outside of this range only once in 2005 when a mobility percentage of 2.19% was registered. The proportion of the employed labour force in Jamaica that moved occupation only remained within the range 0%-1% during the period, remaining virtually constant until the late 1990's after which there were two periods of increase 1998-2000 and 2002-2006.

In order to understand the dynamics of the occupational dimension of job-to-job labour market mobility in Jamaica it might be helpful to consider analyze the *ex-post* probabilities of moving occupations throughout the period.

4.5 Analysis of Occupational Transition Probabilities

Tables 4.2a to *4.2d* below depict occupational transition probabilities for four selected years of the Quarterly Labour Force Survey Data. The years chosen for this analysis are 1987, 1993, 1999, 2004[71]; each table provides a snapshot of the probabilities of mobility between occupational classes in Jamaica. In all tables presented below, the probability of remaining in the occupation of origin is found in cells having the same column and row occupation label. The transition probabilities of moving from the occupation of origin to some other occupational category are presented in the rows which are labelled as the occupation of origin and the destination or receiving occupation is signified by the respective column headings.

[71] By 1987, we mean that the tables contain *ex-post* transition probabilities of mobility between the years 1987 and 1988

We could think of the tables as the square matrix O_{ijk}; where i represents the row occupation (occupation of origin) and j represents the column occupation (destination) and k represents the year of analysis. Since o_{ijk} where $i=j$ is the cell representing the occupation of origin i, then all other cells in that row o_{ijk}, $\forall \ i \neq j$ contain the probabilities of transitioning from i into occupation j. Transition tables of this variety were used in the preceding chapter and are of some use in identifying the linkages between the labour market states, industries, sectors and occupational groupings. Whereas in the preceding chapter we applied transition tables to understand the sectoral and industrial dimensions of mobility within the Jamaican labour market, in this chapter we apply the same device to analyze occupational mobility.

The probabilities within row o_{ijk} are calculated by dividing the flow into all columns occupations $i \neq j$ in year $k+1$ by the stocks of workers in the respective column occupations in year k. The leading diagonals of *Table 4.2a-4.2d* contain the probability of remaining within the row (column) occupation. The high probability values within this diagonal indicate that most Jamaican workers will remain in their occupation of origin year after year. Cells containing zero probabilities were deleted from the table for ease of reading. An examination of all tables presented reveals that relatively highly skilled occupational categories such as engineers and scientists and lower skilled categories such as welfare workers consistently retain a relatively high portion, if not all of their workers.

On the other hand, numerous empty (zero) cells in the upper left quadrant of the table indicate that there is a remarkably low level of mobility between relatively highly skilled occupations in Jamaica. The lower left of the table in *Figure 4.2a*, for example, contains far less empty (zero) cells. This confirms our hypothesis that whatever occupational mobility was taking place during 1987 was occurring mostly among the unskilled occupational groups. As we have seen, this is a characteristic feature of the Jamaican data. For example, the table shows that in 1987 the (*ex-post*) probability of changing occupations from selling to manual occupation was 1.2%

Occupation	Teacher	Engineer	Scientist	Technical	Manager	Legal	Social	Welfare	Clerical	Selling	Manual	Other	Total
Teacher	0.990								0.007		0.003		291
Engineer		1.000											15
Scientist			1.000										11
Technical				0.950							0.025	0.025	40
Manager					0.996	0.001				0.001		0.001	2134
Legal					0.006	0.987			0.003	0.003			314
Social					0.007	0.007	0.971			0.007	0.007		138
Welfare								1.000					34
Clerical					0.001	0.008			0.980	0.005	0.005		763
Selling				0.001	0.003	0.001			0.003	0.976	0.012	0.003	1550
Manual					0.003				0.001	0.007	0.986	0.002	2123
Other					0.003					0.004	0.009	0.983	963

Table 4.2a Table Showing Transitional Occupational Transtiton Probabilities 1987
Source: Jamaica Labour Force Survey (STATIN)

Occupation	Teacher	Engineer	Scientist	Technical	Manager	Legal	Social	Welfare	Clerical	Selling	Manual	Other	Total
Teacher	0.993							0.007					148
Engineer		1.000											8
Scientist			1.000										8
Technical				1.000									46
Manager					0.988					0.005	0.004	0.003	1173
Legal	0.009					0.982				0.009			113
Social							1.000						47
Welfare								1.000					10
Clerical	0.003				0.006	0.006			0.956	0.020	0.006	0.003	342
Selling					0.006	0.001			0.004	0.974	0.010	0.006	1081
Manual		0.001			0.007	0.001			0.006	0.018	0.964	0.004	1206
Other					0.024					0.014	0.016	0.946	369

Table 4.2b Table Showing Transitional Occupational Transition Probabilities 1993
Source: Jamaica Labour Force Survey (STATIN)

Occupation	Teacher	Engineer	Scientist	Technical	Manager	Legal	Social	Welfare	Clerical	Selling	Manual	Other	Total
Teacher	0.984				0.002					0.006	0.008		493
Engineer		1.000											39
Scientist			1.000										20
Technical				1.000									160
Manager	0.001			0.001	0.992					0.002	0.004	0.001	3912
Legal					0.005	0.977			0.014	0.002	0.002		428
Social							1.000						136
Welfare					0.071			0.929					70
Clerical					0.012				0.969	0.017	0.001		1048
Selling	0.001				0.008	0.001			0.004	0.975	0.007	0.003	3210
Manual					0.005	0.001			0.004	0.006	0.979	0.006	3635
Other					0.001					0.006	0.009	0.983	955

Table 4.2c: Table Showing Transitional Occupational Transition Probabilities 1999

Source: Jamaica Labour Force Survey (STATIN)

Occupation	Teacher	Engineer	Scientist	Technical	Manager	Legal	Social	Welfare	Clerical	Selling	Manual	Other	Total
Teacher	0.993					0.003				0.003			290
Engineer		0.964									0.036		28
Scientist			0.909	0.091									11
Technical				0.971					0.014	0.014			70
Manager					0.983		0.001			0.005	0.008	0.003	2117
Legal					0.014	0.967			0.009	0.005	0.005		215
Social							1.000						116
Welfare								1.000					40
Clerical	0.003				0.007				0.972	0.012	0.003	0.003	679
Selling					0.012				0.006	0.971	0.006	0.003	2066
Manual					0.008					0.011	0.976	0.004	2166
Other	0.002				0.009				0.002	0.020	0.022	0.946	554

Table 4.2d Table Showing Transitional Occupational Transition Probabilities 2004

Source: Jamaica Labour Force Survey (STATIN)

while the probability of changing from selling to clerical occupations was 0.3%. It is also noteworthy from the results of *Table 4.2a* that there was not much mobility from the ranks of the unskilled to skilled occupations reflecting the familiar trend first revealed in *Figure 4.3*; Jamaica has not, since 1983-2006, experienced significant improvement in the occupational skill content of its employed labour force.

Table 4.2b reveals results for 1993 which appear strikingly similar to the transition probabilities from the earlier year. Nevertheless, 1993 is an important year to be included in this analysis because the transition probabilities for that year reveals slight yet perceptible increase in the skill content of the employed. The question then arises: what were the occupational adjustments that took place to produce this slight increase in the skilled series represented in *Figure 4.2b*? The transition matrix for 1993 shows increased transition probabilities out of clerical, manual and other occupations and into selling occupations. Although selling was not the only receiving occupation, in general the mobility probabilities into this occupational category were of a relatively greater magnitude. In sum, the majority of the adjustment in this period again involved lower skilled workers but there was a marked movement into selling occupations. We also observe (non- zero transition probabilities) relatively greater transition probabilities in the relevant cells indicating upward or horizontal mobility from the *other* to the *manager* occupation group, indicating that by this time the tendency towards nominal up-skilling-however small-within the Jamaica labour force had begun.

Between the years 1999 and 2000, the Jamaican labour market was undergoing relatively greater sectoral and occupational re-allocation. Recall that at this time the proportion of Jamaican workers undergoing sectoral mobility was 4.2% of the employed labour force of which simple sectoral movers (NS, SO) was of a relatively high magnitude (compared to other years of the review period) at around 2.5% of the employed labour force. Occupational mobility was also increasing during this period. What is clear from *Table 4.2c* is that the occupational mobility occurring at this time clearly favoured managerial and selling occupations. This can be observed from the table by looking at the probabilities in the managerial and selling columns. The magnitudes of the probabilities in both these columns are of a comparatively high magnitude. However, the type of mobility observed during this period contrasts with the type of mobility we have seen before for the earlier years in the sense that there are significantly greater ex-post probabilities into managerial and selling occupations during this interval. The manager occupational category referred to in *Table 4.2a-4.2d,* when elaborated, includes as well more skilled sales occupations so it would seem that there was a move into more highly skilled selling occupations than we had witnessed in earlier years. At the same time however, there was an increased probability in movement from higher skilled to lower skilled selling occupations as well. For example, notice the non-zero cells in the selling and manual columns in *Table 4.2c*. The non-zero cells indicate that workers were actually moving from teaching, technical, managerial and clerical occupations into selling occupations between 1999 and year 2000. Given what we have seen about the production and import matrix of the Jamaican economy what we seem to be observing is the rise of a class of traders who were taking advantage of the increased local trade of imported foreign goods; now more available to the Jamaican market because of the increased imports accompanying the liberalization process. We observe from *Table 4.2c* evidence of labour supply response to increased opportunities in trading around the same time that workers were moving out of employment within primary sectors of the economy. Occupational mobility between lower skilled occupational groups persists during this year. *Table 4.2d* reveals a continuation of this trend.

In sum, it would appear from examining *ex-post* probability transition tables that the labour market transition we observe in Jamaica occurred in various stages. It might be useful for the reader to think of mobility in the Jamaican economy in terms of three distinct periods. During the first period; 1983-1990 the labour market was characterized by stability in almost every sense. A stagnant skill structure characterised this period and relatively low or declining levels of both occupational and sectoral mobility. From the sectoral shares of employment we observe, up to the start of the 1990's, buoyancy in the goods producing sector of the economy. However toward the end of that decade this situation began to change. Most of the dynamics in the occupational structure of the labour market during this period was generated by the lower-skilled workers-grasping whatever opportunity their general and lowly skills would qualify them to perform. The second phase of the adjustment occurred between 1990 and 1993 and coincided with the opening up of the Jamaican economy to trade through the reduction in tariffs and liberalization of the capital account. During this period the wholesale, transport, construction, finance and in general, the service sectors experienced significant growth in their employment shares. Moreover, as we have seen from our analysis of the occupational mobility transition matrices, at the very same time that these sectoral changes were occurring some occupational adjustment had also begun to take effect. Notably, the simultaneous occurrence of the movement of workers from skilled occupations into the ranks of the lower skilled selling related occupations and the promotion of workers from lower skilled occupational categories, in general, to the higher skilled managerial and sales occupational category. This simultaneous up-skilling and de-skilling of the Jamaican labour force appears to have resulted more from increases in entrepreneurial opportunities in the trading of imported commodities than from a structural change in the skill content of the labour force *per se*. It is interesting to note that, on balance, there was a positive net effect as can be seen by an improvement-however small- in aggregate skill levels over this period. The third stage of the adjustment occurred 1995-2006 and is generally marked by a continuation of the earlier trends. In general, the trend increase in the share of service (secondary) sector employment and the continued shift in the occupational structure shifts toward occupations related to sales such as manager and selling occupations persists throughout the period. The pattern of relatively greater degree mobility between unskilled occupations persists during this period as well. Although sectoral mobility tapers off, somewhat, towards the very end of the sample, occupational mobility in favour of the selling occupations intensifies.

4.6 An Examination of Sample Proportions

Table 4.4 depicts the sample means of key socio-economic characteristics of individuals surveyed. To arrive at the sample means in *Table 4.4,* workers are matched with their characteristics in the Jamaican Quarterly Labour Force Survey of the previous year. For example, workers who have made complex moves (NS, NO) are assigned occupation, sector and skill levels in survey year *t-1*. In this way, we attempt to arrive at an estimate of the unweighted sample means for some key variables used in the estimation. Although our decision to assign workers to their occupation and sector of origin is entirely consistent with the idea that there will likely be causal dependence of the worker's decision to move sector or occupation in time t on sector-specific information at time $t-1$, it comes at a cost. The existence within the sample of workers who have reported changing sectors and/or occupation within the last *12* months while not detailing the specific sector or occupation has necessarily meant that the sector and/or occupation of origin for some movers cannot be determined. Unfortunately, these workers had to be removed from the sample leaving the constitution of the sample as is reported in *Table 4.3* below. The means for the complete sample are presented in *Table A8* of the Appendix for academic purposes.

		Moved Occupation		
		Same(SO)	New(NO)	Total
	Same(SS)	**190523**	**1056**	191579
		99.45%	0.55%	100.0%
		99.29%	27.80 %	96.61%
Moved Sector	New (NS)	**1368**	**2743**	4111
		33.28%	66.72%	100.0%
		0.71%	72.2%	3.39%
	Total	191891	3799	195690
		98.06%	1.94%	100.0%
		100.0%	100.0%	100.0%

Table 4.3: Revised Cross Tabulation of Sectoral and Occupation Movers
Source: Jamaica Labour Force Survey (STATIN)

After removing records of respondents who did not specify the specific sector or occupation of origin. We arrive at the sample proportions displayed in *Table 4.3*. Incomplete records for respondents have caused the sample to be reduced from a total of *215861* observations which the reader can verify from *Table 4.1* to the new sample total of *195690* taken from the bottom right hand corner of *Table 4.3*. Most of the decline in the latter table can be observed to have occurred in the same sector (SS, SO) group. However, it is also clear that a significant decline also occurred in the (NS, SO) simple sector mover category with the total observations in this category-falling from 4487 to 1368. On the other hand, the change in the number of observations in the complex mover (NS, NO), and simple occupation mover categories are not as large as the reductions observed in the stayer (SS, SO) and the simple mover categories. The reduction in the number of observations in the categories of analysis introduce the possibility if sample bias within our estimations. This is due to the possibility that particular worker groups could be under- or over-represented in the estimation sample. In order to gain a better understanding of the

Table 4.4: Sample Means of Key Characteristics
Source: Jamaica Labour Force Survey (STATIN)

	Stayer (SS, SO)		New Occupation(SS,NO)		New Sector(NS,SO)		Complex Mover(NS,NO)	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Qualifications								
Higher	0.0364	0.0004	0.0379	0.0059	0.0227	0.004	0.0171	0.0025
Further	0.0194	0.0003	0.036	0.0057	0.0256	0.0043	0.0179	0.0025
Other	0.1322	0.0008	0.1951	0.0122	0.1572	0.0098	0.1181	0.0062
No. Qualification	0.7671	0.001	0.6903	0.0142	0.7368	0.0119	0.8148	0.0074
One Digit Sectors								
Agriculture	0.2652	0.001	0.1525	0.0111	0.0855	0.0076	0.1371	0.0066
Mining	0.0067	0.0002	0.0038	0.0019	0.0102	0.0027	0.0077	0.0017
Manufacturing	0.0989	0.0007	0.0956	0.0091	0.1689	0.0101	0.1469	0.0068
Electricity Gas and Water	0.0075	0.0002	0	-	0.0022	0.0013	0.004	0.0012
Construction	0.0745	0.0006	0.0634	0.0075	0.0833	0.0075	0.1476	0.0068
Wholesale and Retail	0.1971	0.0009	0.4176	0.0152	0.2222	0.0112	0.2319	0.0081
Transport	0.0502	0.0005	0.0218	0.0045	0.0665	0.0067	0.0682	0.0048
Financing	0.0437	0.0005	0.0388	0.0059	0.0563	0.0062	0.0448	0.004
Community	0.2562	0.001	0.2064	0.0125	0.3048	0.0125	0.2118	0.0078
Occupation								
Teacher	0.0385	0.0004	0.0237	0.0047	0.0051	0.0019	0.0142	0.0023
Engineer	0.0024	0.0001	0	0	0.0037	0.0016	0.0004	0.0004
Scientist	0.0012	0.0001	0.0009	0.0009	0.0007	0.0007	0.0022	0.0009
Technicians	0.0083	0.0002	0.0095	0.003	0.0044	0.0018	0.0051	0.0014
Managers	0.2688	0.001	0.1581	0.0112	0.106	0.0083	0.1265	0.0063
Legal	0.0281	0.0004	0.0473	0.0065	0.0329	0.0048	0.0186	0.0026
Social	0.0136	0.0003	0.0152	0.0038	0.0044	0.0018	0.0036	0.0012

Table 4.4: Sample Means of Key Characteristics-Continued
Source: Jamaica Labour Force Survey (STATIN)

	Stayer (SS, SO)		New Occupation(SS,NO)		New Sector(NS,SO)		Complex Mover(NS,NO)	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Occupations cont'd								
Welfare workers	0.0044	0.0002	0.0057	0.0023	0.0015	0.0098	0.0011	0.0006
Clerical	0.0767	0.0006	0.1278	0.0103	0.1564	0.0098	0.0769	0.0051
Selling	0.2251	0.001	0.304	0.0142	0.3194	0.0126	0.2767	0.0085
Manual	0.2491	0.001	0.1951	0.0122	0.2807	0.0122	0.3693	0.0092
Other occupation	0.0838	0.0006	0.1127	0.0097	0.0848	0.0075	0.1054	0.0059
Skill Groups								
Unskilled manual	0.5589	0.0007	0.7661	0.013	0.7032	0.0124	0.8771	0.0063
Unskilled non-manual	0.0767	0.0006	0.1278	0.0103	0.1564	0.0098	0.0769	0.0051
Skilled Managers	0.2678	0.001	0.0028	0.0016	0.087	0.0076	0.0007	0.0005
Skilled professional	0.0966	0.0007	0.1032	0.0094	0.0534	0.0061	0.0452	0.004
Training								
On-the-job	0.0684	0.0006	0.0549	0.007	0.0599	0.0064	0.0437	0.004
Vocational	0.0492	0.0005	0.0757	0.0081	0.0651	0.0068	0.0368	0.0036
Technical	0.0695	0.0006	0.0597	0.0073	0.0365	0.0051	0.0259	0.003
Other	0.0327	0.0004	0.0246	0.0048	0.0139	0.0032	0.0335	0.0034
None	0.7802	0.0009	0.785	0.0126	0.8246	0.0103	0.86	0.0066
N	190523		1056		1368		2743	

possible impact that the dropped observations might have had on the estimations we will have to examine the sample proportions of the complete sample-that is- the sample represented in *Table 4.1* as opposed to the sample proportions from the sample proportions represented in *Table 4.3*. Such an analysis follows below in *Section 4.7*.

From *Table 4.4,* starting with educational qualifications, we find that the level of educational attainment in the Jamaican employed labour force is generally low. This finding is not only consistent with our analysis of the manufacturing sector data from *Chapter 3*, but is also consistent with the *Figure 4.3* which depicts a highly unskilled workforce. This information can also be confirmed with a casual examination of the sample means relating to the more broadly defined skill categories in *Table 4.4*. Examining the sample proportions reveals the low levels of educational attainment among the employed. This information is suggests the possibility of an effective and binding supply- side constraint on skilled employment in Jamaica. Moreover, it is clear that the *stayers* and simple occupational movers (SS, NO) are the most qualified of all the categories. This suggests that the acquisition of educational qualifications remains an important determinant of an individual's labour market experience in Jamaica. Furthermore, the existence of relatively high proportions of less qualified workers within the *simple sectoral* and *complex mover* category suggests that these workers are more likely to move across sectoral boundaries than their more educationally qualified counterparts. At the other end of the spectrum, workers who have the highest qualifications tend to change occupation while remaining within the same sector. However, from what we have seen so far, highly educationally qualified workers represent the minority of the Jamaican workforce. *Table 4.4* also reveals that a relatively low proportion of workers who have a high level of educational attainment transition between jobs. For example, less than 4% of the sample with higher educational qualifications made simple or complex moves. However among the small proportion of *higher* educated workers who changed employment circumstances most tended to undergo simple occupational transitions and were unlikely to change sector.

The sample means for the sectoral categories reveal disparities in the proportion of movers across one-digit sectors. On the one hand, there are "high turnover" sectors, notably among which are the community, agriculture, wholesale and retail, and construction sector. The wholesale sector accounted for 41.76% of the simple occupational movers over the review period while the community sector accounted for as much as 30.48% of simple sector movers. The wholesale and retail sector dominates the complex movers, accounting for 23.19%. On the other hand, there are sectors which see very little, if any mobility at all. These "low turnover" sectors among all classes of mobility are electricity, water and gas sector as well as the mining sector. In our sample we could not find one worker that changed occupation in the electricity sector. In our estimation, the underlying explanation for this remarkable degree of variation between the sector turnover proportions lies at least in part, in the structure of these within these sectors. The electricity generation and distribution sector is run under a monopoly market structure and has highly unionized workers. Certain occupational skills used within this sector are highly specialized and are not used by another other sector within the economy[72]. A similar situation exists in the Jamaican mining sector. Though not quite a monopoly, the mining sector is comprised of only a few companies which are, for the most part, engaged in mining bauxite ore and alumina. It may be possible that in these low turnover sectors, security of tenure may be one source of non-pecuniary reward which these relatively more highly specialized and unionized workers enjoy.

Although we have listed quite a few "high turnover" industries it is also important to note that even within the "high turnover" industries there is significant variation in sample proportions across the various mobility categories. To see this, consider the construction sector; for this sector, the proportion of simple occupational and simple sectoral moves 6.3% and 8.3% whereas the proportion of complex movers stood at 14%. In the case of the construction sector, the most significant proportion of movers are those workers who change both sector and occupation simultaneously. Manufacturing sector workers also account for a significant proportion of complex moves over the period representing 14.69% of the complex movers. The proclivity of manufacturing sector workers to change sector is also observable from the even greater proportion of simple sectoral movers associated with that sector. These

[72] For example, line-men represent one such occupation.

proportions are entirely consistent with the significant decline in the manufacturing employment share in Jamaica over the period of analysis[73].

On the other hand, the table reveals differences between the "high turnover" sectors such as agriculture, wholesale and retail, and the community services sector themselves. The table shows that a significant proportion of simple occupation and complex movers originated in these sectors. All "high turnover sectors" exhibit a significant proportion of both simple occupation moves and complex moves but relatively small proportions of simple sector moves. As we have seen from *Figure 4.1*, these sectors also account for the largest sectoral shares in the Jamaican economy, in this sense we imagine that they contain a wide range of occupations and worker types and therefore one might find that the workers might be able to minimize adjustment costs by changing occupations without forgoing the benefits that derive from sector-specific tenure. In light, of the this, we can conclude that although the extent of both simple occupation moves (SS, NO) and complex (NS, NO) moves represents very significant mobility categories for all of these three sectors, in most cases the proportion of simple occupation movers is even greater.

Moving to the occupational categories we can see that a fair deal of the movers originated from within the *selling*, *managerial* and *sales*, *manual* and *other* occupational categories. In fact these occupational categories account for most of the mobility of all types. For example in the complex mover category manual workers, by far, accounted for the majority of the movers at 36.93%. The next highest contributing occupational group was managerial workers who registered a corresponding proportion of 12.65%. On the other hand, in the complex mover category *scientists*, *engineers* and *welfare* occupations experienced little or no complex mobility at all. The relative immobility of these occupational classes could be due to the specificity and relative scarcity of the occupational skills which are possessed by these worker types. *Selling*, *manual* and *clerical* occupations dominate the simple sectoral mover category accounting for almost two-thirds of these kinds of moves; almost equally shared between the two occupations. *Selling* (30.4%) *managerial* (15.81%) *manual* (19.51%) and clerical (12.78%) occupations dominate

[73] The reader should recall *Figure 4.2*.

the simple occupational mover category in the Jamaican data. The table therefore confirms that workers across many occupational groups in the Jamaican labour market were involved in the labour market transitions. However it also reveals that most of the mobility across all mobility categories involved workers from sales and managerial related occupations. This suggests that most of the occupational dimensions of the labour market adjustment in Jamaica included workers involved in the buying, selling and distribution of goods.

One of the key innovations of this paper is our ability to measure the skill content embodied in the Jamaican labour market. Further summarizing occupational groups into skill groups using *Table 4.4* confirms that almost all of the mobility over the period regardless of the type of job-to-job mobility involved *unskilled manual* workers. *Table 4.4* shows that as much as 87.71% of the complex job-to-job mobility involved unskilled manual workers. Although the share of *unskilled manual* workers involved in simple sectoral and occupational moves was lower, the *unskilled manual* worker category still dominated both simple occupational and simple sectoral transitions registering proportions of 76.61% and 70.32% respectively. The importance of the *unskilled* workers in accounting for labour market mobility in Jamaica during the period 1983-2006 is further underlined by the fact that when one aggregates the *unskilled manual* and *unskilled non- manual* categories at least 84% of the mobility observed across all mobility categories is easily accounted for by this skill group.

The Jamaican Quarterly Labour Force Survey contains information regarding whether the worker has undergone *on-the-job* training, *vocational* preparation, *technical* or some *other* type of training or *no training* at all. Since the survey instrument does not specify at what time training of whatever type was acquired by the worker, the training variables will have to be interpreted as cumulative training acquired throughout the worker's lifetime. This information, as pointed out before in the literature review may affect the workers' labour market outcomes and, as such, collecting this information for the Jamaican labour market allows us to disentangle the effects of various training modalities on worker mobility and adjustment. For now, we simply examine the magnitudes of sample proportions. One striking fact emerging from *Table 4.4* is that a greater proportion of workers that have been exposed to additional training (of whatever type) seem to either remain in their sector and occupation of origin or engage in simple occupation moves above every other category of movers. Workers who have benefited from *on-the-job* and *technical* training appear to be relatively less likely to change sector and occupation simultaneously, whereas workers exposed to *vocational* training seems to be associated most with simple occupational moves (7.5%). Lack of exposure to all types of training appears to have a relatively greater association with workers who have completed either simple sectoral or complex moves. In general therefore, it would appear that a lack of training makes it more likely that a worker can transition across sectoral boundaries whereas, on the other hand, training exposure makes complex moves across sectors less likely and might even result in occupational mobility some of which may presumably be upward.

4.7 Differences in Sample Proportions

In an attempt to evaluate the effect of the change in the sample size as a result of using sectoral and occupational information from before the workers' occupational and sectoral moves we present in Table A9 of the Appendix sample proportions and standard deviations of the complete sample which we will now compare with the sample proportions and standard deviations presented in *Table 4.4* above. Information within the Jamaican Labour Force Survey regarding the past occupation or sectoral employment of the worker is generally less complete than information about the current employment circumstances of the worker. For this reason the decision to include in the estimation information about the occupation and sector of origin of the "movers" has meant that some records have been lost due to the relatively poor data on the sector and occupation of origin. In light of this fact, since *Table A9* in the Appendix contains information on the full sample, the proportions presented therein pertain to the current employment circumstances of the worker. In contrast, *Table 4.4* contains information on sample proportions from the Quarterly Labour Force data using data on the sector and occupation of origin of the Jamaican workers. This simple fact accounts for the differences in the means and variances that are observed across both *Tables*. For example, the sample proportion of manufacturing workers taken from *Table A9* for agriculture in the stayer (SS, SO) category is 26.62%. Similarly the corresponding proportions taken from *Table 4.4* can easily be verified to be 26.52 with identical values of 0.001 for the standard deviation. This fact highlights that for cases in which the worker has not changed occupational or sector over the review period the sample means and standard deviations are very similar, if not identical, across both *Tables A9* and *Table 4.4*. Thus the means and variances reported in the column labelled stayer in both tables are generally similar.

Consistent with how the samples were constructed, the greatest disparities in means and standard deviations between the two Tables can be observed in the column labelled "new sector". This column contains information on the simple sector mover category; which comprises workers who changed sectors but not occupations over 12 months preceding the survey date. From Table A9 we see that the sample proportion of workers from manufacturing sector in the "new sector" column represents 5% of the sample with a standard deviation of 0.003. In stark contrast however, the corresponding magnitudes of sample proportion and standard deviation taken from Table 4.4 are16.89% and 0.01, respectively. This disparity results from the fact that in both samples the agriculture indicator variable are identifying two different sub groups. In the data used to explain Table A9 the indicator variable identifies all agricultural workers, who have made simple sector moves (NS, SO) in the full sample who, having changed sectors throughout the past year, now report being employed in the manufacturing sector at the time of the survey (survey date). On the other hand, the indicator variable in which *Table 4.4* is based identifies all workers in the adjusted sample, who report having changed sectors throughout the past year with manufacturing sector being their sector of origin. To a large degree therefore the disparities in this specific case merely indicates the high level of turnover in the Jamaican manufacturing sector over the review period. The reader can verify that these differences are generally consistent, in the simple sector mover column of both tables in the occupational row categories of the Table.

In sum therefore, the decision to use information on the past sector and occupation for workers in estimating the empirical sample has led to a reduction in the sample size. Unfortunately this loss of observations has primarily affected the simple occupation mobility category (SS, NO) the greatest. This loss may have implications for the estimation results due to the possibility of the introduction of a sampling bias. However this is difficult to measure the effect of this is due to the fact in the

Jamaican quarterly labour force survey information about the past sector and occupation of the worker is not present for many records. Using the differences in *Table 4.4* and *Table A9* in order to infer differences between the sample before and after observations is complicated by the fact that the sample proportions and variances in the former table are calculated based on indicator variables identifying the destination sector and occupational variables of the worker, whereas on the other hand the latter table is based on indicator variables which identify the sector and occupation of origin of the worker.

4.8 The Model

We have in mind a limited dependent variable model of mobility with which to model the types of job-to-job moves we consider in this paper. Within the subset of models we consider is the multinomial logit model and the bivariate probit as well as the multinomial probit. As is well known, if the decisions of the worker to change sector or occupation are related then the "independence of irrelevant alternatives" assumption which underpins the multinomial logit model would not be satisfied and hence that model would be deemed inappropriate. We take an *ex- ante* agnostic approach and proceed along the lines of Hausman and McFadden (1984) and, more recently, Crown (1998) to test whether the decision to move sector and occupation are statistically independent. The application of the Hausman test for independent irrelevant alternatives to the Jamaican Quarterly Labour Force data reveals that occupation and sectoral choices are not independent alternatives and so the bivariate probit approach is more appropriate[74]. The choice of the bivariate probit instead of the multinomial probit was made on the basis of the greater efficiency of the former model given that the multinomial probit model is a generalization of the bivariate probit model (Weeks, 1999). In addition a further justification for our choice of the bivariate probit could be made on the basis of a purely theoretical consideration regarding the structure of the mobility decision from the perspective of the worker. We find the fact that the bivariate probit models the decision of the worker as a choice between two options; moving occupation or sector and that within the bivariate probit framework the correlation (ρ) between the two decisions within the

[74] The Hausman Test for independent irrelevant alternatives for each category of movers all produced p-value of 0.00 under the appropriate Chi-squared tests. Based on this result the null hypothesis of independent irrelevant alternatives could not be accepted on the basis of the sample evidence.

model can therefore be interpreted as a measure of statistical dependence between the decision to move sector or occupation to be relatively more appealing. On the other hand, the multinomial probit appears to be more appropriate for a problem in which the dependent variable of interest is a unique choice made from a set of distinct alternatives (Weeks and Orme; 1999). We therefore find the interpretation of the correlation parameter (ρ) within the context of the multinomial probit to be less informative in analyzing the decision of the worker to move occupation or sector; the issue being explored in this chapter. For example, it is not clear what a low correlation parameter would imply about the relationship between the workers' choice between making simple sector moves and simple occupational moves *vis-à-vis* complex moves and simple moves. On the other hand, Weeks and Orme (1999) point to further statistical differences between both models which we do not explore in this Chapter.

We can therefore write the propensity to move occupation and sector simultaneously;

$$M_i^* = x_i\beta_i + \varepsilon_{1i} \qquad 4.1$$

$$I_i^* = x_i\beta_2 + \varepsilon_{2i} \qquad i = 1,........n$$

M_i^* and I_i^* in the above expression are unobserved latent variables. What we can observe from the data, however, is the decision of the workers whether to remain in his sector or occupation of origin or to change his labour market status within employment by changing sector (I_i^*) or occupation (M_i^*) or both. The vector x_i contains human capital and socio-economic characteristics that are thought to affect labour transition decisions of the workers. Although not ideal, we use information on age and its square, with the implicit assumption that age includes information regarding the tenure effect. Other variables included are parish of residence, the highest level of educational qualification attained, skill levels and sector of origin of the worker. An innovation of our model is that we try to capture the differential effect of the types of training undertaken by the worker and the effect of these on the workers probability of mobility.

In equation (1) $E(\varepsilon_1)=E(\varepsilon_2)=0$, also $Var(\varepsilon_1)=Var(\varepsilon_2)=1$ and also $Cov(\varepsilon_1,\varepsilon_2)=\rho$. A Wald test is then applied in order to test the null $\rho=0$ by comparing the likelihood of the full bivariate model with the sum of the log likelihoods for the univariate probit models. To investigate the relationship more closely we will also estimate *equation 4.1* for each sector in an attempt to identify the sectors in which there is greatest dependence between the decisions to change sector and occupation. We will then examine the marginal effects of the independent variables to investigate more closely the effects of these variables on the probability of changing both sector and occupation simultaneously. The results and discussion from the estimation are presented below.

4.9 Empirical Results

Table 4.5 displays the marginal effects the variables and their standard deviations in the bivariate probit model estimated. The default category used in the estimation is the manual, female worker within the rural, manufacturing sector having acquired no educational qualifications or training. Included among our covariates, but not included in *Table 4.5*, are a set of year dummies, each one representing a survey year 1983-2006. The dummies were used in order to capture year-specific shocks which could affect the magnitude of the parameters of the model. The base year category used in the estimation was 1983. Columns *1, 2* and *3* of the table, display estimates of the marginal effects relating to simple occupational, simple sectoral and complex moves respectively. Although the discussion which follows in this section will be based on the marginal effects associated with the respective mobility categories, the corresponding coefficient estimates for all regressions can be found in *Table A9-Table A11* in the Appendix.

Age and *experience* appear to be important determinants of mobility regardless of whether the worker makes a simple or complex move. This finding corroborates results of numerous empirical models of labour supply; younger Jamaican workers have lower attachment to their current job than older workers and, as such, appear to have a greater propensity to change their labour market circumstances. The sign on the *age-squared* variable is positive but also statistically significant and suggests non-linearity in the relationship between age, experience and the probability of mobility. In addition, our estimates provide some evidence that urban workers are significantly less likely to make complex and simple occupation moves.

	New Occupation (SS, NO) $M_i = 1$ **if moved occupation, 0 if otherwise** (1)	**New Sector (NS, SO)** $I_i = 1$ **if moved sector, 0 if otherwise** (2)	**New Sector and New Occupation (NS, NO)** $I_i = 1$ **and** $M_i = 1$ **if moved sector and occupation** $I_i = 0$ **and** $M_i = 0$ **if otherwise** (3)
Variable	**Marginal Effects**	**Marginal Effects**	**Marginal Effects**
Age	-0.0001(0.0002)***	-0.0002(0.0001)***	-0.0003(0.00004)***
Age-squared	3.26e-07(0.0000)*	1.28e-06(0.0000)**	1.66e-06(0.0000)***
Male	0.00062(0.0001)***	-0.0011(0.0003)***	0.0008(0.0003)***
Urban	-0.00054(0.0001)***	0.0004(0.0003)	-0.0009(0.0003)***
Higher	0.00213(0.0009)**	0.0031(0.0019)	0.0074(0.0019)***
Further	0.0028(0.0009)***	0.0012(0.0013)	0.0069(0.0016)***
Other	0.00113(0.0003)***	0.0009(0.0006)	0.0033(0.0006)***
On-the-Job	-0.0006(0.0002)***	-0.0034(0.0004)***	-0.0035(0.0004)***
Vocational	0.0001(0.0002)	-0.0027(0.0005)***	-0.0021(0.0004)****
Technical	-0.0006(0.0002)**	-0.0043(0.0006)***	-0.0041(0.0005)***
Other(Training)	-0.0005(0.0002)***	-0.0035(0.0006)***	-0.0035(0.0004)***
Agriculture	0.0015(0.0003)***	-0.0035(0.0005)***	0.0005(0.0005)
Mining	-0.0007(0.0004)*	0.0004(0.0017)	-0.0017(0.0012)
Electricity	-0.0012(0.0002)***	-0.0049(0.0009)***	-0.0056(0.0006)***
Construction	0.00018(0.0002)	-0.0001(0.0006)	0.0004(0.0005)
Wholesale	0.0013(0.0002)***	-0.003(0.0004)***	0.0003(0.0004)
Transport	-0.0007(0.0002)***	-0.0003(0.0006)	-0.0020(0.0005)***
Finance	-0.0002(0.0002)	0.0008(0.0009)	-0.0001(0.0007)
Community	-0.0004(0.0002)***	-0.0015(0.0005)***	-0.0021(0.0004)***
Skilled Prof.	-0.0005(0.0002)***	-0.005(0.0004)***	-0.0045(0.0004)***
Skilled Manag.	-0.0073(0.0003)***	-0.006(0.0003)***	-0.0175(0.0004)***
Unsk. non-manual	-0.0006(0.0001)***	-0.0001(0.0005)	-0.0015(0.0004)***
Correlation	0.949	0.0021	
Wald Test of $\rho = 0$	$\chi^2(1) = 17239.6$	Prob> χ =0.0000	
N	195690		

Table 4.5 Bivariate Probit for Occupational and Sectoral Mobility, Jamaican Labour Force Survey 1983-2006

Standard errors in parenthesis
*means significant at the 10% level of significance
** means significant at the 5% level of significance
***means significant at the 1% level of significance

Since we know that in the Jamaican case, there is a concentration of productive activities (labour demand for occupations of all types) in the urban areas, workers located in these areas who change jobs are less likely to have to change their occupations to find employment; as there may be available alternative employment opportunities within their occupational grouping allowing them to forgo the loss of tenure-related, occupation-specific rents. A similar argument extends to sectoral movers except that the location of the worker does not appear to affect his propensity to make simple sectoral moves.

The similarity of the signs of the coefficients of the socio-economic characteristics discussed so far, the results of the Hausman test (for independent irrelevant alternatives) and the significance of the estimated correlation between the decisions, taken together, suggest that some factors influencing occupational and mobility in Jamaica produce similar effects across mobility categories.

From the estimation results we also find evidence that the gender of the worker significantly affects the propensity to change jobs across all categories of mobility. *Table 4.5* reveals that male workers are significantly more likely to make simple occupation moves and complex job moves. On the other hand, female workers seem more likely to make simple sector moves than their male counterparts. In this respect, the results from the Jamaican data contrast the results for the UK data as Elliot and Lindley (2006a) who find that female workers were less mobile across all mobility categories.

The effect of educational qualifications on both occupational and sectoral mobility in the Jamaican labour force is clear[75]-the higher the level of educational attainment achieved by the worker, the more likely the worker will make simple occupation moves and complex moves. This finding is consistent with the theory that educationally qualified workers face a greater variety of possible career progression paths by virtue of their educational attainments. Furthermore, the increased mobility of the educationally qualified workers could arise because employers will tend to be more willing to fill vacancies with more qualified workers, and to replace less-qualified workers with those who are better qualified. This observed advantage of the qualified workers to change their labour market conditions, job-to-job within the

[75] We already know from the preceding chapter that, in Jamaica, higher educational qualifications reduce the probability of worker-job separations for manufacturing workers. Moreover the results for inter- sectoral mobility and intra-sectoral movers are broadly consistent for manufacturing workers especially for those workers at the highest levels of qualification.

Jamaican context, is a direct consequence of the relative scarcity of this worker-type relative to the labour force as a whole. This is especially true for the simple occupational and complex movers; the two categories of mobility with which one would expect upward career mobility to be associated. Elliot and Lindley (2006a) find similar evidence for the UK, suggesting that educational attainment increased the propensity of workers to change both sector and occupation. In contrast, it would appear that educational attainment had little or nothing to do with the simple sectoral mobility in Jamaica over the review period on the basis of the statistical significance of the marginal effects. Therefore an examination of the marginal effects suggests that, in Jamaica, simple sectoral mobility is not primarily driven by educational qualifications of the workers.

However, in another sense, the fact that higher educational attainment leads to greater simple occupational as well as complex moves seems counterintuitive in light of the fact that is appears that it is the less skilled individuals that are making the most transitions in the Jamaican data. One way to view this finding is that the signs of the coefficients of the bivariate probit model estimated in the chapter takes into account other independent variables included in the estimation. Within the modelling framework therefore the effects of the other independent variables are controlled out. Among these controls are variables such as training levels, skill levels and sectoral characteristics on worker probabilities in making simple occupational, simple sectoral and complex moves. For this reason drawing conclusions solely from the examination of unconditional ex-post probabilities such as those presented in the transition *Tables 4.2a to 4.2d*, can be misleading. So that- the fact that skill levels are controlled out, for example makes it possible that, all else held equal, in a group of workers that are all unskilled it is the relatively more educated workers in that group that exhibit a greater propensity to change occupational circumstances or to make complex worker moves. Therefore, it is important that the sign of the coefficient be interpreted in light of the fact that other worker characteristics have been controlled out of the effect of the education variable. Another important observation is the absence of statistically significant effects of the education attainment variables in the simple sectoral mobility category. Yet it is important to recall that most of the labour market mobility observed in the Jamaican case was sectoral mobility involving less-skilled worker groups. The fact that educational attainment did not have a statistical effect on the most pervasive type of worker mobility in the Jamaican case leads to the conclusion that educational attainment was not a major factor driving most of the labour market mobility in the Jamaican labour market over the period of interest. This fact however does not negate the results presented in *Table 4.5*: that in a labour market where skill-levels are general and low and turnover generally high, relatively higher levels of educational attainment, even within lower skilled occupational groups, tends to add an occupational dimension to the type of mobility observed.

While higher educational attainment by the Jamaican worker increases his propensity to change occupations in particular, on the other hand, it would appear that the training accumulated by the worker has a negative marginal effect on his/her probability of changing occupation and sector. The coefficients on the training variables in the table are negative suggesting that, in Jamaica, in order to correctly interpret the results in *Table 4.5,* the reader must bear in mind that our training variables capture the cumulative effect of worker training over the entire labour market experience of the worker (and not necessarily with the workers current employer). Workers reporting to have received *on-the-job*, *vocational*, *technical* or any *other* type of training are generally less mobile across all mobility categories. A likely explanation for this phenomenon is that training represents mutual investment in the human capital of the worker and usually involves a cost to the employer, though the worker will inevitably and usually incur costs as well. This increased investment therefore reduces the moral hazard in the employment agreement (contract), reducing the likelihood of, now more costly, job separation after training has occurred. Both educational attainment and training are therefore key attributes in determining the labour market outcomes of the Jamaican worker. It is likely that the direction, magnitude and significance of these factors within the Jamaican context may well have direct links to the abundance of unskilled labour within the economy. In an environment where the majority of the labour force lacks educational qualifications and training, any such acquisition of specialized skills by the worker is, at the very least, a signal to the employer that the educationally qualified and trained worker will likely form a superior match.

The signs of the marginal effects of the sectoral indicators in the model, give us an idea of the ranking of the propensity to change jobs for workers originating in one-digit sectors across the various jobs across the mobility categories. It is clear from the table that the ordering of the marginal effects differs by mobility type. In the simple occupational mover category, for example, the agriculture and wholesale and retail sectors are the only two sectors whose workers display a significantly greater propensity to change occupations than individuals employed within the manufacturing sector over the sample period. In the simple sectoral mobility category, no other one-digit sector showed a statistically significant, greater, marginal probability to change jobs than the manufacturing sector (our base category). This result highlights the relatively high rate of sectoral exit of manufacturing workers from that sector over the period. Transport, mining and construction sector workers exhibited also displayed relatively high propensities while in the remaining sectors, and especially in electricity and mining sectors, marginal effects are significantly less than for the base category. In the complex mover category similar results are obtained with significantly lower propensities observed in the community, electricity and transport sectors, with the agriculture sector showing a significantly greater marginal effect than manufacturing. The results highlight the complex relationships in sectoral turnover, even within a small economy such as Jamaica. It also highlights the importance of turnover in the traditional, goods-producing or primary sector in explaining the labour market outcomes in Jamaica over the sample period.

The final set of variables included in our model relates to the broad skill categorizations of the Jamaican workers. An examination of the signs of the marginal effects of these variables reveals that relatively highly skilled individuals display a significantly lower propensity to change sector and occupation than those workers in the base category. This implies that the generality of skills of the lower skilled groups allows them to change sector and occupation more easily than the skilled workers. Alternatively, skilled workers tend to enjoy a greater stability of employment in Jamaica. This may well be a source significant non-pecuniary reward accruing to the skilled worker in Jamaica; a benefit that has not been addressed satisfactorily in the literature on labour market mobility yet one that is clearly evident in this low skilled, small, developing country environment that is Jamaica. These results contrast to some degree with results in previous studies of labour market mobility for developed countries. In the Elliot and Lindley (2006a) study, for example, while the authors found negative signs on the marginal effects for the sectoral movers they also found that for the UK labour market, the most highly skilled are more likely to change occupation than those that possess more general or lower occupational skills. It would appear that there is, across all mobility categories, significantly less mobility in the highly skilled group in the Jamaican data. This finding for Jamaica is entirely consistent with the brief analysis of occupational transitions tables carried out earlier in this chapter.

Table 4.6 displays the correlation coefficients for the workers' decision to change occupation and sector. These coefficients were estimated using separate bivariate probit regressions for each sector. This method allows us to measure and compare the dependence between the decision to move sector and occupation across the different sectors of the Jamaican economy. All the correlation coefficients are statistically significant the 1% level when the Wald test for $\rho = 0$ is applied.

Bivariate Probit Correlation Coefficient for Moving Sector and Occupation Separated by ISIC One-digit Sectors, Jamaican Labour Force Survey 1983-2006		
ISIC one digit	Sector	Correlation Coefficient
0	Agriculture, Forestry and Fishing	0.957***
1	Mining	0.99***
2	Manufacturing	0.956***
4	Electricity, Gas and Water	1***
5	Construction	0.9825***
6	Wholesale and Retail, Hotels and Restaurants	0.9165***
7	Transport, Storage and Communication	0.98***
8	Finance	0.9507***
9	Community	0.9449***
10	All sectors combined	0.9492***

Table 4.6: Bivariate Probit Correlation Coefficients 1983-2006

*means significant at the 10% level of significance

** means significant at the 5% level of significance

***means significant at the 1% level of significance

Remarkably, the overall correlation coefficient for the complete model (with all sectors) is 0.9492, which is high in comparision to the estimate of $\rho = 0.8349$ obtained by Elliot and Lindley (2006a) for the UK data. This finding is consistent with the idea that the decisions to move sector and occupation are, in a statistical sense, highly dependent. This result corroborates previous evidence that the decision to move sector or occupation is not differentiated by the Jamaican worker. This result is also indicative of the ability of the Jamaican worker to adjust simultaneously sectorally and occupationally. It also highlights exactly how closely interrelated sectoral and occupational adjustment within the Jamaican labour market over the review period has been. This is especially true for sectors such as electricity, mining, construction and also in the transport and communication sector. Together, these sectors represent the sectors within the Jamaican economy where the dependence of the decision to move sector and occupation is the greatest. At the other end of the spectrum, but still exhibiting a high degree of dependence between the decisions to move sector and occupation are the wholesale and retail sector and the community sector.

4.10 Robustness Checks

Both *Figure 4.4* and *Figure 4.5* hint to possible differences in mobility patterns within the Jamaican labour market between the earlier period 1983-1994 and the latter period 1998-2006. Since there is an absence of data on mobility for the years 1995-1997, and since from visual inspection there appears have been a noticeable change in the mobility trends between the two sub-periods, we estimate the model separately for each sub-period to investigate whether our findings and hence conclusions about the factors influencing mobility in the Jamaican context are robust across both periods of analysis. Another potential benefit of this exercise is to provide us with information needed to identify, if present in the data, any possible differences in the effects of worker and economic characteristics on labour market mobility between the two sub-periods.

Table 4.7 below provides estimates of the marginal effects of the bivariate probit regression model run on the sub-sample of our dataset spanning 1983-1994. The difference between the estimates presented in *Table 4.5* and Table *4.7* is that in the latter the estimation sample is restricted to the years 1983-1994 in order to arrive at estimates for that sub-period. We find from the results that there are striking similarities between the first period estimates provided in *Table 4.7* and the estimates for the entire sample presented in *Table 4.5*. Firstly, the gender effects are almost identical, in that, males are significantly more likely to make simple occupational and complex moves than females. Another area of similarity in the results is the effect of worker training on the likelihood of *job-to-job* moves. In general, we observe a reduction in the likelihood of mobility, of all types, for workers who have been exposed to some type of training. The robustness of these results underlines the importance of training in affecting individual labour market outcomes and in securing job stability for the worker. Moreover, similar effects are observed for the occupational skill categories.

	New Occupation (SS, NO) $M_i = 1$ if moved occupation, 0 if otherwise (1)	New Sector (NS, SO) $I_i = 1$ if moved sector, 0 if otherwise (2)	New Sector and New Occupation (NS, NO) $I_i = 1$ and $M_i = 1$ if moved sector and occupation $I_i = 0$ and $M_i = 0$ if otherwise (3)
Variable	**Marginal Effects**	**Marginal Effects**	**Marginal Effects**
Age	-3.55e-06(0.00003)	-0.0003(0.0001)***	-0.00015(0.0001)**
Age-squared	-5.61e-07(0.0000)	1.50e-06(0.0000)	-2.68e-07(0.0000)
Male	0.0014(0.0002)***	-0.0020(0.0006)***	0.0016(0.0004)***
Urban	-0.0004(0.0002)**	0.0007(0.0005)	-0.0004(0.0004)
Higher	0.0058(0.0026)**	-0.0022(0.0023)	0.0054(0.0028)*
Further	0.0016(0.001)	0.0002(0.0019)	0.0028(0.0016)*
Other	0.001(0.0004)	-0.0003(0.0009)	0.0015(0.0007)*
On-the-Job	-0.0007(0.0003)***	-0.0044(0.0006)***	-0.0033(0.0004)***
Vocational	-0.0005(0.0003)	-0.0029(0.0008)***	-0.0022(0.0006)***
Technical	-0.0009(0.0003)***	-0.0039(0.001)***	-0.0034(0.0006)***
Other(Training)	-0.001(0.0007)	0.0024(0.0045)	-0.0014(0.0022)
Agriculture	0.0016(0.0004)***	-0.0034(0.0008)***	0.0008(0.0006)
Mining	-0.0002(0.0008)	0.0067(0.0039)*	0.0026(0.0022)
Electricity	-0.0016(0.0003)***	-0.0069(0.0011)***	-0.0055(0.0005)***
Construction	0.0008(0.0005)*	0.0028(0.0013)**	0.003(0.0009)***
Wholesale	0.001(0.0004)***	-0.0031(0.0007)***	-0.00012(0.0005)
Transport	-0.0009(0.0003)***	0.0028(0.0016)*	-0.0007(0.0008)
Finance	0.0007(0.0007)	-0.0003(0.0015)	0.001(0.0011)
Community	-0.0003(0.0003)	0.0025(0.0009)***	0.0005(0.0006)
Skilled Prof.	-0.0005(0.0003)*	-0.0056(0.0007)***	-0.0032(0.0005)***
Skilled Managers	-0.0062(0.0003)***	-0.007(0.0006)***	-0.01318(0.0005)***
Unsk. non-manual	-0.0006(0.0002)***	-0.0004(0.0008)	-0.0014(0.0005)***
Correlation	0.9249	0.0042	
Wald Test of $\rho = 0$	$\chi^2(1) = 6326.98$	Prob> χ =0.0000	
N	90102		

Table 4.7: Bivariate Probit for Occupational and Sectoral Mobility, 1983-1994

Standard errors in parenthesis
*means significant at the 10% level of significance
** means significant at the 5% level of significance
***means significant at the 1% level of significance

Workers from relatively more highly skilled occupational categories are less likely to change jobs in the early 1983-1994 period, much the same as is the case for the entire sample period 1983-2006. The main differences in the results, taken from the regression carried out on the total sample and the estimation results for this first sub-period appear to stem primarily from the strength and level of significance of the marginal effects across all categories of the mobility categories examined. Perhaps the best example of this is to be found by examining the significance and sign of the educational attainment variables. In the complete dataset 1983-2006, it is clear that the level of educational attainment increases the likelihood of mobility of simple occupational movers as well as the complex movers.

Recall that we had argued above, that the statistical significance of the marginal effects the marginal effects of the educational attainment variables in the simple occupational and complex mover categories are positive and significant. This result implies that, in Jamaica, educational attainment is an important avenue for occupational mobility and job upgrading by the worker. For the sub-sample 1983-1994 however, while it is true that the sign of the marginal effects are the same as for the estimation for the entire sample, these marginal effects are only significant for the highest level of educational attainment in the case of the simple occupational movers while the effects for the complex occupational movers are only significant at the 10% level. These results, taken together, imply weaker effects of educational attainment on the probability of occupational mobility both simple and complex, in the earlier sub-period.

Examining the marginal effects on the coefficients for the sectoral indicator variables reveals that the relative propensities of sectoral exit for Jamaican worker differ only slightly across sub-samples. In the 1983-1994 sub-sample, agricultural sector workers again exhibit a greater propensity to make simple occupational moves compared to workers in the base category (manufacturing sector worker). The same is true for workers originating in the wholesale and retail sector. In contrast to the results from the estimation for the entire sample period, construction workers and workers from the wholesale and retail sector display a relatively higher propensity to make simple moves during the 1983-1994 sub-periods compared to base category workers. Similar results hold for the simple sectoral and complex mover category. However, the results for these mobility categories point to a slightly different ordering of the exit rates of workers out of one-digit sectors over the sample. The

	New Occupation (SS, NO) $M_i = 1$ if moved occupation, 0 if otherwise (1)	New Sector (NS, SO) $I_i = 1$ if moved sector, 0 if otherwise (2)	New Sector and New Occupation (NS, NO) $I_i = 1$ and $M_i = 1$ if moved sector and occupation $I_i = 0$ and $M_i = 0$ if otherwise (3)
Variable	**Marginal Effects**	**Marginal Effects**	**Marginal Effects**
Age	-0.00004(0.00002)**	-0.0002(0.0001)***	-0.0003(0.00005)***
Age-squared	3.56e-07(0.0000)**	1.37e-06(0.0000)**	2.35e-06(0.0000)***
Male	0.00007(0.0001)	-0.00048(0.0004)	-0.00018(0.00036)
Urban	-0.0005(0.00016)***	0.0003(0.0004)	-0.0016(0.0004)***
Higher	0.0003(0.0006)	0.0101(0.0035)***	0.0096(0.0028)***
Further	0.0028(0.00115)**	0.0016(0.0018)	0.0097(0.0025)***
Other	0.0009(0.0003)***	0.0013(0.0007)*	0.0041(0.0008)***
On-the-Job	-0.00052(0.00019)***	-0.0023(0.0007)***	-0.0035(0.0006)***
Vocational	0.00017(0.0023)	-0.0024(0.0006)***	-0.0017(0.0007)**
Technical	-0.00003(0.00032)	-0.0051(0.0007)***	-0.0047(0.0007)***
Other(Training)	0.0009(0.0003)	-0.0034(0.0006)***	-0.0036(0.0005)***
Agriculture	0.0013(0.0005)***	-0.0036(0.0007)***	0.0004(0.0009)
Mining	-0.0008(0.00029)***	-0.0036(0.0013)***	-0.0053(0.0009)***
Electricity	-0.0007(0.00033)**	-0.0041(0.0011)***	-0.0054(0.0009)***
Construction	-0.0001(0.0002)	-0.0019(0.0006)***	-0.0019(0.0006)***
Wholesale	0.0014(0.0004)***	-0.0035(0.0005)***	0.0003(0.0007)
Transport	-0.0004(0.0002)**	-0.0022(0.0007)***	-0.0031(0.0006)***
Finance	-0.0004(0.00021)*	0.0001(0.001)	-0.0013(0.0008)
Community	-0.0002(0.0002)	-0.0044(0.0006)***	-0.0044(0.0006)***
Skilled Prof.	-0.00029(0.0002)	-0.0049(0.0006)***	-0.005(0.0006)***
Skilled Managers	-0.008(0.0004)***	-0.0042(0.0004)***	-0.0213(0.0006)***
Unskilled non-manual	-0.0004(0.0002)***	-0.00007(0.0007)	-0.0015(0.0006)***
Correlation	0.9652	0.0021	
Wald Test of $\rho = 0$	$\chi^2(1) = 10953$	Prob> χ =0.0000	
N	105588		

Table 4.8: Bivariate Probit for Occupational and Sectoral Mobility, 1998-2006

Standard errors in parenthesis

*means significant at the 10% level of significance

** means significant at the 5% level of significance

***means significant at the 1% level of significance

general finding that across all mobility types electricity and mining sector workers were the most unlikely to experience mobility and that agriculture, manufacturing wholesale and construction sector workers were the sectors associated with the highest probabilities of mobility continues to hold. From these results, we can conclude that our result, remains very much consistent across samples though the exact ordering of the sectors in terms of their contribution to the marginal probability of mobility varies only slightly. In one sense, estimation of the model for the 1983-

1994 sub-sample reveals the dynamic nature of the relative probabilities of exit between sectors over time, while not changing significantly the substantive findings. Less-skilled manual workers are also the most likely to undergo simple or complex moves in the earlier sub-sample as was the finding when the probit regression was estimated over the entire review period. To sum up, it is clear that the main results of the model over the period tends to hold for the first sub-period 1983-1994, despite the fact that the strength of the effects of the educational attainment variables are slighted muted[76].

To complete the robustness checks we also estimate the model for the latter sub-period 1998-2006. The results of which are placed in *Table 4.8.* The *age*, *gender*, and *location* effects for this sub-period reflect closely what has been observed from our earlier analysis; that these demographic factors play an important role in the propensity to move jobs whether at the simple sectoral, simple occupational or complex level. Interestingly however, the estimates from this later sub-sample suggest that the gender of the worker was less important of a factor than in the earlier sub-period since this coefficient is not statistically significant in any of the mobility classes examined in this paper. This is an interesting development which coincides with the observed increased levels of female participation in the Jamaican labour market towards the end of the review period. This development coupled with the possibility of less discrimination on the basis of gender by Jamaican employers is a possible explanation for this result.

Workers located in urban areas were less likely to make simple occupation and complex moves. This result differs only slightly from the results of the probit estimated using data from the sub-period 1983-1994 which revealed negative and statistically significant marginal effects on the "urban" variable only for the simple occupation mover category. On the other hand, the sign of the marginal effect on this variable is entirely consistent with the results from *Table 4.8.* These results imply that urban workers are less likely to change occupation relative to the base category across both sub-periods. This result also holds when the probit regression is estimated for the entire review period 1983-2006. On the other hand, there are negative and significant marginal effects on the urban variable only when the probit

[76] The coefficient estimates are to be found in the appendix.

is estimated on data for the entire review period and the sub-period 1998-2006. Nevertheless, the general result that urban workers are less likely to make simple occupational or complex moves is fairly robust. Similarly, robust results hold for the marginal effects on the training variables. Overall, training reduces mobility of all types.

Educational qualifications are also found to significantly increase the likelihood of all types of mobility when the probit is estimated on the 1998-2006 sub-sample. All levels of educational attainment exhibit positive and highly statistically significant marginal effects relative to the base worker within the complex mobility category. These results are entirely consistent with the results obtained when the probit regression was estimated on the data for the entire sample; 1983-2006. The results for the other two mobility categories are broadly consistent with this theme though not all levels of educational attainment are statistically significant.

The signs, magnitudes and statistical significance of the marginal effects on the sectoral indicator variables reflect findings from the earlier regressions. Workers originating in the agricultural, manufacturing, wholesale and retail sector tend to exhibit a greater propensity to exit those sectors as we have seen from the earlier regressions. The familiar result of low turnover in the mining and electricity sectors continue to hold. Differences in the results on the marginal effects for the sectoral indicator variables across sub-samples are not remarkable and merely reflect the dynamics in the patterns of sectoral shift over the period. We are, therefore, willing to accept these few differences as evidence that over the period under review there were only small changes in the ranking of scrotal exit rates over time. Overall though, the sign and magnitude of the effects were similar and consistent over the both sub-samples.

The results for Jamaica should be viewed against the background of findings from other studies of occupational mobility and especially those studies carried out within a developing country framework. Nurminen *et al* (2010) study on occupational mobility in Finland reveals that in that economy there was a great deal of occupational mobility. They, like us, discover greater and increasing levels of mobility among individuals with higher levels of educational attainment. This finding is viewed as counterintuitive when viewed against the background of the higher opportunity costs of individuals within this class, as they potentially face relatively greater loss of specific human capital when making job moves. Occupational mobility in countries that have undergone fundamental transitions in their economic systems have been studies in Russia (Sabirianova, 2000), Estonia (Campos and Dabusinskas, 2002) and Hungary (Dan, 2007). The Russian study 1985 to 1998 shows found that the restructuring process increased the rate of occupational reallocation. The empirical work illustrated how the process of job creation and destruction accounted for a substantial increase in the occupational flows. Campos and Dabusinskas' (2002) study on Estonian Labour Force Survey found that between 1989-1995 around one third of the labour force changed occupations. A similar proportion of occupational moves was reported by Dan (2007) after examining Tarki Hungarian Longitudinal Database. Both Campos and Dabusinskas (2002) and Dan (2007) cite structural change within the respective economies studied as a major factor driving occupational change. Worker tenure also played a significant role in the former study. This finding orders with the robust finding in the Jamaican data that age/experience variables are both statistically significant and robust determinants in affecting the mobility observed in Jamaica. In the Jamaican case, it turns out that age and experience of the worker is also a statistically significant factor in affecting sectoral mobility as well- a dimension of adjustment not explicitly addressed in the transition economy studies mentioned herein. Strong tenure effects of worker turnover were also found to be present across labour market surveys for Russia, Poland and Britain as reported by Lehmann and Wadsworth (2000). It should be noted however that, in general, that the magnitude of the occupational mobility reported from the empirical studies on these transition economies is substantially greater than the degree of occupational change we were able to detect for the Jamaican data. However, the reader should recall that in the Jamaican case we record only job-to-job occupational mobility which likely underestimates the total occupational job mobility since it only considers workers for whom there were not intervening moves into non-employment. The Estonian study also highlights the importance of tenure and the current and alternative occupations of the worker in influencing occupational moves

4.11 Conclusion

We have shown, in this chapter, that the Jamaican economy has undergone significant labour market adjustment over the sample period 1983-2006. We also provide evidence that the sectoral transformation over the review period in Jamaica was accompanied by an accommodating occupational adjustment. The empirical work in this chapter was not so much concerned with the external factors which led to these labour market adjustments but had more to do with identifying the socio-economic characteristics of the individual workers themselves which affect their propensities to change sector occupation or both. In full recognition of the inherent complexities in the relationship between sectoral and occupational skills, a simple classification schema was adapted for analytical purposes. Under this schema, worker moves were divided into simple occupational, simple sectoral and complex moves in an attempt to describe and analyze the mobility within the Jamaican labour market over the period.

By dividing worker moves into simple and complex moves we discover that there are distinct differences in the worker groups that are likely to move occupation, sector or to change both simultaneously. The most important difference is that individuals who have attained relatively higher levels of educational attainment are more likely to make undergo simple occupational or complex moves. This reflects the fact that the educational qualifications embodied in the worker are relatively transferrable and may therefore increase the probability of worker mobility through opening up potential career paths either intra-sectorally or inter-sectorally. The finding that educational attainment has little or no effect on simple sectoral moves highlights the ability of educational attainment to influence career change; even across sectoral boundaries, and emphasizes the ability of educational attainment to augment the general skills of the worker. Similarly, Jamaican males are more likely to make simple occupation and complex moves, while at the same these workers are less likely to make simple sectoral moves.

Other socio-economic variables used in the empirical estimation appear to have uniform effects on movers across all categories of mobility. Younger workers are more likely to undergo all types of mobility as are workers who possess low and general levels of skills or those who have had no exposure, whatsoever, to any forms of training. These results robustly hold regardless of whether the bivariate probit regression was estimated on a sub-sample of the data over the review period or on the entire dataset. We infer from this result that the mutual investment in training by the worker and employees coupled with the relative scarcity of skilled workers in the Jamaican labour market make job separations after training acquisition relatively costly. The relatively greater cost of mobility incurred after the acquisition of training, makes such moves more undesirable and suggests that the degree of skill-specificity that the worker possesses significantly affects that worker's labour market experience.

Examining sample proportions we find evidence that most (in excess of 70%) of the mobility across all mobility types were due to the *job-to-job* transitions of unskilled manual and non-manual workers and that in the complex mobility category the proportion was even greater. On the other hand, relatively highly skilled professionals and managers were less likely to change sector, occupation or both underlining the importance of skill-specificity in determining labour market outcomes.

In general, the reallocation of employment in the Jamaica over the period under review favoured sales and distribution related occupations. The nominally small increase in the skill content of the employed labour force in Jamaica over the review period was partly due to this effect as lower skilled workers transitioned into relatively highly-skilled sales related occupations. Although we have not explored directly the causal link between the mobility observed in the data and trade openness, it is noteworthy that mobility across all categories increased during the period in which the economy experienced increased openness and liberalization of trade within the Jamaican economy. The fact that most of the reallocation observed involved less skilled workers may have, to a certain extent, mitigated the adjustment costs incurred by workers in the *job-to-job* dimension of the adjustment. On the other hand, other forms of worker reallocation such as job-separations into unemployment or inactivity may have incurred significant economic costs. Moreover, the obvious shrinkage in employment in the goods-producing or primary sectors observed over the period could have implications for the country's balance of trade. The main sectors involved in the adjustment have been identified as the agriculture, manufacturing, wholesale and retail, agricultural and transport and community sectors. However the empirical analysis showed that that the magnitude of the marginal propensities to exit these sectors differed across sectors and over time. In addition, we showed that in Jamaica there is dependence between the decision to move sector and that of moving occupation.

In conclusion, this chapter has demonstrated the complex links between skill specificity, mobility and labour market adjustment in Jamaica. The analysis reveals that the relationship is one that depends on a multiplicity of factors. The categorization of labour market moves into simple and complex categories, though analytically convenient, is limited in the sense that the "complexity", costliness or "distance" of a particular type of worker transition appears to depend on the characteristics of the individuals and the nature of the economic shocks themselves. It therefore follows that, in an aggregate sense, the costliness of the adjustment will crucially hinge on how an economy's labour force is constituted and the specific sectors and worker groups most affected. In light of these facts, the complexity of worker moves in the truest sense may well differ in a highly skilled developing country setting from that existing in a low skilled developing country such as Jamaica. Low and general skill levels of the Jamaican workers may well have mitigated some of the costs of the job-to-job adjustment but may well have implied greater costs for the masses of low- skilled unemployed workers who experienced job separations into unemployment or out-of-the labour force.

Chapter 5

Escape Probabilities from Unemployment: The Jamaican Case

5.1 Introduction

Unemployment is a key economic and political variable. The evolution of this key economic variable has been given heightened attention by politicians, policy-makers and the general public alike following the economic fallout and ensuing financial downturn of September 2008 which has led to increased unemployment in many countries across the world. For many developing and transition economies in Europe, Africa, the Caribbean and the Pacific, however, high unemployment problems have predated the recent global crisis. Recent economic challenges have merely worsened and exacerbated, what has been to these economies, a perennial and persistent problem.

Jamaica has also been faced with the problem of high unemployment. Over the period 1983-2006, Statistical Institute of Jamaica (STATIN) data reveals that the unemployment rate in the Jamaican economy *averaged* 10.8%; which is considered relatively high. Over this same period, the Jamaican employed labour force has accounted for a constant share of the population (as a percentage of individuals 14 years and over) while the comparable share of workers in the out-of the labour force has been increasing since 1990's. What is more, the secularly slow rate of growth in the labour force coupled with the fact that the share of the Jamaican labour force as a percentage of the population aged 14 years and over has been- in fact- shrinking (World Bank, 2006c) makes the Jamaican case worthy of investigation. As we have already seen from our study of labour market mobility in the Jamaican manufacturing sector (*Chapter 3*) and the subsequent analysis exploring aspects of *job-to-job mobility* within the Jamaican context (*Chapter 4*), it is possible to uncover important information regarding the nature of adjustment costs and the causal factors leading to worker moves across labour market categories. This type of analysis is possible using worker flow data which-as we have shown- is retrievable from the Jamaican Labour Force Survey. By extending our empirical analysis to unemployment and individuals in the out-of the labour force category (the aggregate of both these groups will henceforth be referred to as disemployment), we hope to find clues about the anatomy of the problem and how economic policy can be formulated in order to reduce its scale in Jamaica.

This Chapter has two main thrusts. The first and primary goal of is to use Jamaican Labour Force Survey data to analyze the incidence of disemployment in Jamaica and to identify the key characteristics of the Jamaican workers within this labour force category. As a result of this analysis, we hope to identify factors which make the Jamaican worker more susceptible to lapses into spells of unemployment. The second main thrust of the paper is to estimate individual, conditional probabilities of escape from unemployment using repeated cross section data from the Jamaican Labour Force Survey.

5.2 Previous Literature

As far as we are aware, there are no existing micro-econometric, individual-level studies that analyze this issue for Jamaica. The previous unavailability of microeconomic data has severely restricted empiricists' ability to match individual worker characteristics to labour market outcomes in Jamaica (Lewis, 2006). Recently however, two World Bank papers have appeared which seek to analyze the Jamaican labour market; exploring possible reasons behind the coincidence of rising wages and unemployment since the early 1990's. Using the neoclassical framework, Bussollo and Medvedev (2007) take a general equilibrium, structural modelling approach and find that remittances negatively affect the labour market participation of Jamaican workers. Furthermore, Kim (2007), like Bussolo *et al*, also utilized the neoclassical approach to arrive at the same conclusion using aggregated survey data for Jamaica. Our work here fills an important gap in the literature and takes an alternative approach towards understanding and analysing the problem. By using data on respondents to the Jamaica labour force survey, we are able to identify, for the first time, individual traits affecting employability. Insofar as these traits can be affected directly or indirectly by government policy, we are then able to identify specific areas of policy focus that could have significant effects on employment outcomes. Moreover, a major drawback of the neoclassical approach is that this method can only explain the unemployment that results from a worker being offered a wage that is inferior to his reservation wage[77]. This peculiarity arises by virtue of the fact that within the neoclassical formulation of the theory of labour markets there is no unemployment labour force category - since the individual worker merely chooses between work and non-participation. In light of this, it should come as no surprise that key explanations of labour market dynamics relying on the neoclassical theoretic framework tend to hinge crucially on the dynamics of the reservation wage itself. As it turns out however, information imperfections and the concomitant search are undoubtedly features of any market-the labour market being no exception. We find that by including this underlying feature common to virtually all labour markets, we are able to provide a richer explanation of Jamaica's unemployment problem, focussing centrally on worker characteristics. The modelling framework we have chosen, therefore, does not ignore *a priori* any important labour force category.

As regards the paper's second main thrust- our intention is to estimate individual conditional probabilities of escape from unemployment using repeated cross section data from the Jamaican Labour Force Survey, applying suitable econometric techniques. Earlier empirical models estimate exit probabilities using cross- section data, relied on data from a single cross-section. More recently, the econometrics of survival and renewal processes has been applied to, now more commonly occurring longitudinal datasets. While there has been an increasing reliance on longitudinal datasets in the investigation of labour market phenomenon, there remains a paucity of such datasets for developing countries. Not surprisingly, no such longitudinal dataset exists for Jamaica, as is the case for many other developing countries (Kim, 2007). As a consequence, in order to estimate escape probabilities we make use of the survey design of the QLFS to produce reliable probability estimates. In so doing, we fill a gap in the literature by suggesting a simple approach through which estimates of escape probabilities from unemployment can be obtained using repeated cross-sectional data. The remainder of the chapter is organised as follows: Section *5.3* contains a review of the theoretical literature. *Section 5.4* contains a review of the empirical literature. In *Section 5.5* we explore some stylized facts of the Jamaican data and discuss sample construction, while in *Section 5.6* we demonstrate how the

[77] Predictably, therefore, the aforementioned papers draw conclusions which hinge crucially on the reservation wage. Both papers suggest that increased remittances have increased the reservation wages of Jamaican workers and thus reduced their willingness to participate in the labour market.

estimation sample was derived after which we will analyse the descriptive statistics in *Section 5.7*. *Section 5.8* introduces a simple model which will be used in the estimation. Estimation results, robustness checks and conclusions resulting from the estimation will follow in subsequent sections and together complete the paper.

5.3 Theoretical Literature Review

5.3.1 Neoclassical Theory

The neoclassical labour supply theory is the traditional approach to understanding the supply-side of labour markets. The analytical structure of the model is specified from the perspective of a utility maximizing agent faced with the problem of making a constrained choice between leisure and consumption. Joblessness is generated in this model only when the consumer is offered a wage below the reservation wage; the lowest wage at which the individual is prepared to forego leisure. Central to the theory and its many extensions is the reservation wage, on which the decision to work is so critically hinged. Also important are level of non-labour income, resources and the shape of his/her indifference curves. The application of this model has been broad and varied. It has been extended to a multi-period setting and to include non-linear budget constraints- the literature on which is voluminous[78].

The major critique of the neoclassical approach is that individuals who are unemployed in the labour market do not feature, since individuals who are offered a wage inferior to their reservation wage simply choose not to participate. Perhaps an equally worrying feature of the model is that its assumption of perfect competition proves too strong for real-world labour markets where information is usually both imperfect and costly and where there are bound to be adjustment costs. While the neo-classical model of labour supply is primarily concerned with exploring the link, primarily using elasticities, between wages and labour supply; in this paper, we will be estimating escape probabilities from unemployment taking into account worker characteristics. To the extent that these characteristics can be affected by policymakers, targeted social and economic strategies may be engaged to improve employment outcomes.

[78] Blundell and MaCurdy (1998) provide a thorough review.

5.3.2 Job Search Theory

Job search theory offers a complement to the neoclassical model which extends the frame of analysis to explicitly include the unemployed and hence provide greater flexibility in explaining labour market phenomenon. Stated in its simplest and most intuitive form, the theory - first propounded by Stigler (1961, 1962) and later formalized through models of McCall (1970) and Mortenson (1970) - posits that the individual's problem involves comparing the (discounted) benefits derived from each labour market state. It is therefore, on the basis of the ordering of these state-specific, discounted, expected values that the individual worker will decide the labour market state in which to locate. Expectations play a key role in the model, since the individual does not know for certain what wage each job pays and it is primarily through the job search that he can improve his prospects. If we denote the interest rate by r we could write the returns of a dollar invested at time t after time dt as $1+rdt$. From the perspective of the job-holder, the following equation will hold in equilibrium;

$$V_e(w) = \frac{1}{1+rdt}\left[wdt + (1-qdt)V_e(w) + qdtV_u\right] \qquad 5.1$$

Where V_e and V_u are the discounted expected utility of being employed and unemployed respectively; wdt represents the wage earned over the period and qdt represents the job losing rate for a waged worker. Equation 5.1 shows that, in the steady state, the worker will equate his discounted expected probability of being unemployed with his discounted expected probability of being employed. Simplifying the equation above reveals two important identities;

$$rV_e = w + q(V_u - V_e) \qquad 5.2$$

$$V_e(w) - V_u = \frac{w - rV_u}{r+q} \qquad 5.3$$

Equation 5.2 shows that a job entails a discounted expected flow of income rV_e equal to the wage plus the expected losses from unemployment. From equation 5.3 we see that, from the individual's perspective, the utility differential between employment and unemployment varies positively with the wage and negatively with the interest rate and the quit rate. These results follow directly, since the higher the interest rate the lower the present value of a job whereas a higher quit rate magnifies the expected loss from unemployment and makes search less attractive.

Search theory also allows for the inclusion of costs implicit to the job search $c(e) > 0$ such as transportation or shoe-heel costs of finding a job, information costs relating to receiving information about jobs and dispatching applications. These costs are generally assumed to be concave in effort *(e)*. On the other hand, search theory offers enough flexibility for the explicit inclusion of unemployment benefits $b > 0$; to which the worker may be entitled if out of a job. Because Jamaica does not have an unemployment benefits system, the reader might, more appropriately, think of these benefits as conditional remittances received based on the altruism of relatives or friends while undertaking search activity in the labour market[79].

Critical to the structure of job search models is the theoretical construct referred to as a wage offer distribution which is the distribution of wages facing the individual engaged in the job search. In the literature, various assumptions have been made regarding this distribution and how values are sampled from it. Under the *non-sequential* approach due to Stigler (1962) the searcher samples a pre-determined number of offers from, say N firms. In contrast, under the more intuitive *sequential* method (McCall, 1970) the worker decides, in advance, on a range of acceptable offers and hears bids from successive, possible employers; each of which he compares with the pre-determined acceptable values. Denoting the wage offer distribution as $H(w)$, we could write the discounted utility expected upon receiving employment V_λ in terms of moments of the wage offer distribution as;

$$V_\lambda = \int_0^x V_u dH(w) + \int_x^{+\infty} V_e(w) dH(w) \qquad 5.4$$

In equation 5.4, x is the reservation wage. Rewriting equation 5.1, but from the perspective of the unemployed we get;

$$V_u = \frac{1}{1+rdt}\left[(b-c)dt + \alpha\lambda dt V_\lambda + (1-\alpha\lambda dt)V_u\right] \qquad 5.5$$

[79] Of course this is not explicitly stated in the theory. The notion of "private" versus "public" unemployment support however is a convenient, possible, substitute in economies without a public unemployment benefits system.

Note that in equation 5.5 we have included the parameter $\alpha > 0$ which is a measure of labour market conditions independent of the individual's effort. A labour market in which overall macroeconomic demand is strong and job vacancy rates are high would therefore have a higher α. The rate at which offers arrive is represented by $\lambda(e)$. We will use this parameter as an important point of departure in our discussion of the Jamaican labour market. Combining equations 5.4 and 5.5 we get;

$$rV_u = b - c(e) + \alpha\lambda(e)\int_x^{+\infty}\left[V_e(w) - V_u\right]dH(w) \qquad 5.6$$

[80]

The right hand side of equation 5.6 is the reservation wage or discounted expected utility from being unemployed. By differentiating this expression with regards to the parameters of interest, we are able to understand better the effect of different labour market phenomena on the reservation wage and hence the probability of escaping unemployment.

Some intuitive results emerge from the simplest of partial equilibrium search theoretic models such as the one outlined above;

1. The reservation wage (rV_u) is positively related to net benefit from unemployment ($b - c$).
2. The reservation wage is positively related to the rate of arrival of job offers.
3. An increase in the rate of arrival of job offers reduces the average duration of unemployment.
4. The reservation wage is negatively related to the interest rate.
5. The reservation wage is negatively related the job losing rate.
6. The reservation wage is positively related to the average duration of unemployment.
7. The average duration of unemployment is negatively related to the interest rate.
8. The average duration of unemployment is negatively related to the job loosing rate.

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[80] Use is made of the fact that $\int_0^{+\infty} 1.dH = 1$. The hazard rate within this model takes the form $f(\alpha)\lambda(e)[1 - H(x)]$ where x is the reservation wage. It follows therefore that the average duration of unemployment is $\left(f(\alpha)\lambda(e)[1 - H(x)]\right)^{-1}$ where $f(\alpha)$ gives the probability of realizing a labour market state α.

9. Labour market state α is positively related to the reservation wage and increases the intensity of the job search.
10. The reservation wage is positively related to unemployment benefits (household production, informal income, non-labour income) but unemployment benefits are negatively related to effort during the job search.

In sum, the job search model allows for the explicit inclusion of the unemployed category into the theoretical explanation of labour market behaviour- the noticeable absentee from the neoclassical approach. Herein lies the flexibility of this approach, in that all three categories; that of employed, unemployed and out-of-the labour force can be included within the search theoretic modelling framework with the mere specification of some additional reservation wage say $R_O \leq rV$ which forms the threshold for the decision to participate (search) or not to participate (search). However, based on the empirical findings of Abowd and Zellner (1985) as well as Jones and Riddell (1999), the distinction between participation and non-participation often proves to be an ambiguous one; especially when job search behaviour is taken into account. We take the finding of these authors on board in this our study of the Jamaican data for two reasons. Firstly, based on our investigation of the Jamaican manufacturing sector in Chapter 3, it is clear that both the out-of- the labour force labour market category as well as the unemployed category play a disproportionately significant role in the Jamaican labour market turnover. Secondly, the Jamaican QLFS simply does not provide enough information to allow the researcher to distinguish which of the two disemployment categories is the labour market state of origin for the recently employed worker.

Despite its merits, job search theory is not without its weaknesses. Chief among these is the stationarity assumption underlying the model-an assumption which in reality- may prove too strong. Van den Berg (1990) writes that non-stationarity can also arise if one or more of the exogenous variables change after the beginning of the spell of employment. As an example, a cyclical shift in aggregate demand may lead to a fall in $\alpha(t)$ or the arrival rate $\lambda(t)$. Similarly, unemployment benefits $b(t)$ may also vary over the spell of unemployment, or the wage offer distribution may shift resulting in non- stationarity. The manifest negative duration dependence of the probability of re-employment observed in empirical models, even after accounting for unobserved heterogeneity, is highly suggestive of non-stationary job search (see Meyer 1990; Narendranathan and Stewart, 1993; Bover, Arellano and Bentolila, 2002).

Furthermore, job search theory does not fully elucidate all the factors which one might reasonably expect to play a role in determining a worker's escape probability. One such factor is worker heterogeneity. This important feature of labour markets has been introduced within the job search modelling framework. Albrecht and Axell's (1984) model exemplify this approach. In their model, worker heterogeneity is introduced *via* differences in the workers' valuation of leisure costs. In general, models incorporating worker heterogeneity models tend to have as their main focus-the derivation of a non-degenerate wage offer distribution in a bid to escape the salient critique of Diamond (1971) and Salant (1977). However, this approach has lost popularity due to the fact that Krueger and Summers (1988) and Abowd *et al* (1999) have shown that, though important, worker heterogeneity does not adequately explain the variation in wages observed. An alternative approach is to model *on-the-job search*. Burdett and Mortensen (1998) show that in a model of *on-the-job* search with worker homogeneity, the labour market equilibrium is characterized by a non-degenerated wage distribution.

5.3.3 Sectoral Shifts Hypothesis and the Demand based Approach

So far, we have focussed, in the main, on supply-side determinants of the probabilities of escape from unemployment. It is perfectly natural however to suppose that demand- side factors may also play a significant role in influencing the likelihood of escape from unemployment. *Ceteris paribus*, worker characteristics such as skill levels, ability, training and experience all affect the individual worker's efficiency on the job and hence will affect the degree of worker suitability to performing tasks, the desirability of the potential employee to a given employer and hence the likelihood of success in finding employment. In addition, the technology of the firm, the degree of complementarity of labour with other inputs, the cost structure of the firm are all important factors which we expect to play a key role in determining the likelihood of success in obtaining employment. Ultimately, it is the strength of the demand for the output which will serve to anchor the derived demand for all factors; including labour.

The sectoral shifts hypothesis provides a direct link between individual skill levels and sectoral demand. This hypothesis, due to Lilien (1982) provides an explanation of one source of long term unemployment which is based on the underlying assumption that shifts in economy-wide demand do not affect each sector equally. Lilien notes that, at any point in time, some sectors of the economy may grow more rapidly than others, with the additional possibility that other sectors may, at the same time, be in decline. According to Lilien (1982), this disparity in growth outcomes between sectors is observable, not only in terms of output, but also in terms of employment levels. This idea represents an extension of an assumption made in the influential model of Lucas and Prescott (1974) - that markets are spatially distinct and that labour mobility between markets is both costly and time consuming. Lilien's (1982) extension was offered as an explanation for unemployment in the 1970's in the US. In fact, the period 1969 to 1980 marked a decline in US manufacturing of 23% and a simultaneous increase in service sector employment. We have already seen, between the years 1983-2006, Jamaican manufacturing declined by 31% while the service sector expanded by 46%. If the sectoral shift hypothesis were to hold in the Jamaican case, this would imply that workers possessing skills specific to manufacturing or agriculture potentially face significant costs in finding alternative employment in other expanding sectors due to structural imbalances. These structural imbalances are brought about by the mismatch between the skills of the unemployed workers and the skills the employer are looking for. So that, to the extent that there is a great deal of dispersion in the growth rates across different industries one might reasonably expect to find long term unemployment as a consequence.

As King and Morley (2005) point out there is a close relationship between search theoretic models involving worker heterogeneity and the sectoral shifts hypothesis; though this link is usually not explicitly stated in search theory. These authors point out that an exogenous shift in the sectoral composition of the employed implies that workers who have been separated from jobs must now learn new skills when relative demand in various industries changes. The degree of transferability of the skills embodied in the worker will therefore be critical in determining whether the search will be successful and may have implications for potential workers who are undergoing training at the time when the exogenous shock occurs.

5.3.4 Development Theory

Lewis (1954), in his much celebrated development model, explained the problem of unemployment and underemployment which he observed in Jamaica, and other such labour surplus economies at the time, using the concept of "unlimited supplies of labour". This concept was based on his observation that in certain economies "where the population is large relative to capital and natural resources, there are large sectors of the economy where marginal productivity of labour is negligible, zero or even negative". According to Lewis, in these sectors, suppliers of labour (alternatively-individuals willing and able to offer it) could easily be halved without reducing their output. Lewis (1954, 1979)[81] coupled this idea with the notion of a higher wage "capitalist sector" which faces an inelastic supply of labour and a "subsistence" sector whose supply of labour to the "capitalist sector" is effectively elastic in the sense that there is no limit to the labour supply on offer to it at the going wage.

Addressing the same issue Sen (1957) wrote that "in these economies, it is not that too much labour is being spent but it is that too many labourers are spending it". One explanation offered by Uppal (1969) for this phenomenon is that in such a setting there are limited opportunities for technical substitution of the factors of production. The existence of such limitations imply that there is only a restricted range of substitution for labour and capital for a particular level of output beyond which, the employment of additional labour with fixed amount of capital will not add to total output- with the result being redundant labour with zero marginal product. One of the earliest applications of this model was to the issue of rural to urban migration by Harris and Todaro (1970)[82]. The Harris-Todaro model predicts urban unemployment as individuals pour out of the subsistence sector into the capitalist sector in search of higher-wage employment opportunities but for which they must be physically present to apply for or to accept. Within this framework, a greater wage differential between the rural and urban sectors implies greater rural to

[81] A vast literature exists on "what Lewis meant" or "did not mean" into which we do not enter.
[82] This model treated at greater length in Chapter 3 of the thesis.

urban migration, and a proportionate flow of workers into the capitalist sector. These factors effectively reduce the probability of escape from unemployment for the job-seeker already within the urban areas. This is because, from the perspective of the worker searching in that sector, the greater the pool of competing searchers make his success less likely. We will not be detained by this model for much longer given that the model and its extensions have been broached earlier[83].

5.3.5 Education, Training and Signalling

In the human capital theory of Becker (1964), education and training are identified as key determinants of the labour market outcomes of individuals. In his seminal work, Becker highlights that differences in productivity observed in labour markets are closely linked to differences in the level of human capital investment embodied by the worker. According to the human capital theory therefore, a worker who has benefitted from human capital investment is therefore more productive and would be more likely to reap higher wages in the labour market. Although not stated explicitly in the theory it naturally follows that, for a given wage, an employer will prefer to employ an individual who is more productive as a result of relatively greater investment in human capital. We also know from human capital theory that the type of human capital acquired by the worker; be it general or specific, will affect the degree of transferability of skills and hence the probability of employment or re-employment once a job separation has been experienced.

The present value concept- a cornerstone of human capital theory- further elucidates the possible impacts of education and training on labour market outcomes in general and in particular, the effect of these variables on escape probabilities from unemployment or from non-participation into employment. The costs of education and training are therefore important considerations in evaluating the present value of a job. The existence of credit constraints affects an individual's ability to access needed resources to fund education and training. Moreover, the opportunity costs of schooling such as paid informal employment, the expected gains from criminal activity, household production, or the existence of government funded educational

[83] Anderson (1987), Panton (1993), Tidrick (1975) and Santiago and Thorbecke (1984) have all applied variations of the dual model in the analysis of the Jamaican labour market. For the most part, these studies have tended to be primarily descriptive, attempting to estimate the size of the various sectors.

and training policy, security[84], -all affect the observed probabilities of escape from unemployment. In addition, the discount factor may also affect choices to pursue educational qualification. There is some suggestive evidence from the U.S. based study of Lawrance (1991) that discount rates are higher for the poor. The study also revealed that differentials in discount rates are even greater when individual attributes, educational attainment and family composition are taken into account. Similar observations have been made by other writers in this regard (See for example, Becker and Mulligan; 1997). In countries, where individuals have a high rate of discount, the payoffs from seeking employment will be highly discounted and the magnitude of upfront financing costs will weigh heavier in the determination of the expected discounted value of a job. This may make training less likely since it lowers payoffs.

It is also possible for training and education to serve as a signal, to the employer, of the ability and productivity of the worker. The signalling literature inaugurated by Spence (1973) examines how educational qualifications serve as a signal to improve worker wages. While not explicit, a corollary of the signalling hypothesis is that when wages are fixed higher educational qualifications should therefore affect the probability of escape from unemployment. Strobl (2003) argues that, in developing countries, the channels for obtaining information about the labour market such as employment agencies and vacancy advertising are generally underdeveloped or even non-existent and thus information acquisition costs are much higher under these settings. Under these circumstances, therefore, educational qualifications may be used as a criterion for selecting workers; since most able workers will tend to educate themselves to a level that will indicate, to potential employers, their superior ability.

5.4 Empirical Literature Review

5.4.1 Micro-econometric models of Escape Probabilities

Existing econometric studies on the probability of escape from unemployment make use of three types of data. They are: micro-level survey data, aggregate time series data or a mixture of both data types. With respect to studies using micro-level survey

[84] There could be real security risks for attending school on volatile and crime ridden areas, so that school attendance my actually be a risk to life.

data, longitudinal studies feature prominently in the literature. Comprehensive literature reviews of this empirical approach can be found in Van den Berg (2001), Lancaster (1990) and the references therein. These studies together, represent excellent surveys and are comprehensive extensions of the brief sketch outlined here. In general, this approach makes use of the population cumulative density distribution function of durations, T realizations of which are denoted t, where T is non-negative and stochastic. The probability that the duration of a spell of unemployment is less than t can therefore be written as;

$$F(t) = \Pr[T \leq t] = \int_0^t f(s)ds \qquad 5.7$$

Analogously, the probability that an individual will survive past time t is the mutually exhaustive complement $S(t)$; otherwise referred to as the survival function, which itself can be elaborated as;

$$S(t) = \Pr[T > t] = 1 - F(t) \qquad 5.8$$

The key construct used in survival analysis, however is the hazard function $\lambda(t)$[85] which can be written as;

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr[t \leq T, < t + \Delta t \mid T \geq t]}{\Delta t} = \frac{f(t)}{S(t)}\text{[86]} \qquad 5.9$$

The hazard function, written in this way, provides a measure of the risk of exiting unemployment instantaneously. In particular, the hazard gives the rate at which a spell is completed at t, given that it has not yet been completed before t; as a function of t. It is this function that is typically estimated in studies of probability of escape from unemployment. Covariates are generally included in the model by writing the hazard function in the form;

$$h(t) = \lambda(t).\theta(x)v \qquad 5.10$$

$\lambda(t)$ is referred to as the baseline hazard since it contains information on the shape of the hazard function for all individuals. The level of the hazard modelled in this way will vary per individual through the effect of individual covariates on the function $\theta(x)$ or the systemic part of the hazard and is usually specified as

[85] This is analogous to $f(\alpha)\lambda(e)[1 - H(x)]$ alluded to in our sketch of the basic search model in equations (5) and (6). However in this case the dependence on time instead of effort is what is primarily being modelled.

[86] It can be easily shown that $\lambda(t) = -\dfrac{d\ln(S(t))}{dt}$

$\theta(x) = \exp(x'\beta)$. The error component v, follows a distribution with well-specified properties (see Van den Berg; 2001). The specification of $v(.)$ offers flexibility allowing for parametric or non-parametric modelling solutions. For example, given a specification of equation 5.10 where $v = 1$ we arrive at the proportional hazard specification. On the other hand, $v(.)$ can be specified as a probability distribution capturing the heterogeneity of workers. This is the approach used in mixture models. Alternatively, $v(.)$ can be used to model the existence of competing risks. The competing risk framework is preferred when there are more than one destination states which the researcher wishes to model explicitly (McCall, 1996).

Given the voluminous literature in the area of survival analysis and the estimation of duration models we will not be detained for too long with this modelling technique. Moreover, any survey we could provide here would pale in comparison to the excellent outlines of the model to be found in any leading micro-econometric text[87]. Since the Jamaican QLFS is not suited to longitudinal analysis and no such longitudinal dataset exists for Jamaica (Kim, 2007), the use of survival models of the class outlined above is not feasible for the Jamaican data. In any case, longitudinal datasets tend to suffer from biases due to endogenous attrition and are usually available over relatively short time periods. As a consequence, we will devote the remainder of this section to studies using other types of data comparable to the Jamaican QLFS data. Throughout, we will attempt to highlight the distinctions between these approaches and comment on the suitability of these methods to the Jamaican data.

There are also a few studies which use cross-sectional data in order to estimate probabilities of escape from unemployment. One of the most notable, earlier studies is due to Nickell (1979). Nickell's model uses unemployment data from a single cross-section of 426 males from the 1972 General Household Survey (GHS) - so that, in the GHS, actual exits from unemployment are not observable. This dataset exemplifies "stock sampling" which is sampling from the group or set of individuals in a particular state at a given point in time. Stock sampled data contrasts "flow sampled" data which involves tracking individuals who enter states; in our case

[87] See for example Cameron and Trivedi (2005), Wooldridge (2001) and Lancaster (1990)

labour market states, over a given time interval; with each data type presenting its own, distinct, econometric challenge.

In light of this, Nickell's (1979) study is based primarily on the intuition that the cross-sectional data contains information on the unemployed individuals who have survived in that labour market state; each having their own unemployment durations at time t. Moreover, an additional data requirement of the model is that administrative unemployment inflow data be utilized in order to estimate the labour market inflows into unemployment. This additional data requirement cannot be met for Jamaica[88]. Inflow data is key to Nickell's method since inflows into unemployment represent the population "at risk" at different points in time thereby allowing for estimation of the likelihood. The empirical model utilizes a function which is the probabilistic complement to the hazard- $S_i(t,v,x_i)$, called the survival function. This function gives the probability of an individual "surviving" or remaining unemployed, conditional upon having entered unemployment at time $t-v$. More specifically we could write;

$$S_i(t,v,x_i)=\prod_{\tau=1}^{v}(1-\lambda(x_i(t,\tau),t,\tau)) \text{ for } v\geq 1 \qquad 5.11$$

The $\lambda(x_i(t,\tau),t,\tau)$ function is the familiar hazard function, now written with explicit arguments x_i -representing the set of worker's attributes, which are allowed to vary over the length of the spell of unemployment $(t-v)$ which itself varies over τ. By multiplying the probability of having entered into unemployment at time τ; $u_i(\tau)$ by $S_i(t,v,x_i)$ then one could write the probability of being unemployed at time t as;

$$U_i(t)=\sum_{t=0}^{\infty}u_i(t-\tau)S_i(t,\tau) \qquad 5.12$$

Following from equation 5.12, the likelihood of observing individual i unemployed in the sample can then be written as;

$$L_i=\frac{u_i(t_i-v)S_i(t_i,v)}{\sum_{v=0}^{\infty}u_i(t_i-v)S_i(t_i,v)} \qquad 5.13$$

[88] While it is possible to estimate the quarterly inflows from unemployment or out-of the labour force into employment and vice-versa from Jamaican Labour Force Survey data. One is not able to estimate the gross flows across labour market states within disemployment. Nickell (1979; 1980) relied on administrative data for information about the magnitude of these inflows.

The joint likelihood of observing the unemployed sample of all I individuals - L is then derived as a multiple of all the individual likelihoods;

$$L = \prod_{i=1}^{I} \frac{u_i(t_i - v)S_i(t_i, v)}{\sum_{v=0}^{\infty} u_i(t_i - v)S_i(t_i, v)} \qquad 5.14$$

Nickell's (1979; 1980) model is estimated using a logit specification under the strong assumption that the composition of inflows into unemployment by worker type remains unchanged over the *entire* sample period, This assumption is referred to as the "stationarity" assumption on which the ability to arrive estimates of probabilities of entry into unemployment u crucially depends.

Nickell found that the replacement ratio, individual attributes such as marital status and duration of unemployment significantly affect escape probabilities. In a follow-up paper, Nickell (1980) extends the earlier model to provide a more detailed analysis of male unemployment in the UK. Although, the estimation framework was similar to that of the earlier paper, more detailed results on the characteristics of the unemployed broken down by replacement ratio, socio-economic and occupational grouping were presented in the latter study.

In undertaking empirical analysis of cross-sectional, stock-sampled data such as the data used by Nickell (1979), a key consideration is the problem of length-biased-sampling. Length-biased sampling occurs because such data contains, on average, longer durations than is representative of the true population. Left-censoring and the initial conditions problem may also arise due to the fact that observing uncompleted unemployment spells is statistically dependent on unemployment occurring during the specific time interval within which the survey was administered. Any study investigating the issue of unemployment escape probabilities must therefore take both considerations into account[89]. Since we have more than one cross-sections of the Jamaican QLFS it seems insufficient to employ Nickell's method to one survey. Moreover, a key difference between the GHS data and the Jamaican data is that it is possible to directly identify successes using the latter dataset. Moreover, the assumption of stationarity may prove too strong, since as we have already seen; the

[89] A more recent application of Nickell's (1979) model is due to Murphy (1996).

Jamaican labour market has undergone significant occupational transformation which has accompanied the sectoral adjustment.

Many studies investigating escape probabilities from unemployment using cross-sections have also been conducted using CPS data from the US. This is due to the fact that for some time, the study of unemployment in the US was, for the most part, highly reliant on the use of CPS data. The problem facing the empiricist wishing to exploit the CPS data, however, is twofold. Firstly, only unemployed individuals are asked to report the length of their incomplete unemployment spells leading to the well known problem of right-censoring of the duration data. Secondly, the problem of length-biased sampling to which studies based on stock sampled-data are so prone is likely to feature. Given the lack of, now more frequently occurring, longitudinal datasets in the past, much of the research at that time focused on the problem of how to infer the distribution of completed unemployment durations from a length-biased sample. It is worth reminding the reader however, that unlike the Jamaican QLFS data that by virtue of the survey design of the CPS data, inferences from this type of data precludes the use of data on employment since, in the CPS, employed workers are not asked about their unemployment durations. Among the earliest and most frequently cited are the studies based on CPS data are Salant (1977), Frank (1978) and Flinn (1986)[90]. Salant (1977) used the gamma distribution to model the escape rate density in an attempt to capture stylized facts of the BLS data. Frank's (1978) study employed the use of moments to retrieve the average durations of unemployment spells from the cross-section and thus make inferences about the population duration density function. On the other hand, Flinn (1986) explored the properties of various maximum likelihood estimators that could be suitably applied to the analysis of such data.

5.4.2 Escape Probabilities and Macro-data

Van den Berg *et al* (1994) uses macro-economic unemployment data from Netherlands, UK and France to estimate a mixed proportional hazard model taking into account exit rates, unemployment durations and unobserved worker

[90] See also Chesher and Lancaster (1983) in which the relationships between the distribution of observable and unobservable characteristics of workers when sampled from stock, flow or time-series type surveys are explored.

heterogeneity. For example, Van den Berg *et al* (1994) estimates that the jobless in Britain exhibit negative duration dependence while French workers showed little signs of duration dependence. On the other hand, for the Netherlands the relationship between escape probabilities and unemployment duration was found to be nonlinear (inverted U shape). The authors are only able to differentiate unemployment escape probabilities along the lines of gender which is a problem common to macro-level data-the studies are not usually very informative about individual worker characteristics that affect their employment prospects. In the extreme case the relevant characteristic traits may have to be decided by the researcher himself. On the other hand, a clear advantage of macro-data such as that used by Van den Berg *et al* (1994) is that such data is highly conducive to making cross-country comparisons. A similar analysis was carried out in a later paper by Van den Berg *et al* (1996), this time exploiting CPS data[91]. In this paper, the authors find significant differences in the duration dependence in the US along the lines of race.

Van den Berg and Van der Klauw (2001) estimate a model using a mixture of macroeconomic and micro-level data. The idea behind this study is to overcome issues associated with short time span and endogenous attrition frequently associated with the use of longitudinal data, while at the same time exploiting the observable heterogeneity in the micro data. To achieve this, the authors combine longitudinal French Labour Force Survey data with administrative longitudinal data collected by the public employment agencies (APNE) over a ten year span. Adjusting for definitions of unemployment across data types as well as for specification errors, the exit rate and inflow rate are modelled. The authors find that individual exit probabilities vary over the business cycle; a finding consistent with the empirical observation that mean unemployment duration varies counter-cyclically. The compositional effects of worker flows are also explored in this study although the sample period proved too short for conclusive results to be obtained.

5.4.3 Studies using Repeated Cross-Section Data

This chapter is more directly linked to the empirical literature using repeated cross-section data. Earlier studies exploiting this type of data focussed mainly on

[91] See also Abbring et al (2002)

examining the cyclical behaviour of escape probabilities and how exit rates differ by groups-most notably, groupings based on duration categories. One of the earliest papers to adapt this approach is Sider (1985). This paper analyzes the effect of the stationarity assumption on the average (unconditional) probability of survival. In addition, using cohort analysis on CPS data spanning 1968-1982, the theoretical implications of deriving estimates for the average (unconditional) probability of survival in unemployment with and without the stationary assumption were derived. Sider (1985) concludes that if steady state conditions do not hold then sampling biases with respect to the spell duration as well as the expected hazard could occur. However, the inability of the empirical strategy adopted by Sider (1985) to exploit all the micro-economic information in the survey as well as the failure of the author to distinguish unemployment spells by reason of unemployment meant that the study is restricted to analysing the incidence of unemployment as well as the cyclical behaviour of unemployment duration. A link between unemployment and unemployment duration is found to exist irrespective of whether the stationarity assumption is imposed.

In a related paper, Baker (1992) further exploits micro-level data by incorporating compositional effects in analysing unemployment duration within a repeated cross-section (pseudo-panel) framework. The key intuition behind Baker's approach is that: if a given survey contains data on the time of commencement of unemployment spells in addition to information about the unemployment duration of respondents then survival probabilities can be estimated for particular cohorts which begin unemployment at the same time with some unemployment duration τ, by matching these records with those of workers who report unemployment duration of $\tau + 1$. This approach is implemented on CPS data from 1979-1988 and unemployment survival rates were estimated from consecutive surveys. The impact of demographic characteristics is ascertained by comparing results for demographic "groups" or "cells" defined by the authors[92]. Using this method, Baker (1992) finds significant differences in the unemployment experiences based on demographic characteristics. Furthermore, counter-cyclical behaviour of mean unemployment durations, usually encountered in macro-level datasets was also observed.

[92] According to Baker (1992) "the choice of groups is guided by considerations on sample size and evidence from previous research".

Studies using repeated cross- sections such as those outlined above are generally criticised on the grounds that the definition of "cells" or demographic groupings are done in a somewhat *ad-hoc* manner. In addition, the ability to create a "cell" from which these inferences can be made relies to a large extent on the number of observations or data points within each category. This implies that regardless of how relevant an observable characteristic or worker- type may be in affecting the unemployment experience of the worker, if there are simply not sufficient workers within that group the "small cell size" problem would preclude its inclusion in the model. In general, the groups used in the analysis are either selected on the basis of past studies or theoretical models or are chosen arbitrarily. Moreover, while informative, these studies at best, allow for the prediction of group but not individual escape probabilities.

Markov models have also been applied to independent, repeated cross-section data in a bid to analyze the unemployment (employment) entry and exit hazards. Moffitt (1993) pioneered this modelling strategy by exploring the conditions under which repeated cross-section data could be used to estimate a general class of dynamic models containing the lagged dependent variable. Using the intuition that a first-order autoregressive model between binary outcomes can be modelled as a first-order Markov process, Moffitt (1993) illustrates from CPS data on married women in the US between the ages 20-59, over the years 1968-1988, how transition rates can be modelled using a Markov process. He estimates that the age of respondents, number of children, education and cohort effects play a statistically significant role in explaining transition probabilities. Subsequently, other studies have appeared which make use of Moffitt's technique. We sketch here, the general approach taken by those papers adapting this method to explore labour market transition probabilities[93] examples of which are; Mebane and Wand (1997) and Pelzer *et al* (2001).

[93] Another important class of the models looked at by Moffitt (1993) was the linear fixed effect model. The issues involved in the estimation of this model have been explored by Baltagi (1995), Collado (1997), Girma (2001), Nijman and Verbeek (1992).

The analytical structure of this class of models is such that the Markov matrix containing transition rates can be written as;

$$\begin{array}{cc} & y_{it} \\ & \begin{array}{cc} 0 & 1 \end{array} \\ y_{it-1} \begin{array}{c} 0 \\ 1 \end{array} & \begin{bmatrix} 1-\mu_{it} & \mu_{it} \\ \lambda_{it} & 1-\lambda_{it} \end{bmatrix} \end{array}$$

Note well, that all row entries sum to unity. The entries in the matrix represent transition probabilities across labour market states. This is because μ_{it} represents the probability that the *i*th individual occupied state $y_i = 0$ at time *t-1* and state y_i=1 at time period *t*. By a similar argument, the probability that the individual exits state $y_i = 1$ in time *t-1* to state $y_i = 0$ in time *t*.

If we write $p_{it} = P(Y_{it} = 1)$, $\mu_{it} = P(Y_{it} = 1 \mid Y_{it-1} = 1)$ and $\lambda_{it} = P(Y_{it} = 0 \mid Y_{it-1} = 1)$. Then we could summarize the relationship between the probabilities as;

$$E(Y_{it}) = p_{it} = \mu_{it}(1 - p_{it-1}) + (1 - \lambda_{it})p_{it-1} = \mu_{it} + (1 - \lambda_{it} - \mu_{it})p_{it-1} \qquad 5.15$$

Equation 5.15 is the elemental equation relating transition probabilities between the two states to the marginal probabilities. It describes the underlying process in terms of one-step transitions; implying that the probability of being in a particular state at time *t* is dependent only on the state occupied in the preceding time period *t-1*. If the transition probabilities are equal across individuals and are time stationary, then $\lambda_{it} = \lambda$ and $\mu_{it} = \mu$ and $E(Y_{it}) = \mu/(\mu + \lambda)$ which is independent on the initial probability p_{io}. The time invariant steady-state, Markov model invokes these assumptions and represents the standard approach used in modelling transition probabilities[94].

94 Examples of studies using this standard approach to estimate transition probabilities are Topell (1983) as well as McCall (1971).

Solving the elemental equation recursively as $t \to \infty$ (or alternatively assuming that $p_{i0} = 0$) we get the expression;

$$p_{it} = \mu_{it} + \sum_{\tau=1}^{t-1} \mu_{it} \left(\prod_{s=\tau+1}^{t} (1 - \lambda_{is} - \mu_{is}) \right) \qquad 5.16$$

The attractive property of equation 5.16 is that probabilities modelled in this way incorporate time-dependence while at the same time allowing enough flexibility for the inclusion of heterogeneity. In particular, equation (16) is estimated using the method of maximum likelihood where;

$$\mu_{it} = (1 + e^{-X_{i\tau}\beta})^{-1}, \qquad \lambda_{is} = (1 + e^{X_{is}(\alpha+\beta)})^{-1} \qquad 5.17$$

$X_{i\tau}$ and X_{is} represent current and back casted values of the covariates at times $t = \tau$ and $t = s$, respectively. In the identity written describing λ_{is}, α is the parameter vector containing the differences in the coefficients across time periods. Inclusion of this parameter within the modelling framework avoids imposing the restriction that the intercept and slope coefficients are always the same.

In sum, the basic intuition behind models of this class is to use histories of the covariates X_{it} to generate backward predictions for the transition probabilities and hence the marginal probabilities ($p_{it}, p_{it-1}, p_{it-2}, p_{it-3}$,........., p_{i1}). In the case of repeated cross-section data, where the histories of microeconomic units of interest may be unknown, important variables may have to be omitted from the model or arbitrary and *ad-hoc* backcasts imputed. Another reason for the undesirability of this model is the counterintuitive condition under which the elemental equation relating the marginal to the transitional probabilities is derived. Moreover, although an interesting departure for future theoretical work, we cannot find a theoretical justification in the existing literature for a single process determining simultaneously both job exit and entry rates. In our case, we are only interested in transitions from joblessness into employment.

There have been other attempts to estimate individual probabilities of escape from unemployment using repeated cross-section data under the assumption of intertemporal independence. Guell (2001), is one such example, which uses data from the Spanish LFS to estimate escape probabilities while extending the work of

Nickell (1979). This study is aimed at analyzing the effect of fixed term contracts on the duration distribution of unemployment in Spain. Exploiting data from the Spanish Labour Force Survey from 1980-1994 the likelihood function of equation 5.13 was adjusted for grouped duration data so that the likelihood of observing an unemployed individual is written as;

$$L_i = \frac{\sum_{v=a_i}^{b_i} u_i(t_i - v)S_i(t_{i,}v)}{\sum_{v=0}^{\infty} u_i(t_i - v)S_i(t_i, v)} \qquad 5.18$$

Note that this function depicts the likelihood of observing an individual who has entered unemployment between time $t_i - a_i$ and $t_i - b_i$. This function is identical to equation 5.13 except for a minor adjustment. This adjustment was made in order to accommodate the fact that unemployment duration information from the Spanish labour force Survey, could not be observed perfectly, and was only recoverable in the form of duration groups or categories. Consistent with equation 5.18, therefore, the joint likelihood of observing the unemployed sample over the duration categories can be written as;

$$L = \prod_{i=1}^{I} \left(\frac{\sum_{v=a_i}^{b_i} u_i(t_i - v)S_i(t_{i,}v)}{\sum_{v=0}^{\infty} u_i(t_i - v)S_i(t_i, v)} \right) \qquad 5.19$$

Rather than applying the logit model of Nickel (1979; 1980) the Weibull distribution was adopted for estimation of Guell's model. The assumption of stationarity, along with the additional assumption that unemployment durations greater than *3* years have no effect on the hazard were invoked in order to estimate the model. Importantly, Guell's (2001) study is distinctive in two key respects; firstly the estimation strategy requires the use of a single cross-section for each survey year; secondly the study used the sample of unemployed and no data from the employed respondents. Guell (2001) conclude that the introduction of temporary contracts in Spain have caused a negative shift (shift to the left) in the duration distribution of the unemployed. Age and experience, education and other demographic factors were also found to significantly affect escape rates from unemployment.

In a later paper, Guell and Hu (2006) propose a method of moments *M*- estimator to estimate individual probabilities of leaving unemployment to re-evaluate the introduction of fixed-term contracts in Spain. Repeated, cross-section data comprising incomplete, unemployment spells only, from the Spanish QLFS was used in this study. The improvement over earlier models is that the model relaxes the assumption of stationarity while still permitting estimation over a time series of cross- sectional data. In this way, the composition of the population at risk is allowed to vary over time, reflecting structural shifts in the labour market. In a sense, the title of their paper is a misnomer since the model they use in fact estimates the probability of remaining (surviving) in unemployment[95]. The estimation strategy utilizes the idea that, assuming a simple two-time period model, where successes cannot be observed directly, the standard first order condition for a binary process can be "mimicked" using the equation 5.20 written below;

$$\sum_{\substack{dur=s \\ t}} y_i X_i = \sum_{\substack{dur=s-1 \\ t-1}} X_i \Lambda(X_i \beta) \qquad 5.20$$

The parameter estimates must therefore satisfy equation 5.20 which is the first order condition for the maximization of the joint likelihood of a simple binomial logit $\Lambda(.)$ with coefficient vector β, where $y_i = 1$ if an unemployed individual *i*, at time *t-1*, remains unemployed at time *t* and $y_i = 0$ otherwise. Alternatively, this estimation strategy implies that a solution can be found for the coefficients of equation 5.20 if one were to create a moment condition using information across the successive independent cross-sections. This could be achieved if the representative cohort of individuals having unemployment duration *s* at time *t* were matched with information on individuals of duration *s-1* at time *t-1*. By adding other successive surveys the authors add more moment conditions which are then simultaneously optimized to recover the parameter estimates. Essentially then, under this method, a representative cohort of unemployed individuals, having a spell duration *s-1* are matched with a representative sample of unemployed having duration *s* in the subsequent cross-sectional survey. The final sample used by the authors comprises consecutive Spanish labour force surveys between 1978:2 to 1994:4. They find that short-term unemployed are more likely to find a job in Spain in the 1990's relative to the long-term unemployed; a change which they attribute, at least in part, to the introduction of temporary contracts. The authors conclude that there is increased

[95] As we have seen this is common to studies examining unemployment escape probabilities, since for most studies using repeated cross-section data only unemployment data are used.

segmentation in escape rates of the unemployed, with the escape probabilities of the longer-term unemployed deteriorating significantly in the 1990's. They find further that both demographic characteristics and the duration of unemployment play a statistically significant role in affecting unemployment escape probabilities.

5.5 Stylized Facts: Jamaican Unemployment

5.5.1 The Definition of Labour Survey Aggregates in Jamaica

The Jamaica Labour Force Survey adheres to the ILO definition of the employed, unemployed and out-of-the labour force category. According to the Statistical Institute of Jamaica, the employed comprises all persons in employment; that is all persons working during the survey week, together with persons who had jobs but were not working during the survey week. According to the same source, the unemployed comprises those persons who are seeking work together with those who desire employment and are available for work. The latter category includes individuals who were, during the survey week, actually engaged in home or other duties not classified as economic activity, but who were willing and able to accept work during the survey week.

Among individuals who are considered to be seeking work in the unemployed category are those individuals: registered with and employment agency, on call as available for work such as a nurse on the register as a private nurse, visiting job sites in search of a job; applying in person to prospective employers, placing advertisements in any public press or place, writing letters of application, asking someone to try to assist them in finding a job; making investigations with a view of starting own farm or business. The approach of the ILO in defining unemployment is based on the "labour force framework" which has its roots in the Eighth International Conference of Labour Statisticians convened by the ILO in Geneva in 1954. Contained within this framework is the requirement that an individual be considered unemployed if s/he during the reference period simultaneously satisfies being; without work, currently available for work and seeking work.

Within the out-of-the labour force category are all person 14 years and older who were not classified as employed or unemployed. Included in this category are full-time students, persons engaged in home duties, persons incapable of working, and persons not wanting work or not available for work. The empirical estimation to be carried out in this chapter is solely concerned with the two labour force states; employed and unemployed. Unfortunately, enough information is not known on the respondents in the out-of-the labour force category in order to justify including any respondents from this category within the empirical analysis. Nevertheless we provide below, for the readers' convenience, a review of trends in the Jamaican labour market and examine the composition of individuals within unemployed and within the out-of-the- labour force category.

5.5.2 The Incidence of Unemployment in Jamaica

Table 5.1 below depicts the incidence of unemployment in Jamaica by gender, age, sector and skill over the period over the years 1983-2006. The table shows unemployment rates in Jamaica[96] and therefore does not contain information on survey respondents within the out-of-the labour force category[97].

An examination of the table reveals a trend decline in both male and female unemployment rates in Jamaica over the period of interest. Whereas the male unemployment rate within the 1983-1988 sub-period averaged 14.65%, towards the end of the sample the unemployment rate fell to a much lower average of 8.9%. The female unemployment rate registered an even greater decline-averaging 33.62% in the 1983-1988 sub-period before falling to an average of 17.88% within the ultimate sub-period.

In general, unemployment rates by gender for the 1995-2000 sub-period appear to have been relatively greater than in the preceding period; indicating a slight reversal of the trend decline. Turning our attention to unemployment rates disaggregated by age group, it can be observed that the highest incidence of unemployment in Jamaica over the review period has consistently been among the country's youth. On the other hand, unemployment incidence among the elderly has been relatively low. In

[96] The standard definition of unemployment rates are used in this table. That is $UR_t = \frac{U_t}{E_t + U_t} \times 100$.

Where UR_t symbolizes the unemployment rate at time t, U_t represents the stock of unemployed at time t and E_t is the stock of employed at a particular point in time.

[97] Information on individuals who are out-of-the labour force is contained in Table 5.2.

fact, across *all* age groups the lowest unemployment rates can be consistently observed among individuals within the 50-65 age groups despite the fact that there were noticeable increases in average unemployment rates of individuals within this age category towards the end of the sample.

Characteristic	1983-1988	1989-1994	1995-2000	2001-2006
Gender:				
Male	14.65	9.75	10.28	8.9
Female	33.62	22.68	22.8	17.88
Age:				
14-20	49.18	33.95	22.32	28.78
21-24	36.57	22.64	20.81	23.01
25-29	25.44	15.67	16.16	17.12
30-39	17.35	9.87	12.47	13.80
40-49	12.92	6.44	11.39	12.20
50-54	10.23	4.36	10.88	11.69
55-59	9.57	3.95	11.68	11.48
60-65	9.33	3.27	11.29	10.14
Sector:				
Agriculture	2.98	11.73	2.06	3.0
Mining	13.3	4.6	6.5	12.35
Manufacturing	19.17	11.5	14.34	17.88
Electricity	7.82	5.75	11.81	11.50
Construction	26.22	12.42	11.79	18.33
Wholesale	18.64	9.9	12.59	16.08
Transport	13.01	6.34	5.9	8.45
Finance	7.6	6.08	10.87	10.55
Community	21.08	10.36	9.5	10.99
Skill:				
Skilled Professional	9.23	3.64	9.27	6.27
Skilled Managers	16.11	7.66	5.69	6.01
Unskilled Non-Manual	21.07	11.20	20.92	17.02
Unskilled Manual	13.36	7.99	11.60	12.27

Table 5.1 Incidence of Unemployment in Jamaica 1983-2006[98]
Source: Jamaica Labour Force Survey (STATIN)

[98] Figures in Table represent percentage estimates from the QLFS

During the period 1983-1988, the unemployment rates for the 14-20 years category averaged as high as 49%, while the corresponding rate for the 21-25 years category was 35.57%. Very high rates of unemployment extend to even older age classes. In fact, across all unemployment categories and over all periods individuals under 49 years in the Jamaican labour force experienced average unemployment rates in excess of 10%, with the minor exception of the 30-49 age group (during the 1989-1994 window). On the basis of average unemployment rates, it is clear that while the incidence of youth unemployment is both high and persistent, there is a slight improvement (decline) in average youth unemployment rates in the 1990's before rates, once again, deteriorate toward the end of the review period. In sum, *Table 5.1* provides evidence of high and persistent youth unemployment in Jamaica for the duration of the sample; such that even during the period of a relative, uniform lowering of youth unemployment rates in the late 1980's and at the turn of the decade youth unemployment rates were, to all intents and purposes, still very high.

Given that Jamaica has experienced significant sectoral transformation over the period covered, it is not surprising that there has been significant variation in the incidence of unemployment by sector during the period 1983-2006. In order to calculate average unemployment rates by sector, unemployed individuals were matched to the sector to the sector to which they were previously employed. *Table 5.1* reveals that historically the construction, community, wholesale and manufacturing sectors have experienced the highest unemployment incidence. All these sectors have experienced average unemployment rates of over 12% over the entire review period. At the same time, all these sectors experience a noticeable decline in unemployment rates during the 1989-1994 sub-periods. However, this trend was not maintained to the end of the sample. The agriculture, mining, electricity and transport sectors typically enjoy lower rates of unemployment, though for agriculture we observe a significant increase in the average unemployment rate for this sector during the 1989-1994 period, in the aftermath of the hurricane and a high inflationary episode. The informality of this sector may also be a contributing factor. Weak legal framework and lack of property rights (legal entitlement to land) all make it relatively easy for workers intent on seeking agricultural employment to find work. It is also arguable that another reason for the low unemployment incidence in this sector is its relative unattractiveness to younger workers who account for the majority of the unemployed in Jamaica (as we have seen). The markedly lower unemployment rate in the agricultural sector implies that labour faces no bottleneck for employment in this sector since the skill requirements are so low and opportunities for re-employment so many. The wide disparities between average unemployment rates across sectors within the Jamaican economy imply that there are significant differences in employment and re-employment probabilities across sectors.

Table 5.1 also provides information regarding the incidence of unemployment by skill levels. For the purposes of this analysis we revert to the skill classifications employed in the previous chapter based on the work of Dolton and Kidd (1995) and Elliot and Lindley (2006). It is clear from the table that the highest unemployment incidence is among unskilled workers; both manual and non-manual. This situation however, was not always the case in Jamaica, as the table reveals that at during the first sub-period of the sample the average unemployment rate for skilled managers was realized at 16.11%. Closer examination of the average unemployment rates reveals that in the class of unskilled workers there is actually a relatively greater unemployment incidence among the non-manual unskilled workers and that at no time (during the sample period) was this phenomenon more pronounced than in the sub-period 1983-1988. It is also true that in this sub-period unemployment rates across all skill categories were generally higher than at other sub-periods depicted in *Table 5.1*. Moreover, the table shows a markedly lower incidence of unemployment among skilled workers in Jamaica and skilled managers realize even lower average unemployment rates than the comparable rates observed for skilled professionals toward the latter years of the sample.

Figure 5.1 below depicts the evolution of unemployment rates in Jamaica from 1983-2006. The figure shows the downward trend in unemployment rates over the period. This observation must be interpreted against the background of the economic turmoil in the decade of the 1970's in which the Jamaican government pursued a socialistic, populist economic model (called "Democratic Socialism") which saw a cumulative decline in real per capita GNP of 26% between 1973-1980, at the end of which the level of employment in Jamaica stood at 30% (Fields, 1984). At the beginning of the review period, an aggregate unemployment rate of 26% is registered with female unemployment rate at a remarkable 37.5%. This is more than double the male unemployment rate at that time. Since that time, the Jamaican unemployment rate has progressively declined to approximately 10% by 2006.

Figure 5.1 also shows that the sub-period 1986-1990 was marked by the fastest rate of decline over the period. This remarkable increase in the rate of decline in the unemployment rate was experienced by both male and females. Examining *Figure 5.1* more closely, however, reveals that while both genders generally experienced lower unemployment rates over the review period, female unemployment appears to decline at a faster pace, narrowing the gap between the level of male and female unemployment rates. On the other hand, during the decade of the 1990's there was a slowing down in the rate of decline in unemployment rates of both male and female

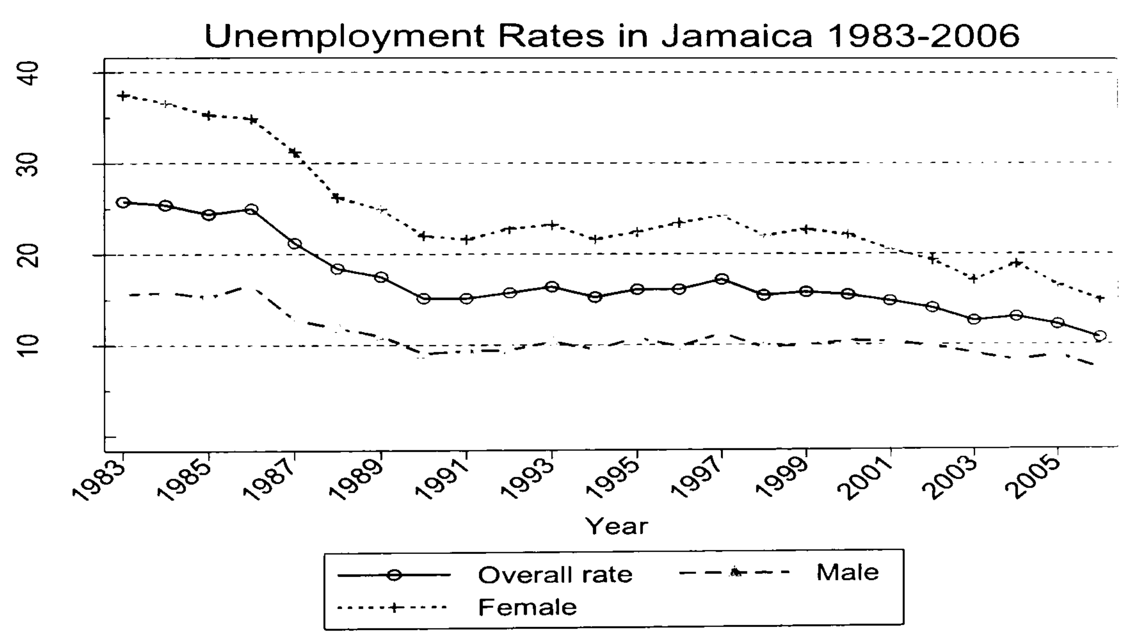


Figure 5.1 Trends in Jamaican Unemployment Rates 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

workers. By 1997, the unemployment rate stood at its highest level for the 1990-2000 sub-period at 16%. Notably, the high unemployment rate in 1997 coincided with the period of financial crisis. Since that time, the pace of decline in unemployment rates has once again increased. The subsequent fall-off in all unemployment rates and the further narrowing of the male-female differential in unemployment rates within the context of little or no economic growth in the late 1990's and throughout the following decade requires further explanation. In order to understand what could have led to this phenomenon we examine below the evolution of labour market aggregates in Jamaica.

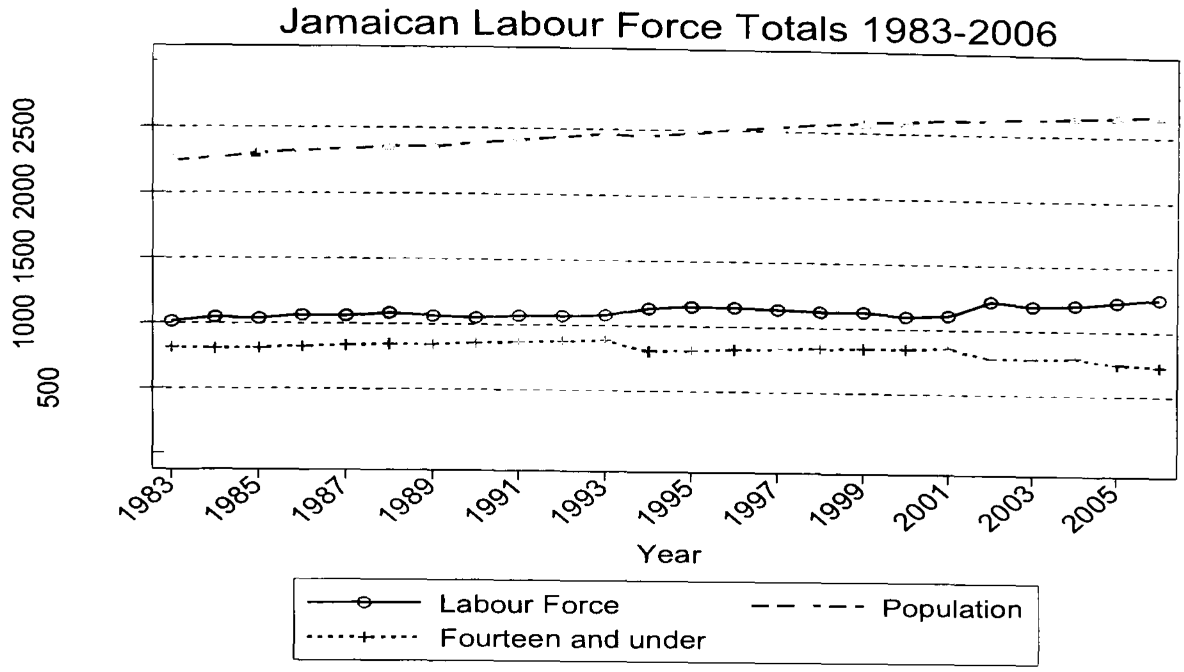


Figure 5.2 Jamaica Labour Force Totals 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

Figure 5.2 above shows the size of the Jamaican population and labour force over the period 1983-2006. Over the period the population has experienced a constant rate of growth. In 1983 the population stood at 2.24 million steadily increasing to 2.66 million by 2006[99]. These results show that Jamaica's population growth rate was relatively low when compared to global population growth rates over the period. Consistent with this finding, the number of individuals fourteen years and under has been decreasing. This decrease only began in 1994 and is indicative of an aging population. Other possible explanations for this phenomenon are; a reduction in the birth rate toward the end of the sample, the effects of emigration and increased incidence of mortality among the very young[100]. Taken together therefore, the concurrence of a noticeable decline in the number of individuals 14 years and under, relatively low population and labour force growth coupled with even lower employment growth, suggests that the *share* of the population that are classified as outside of the labour force has increased since the beginning of the 1990's. The picture which emerges is therefore one of an economy with an aging population and also with a growing number of economically inactive or non- participatory individuals. These results are more clearly presented in *Figure 5.3* below.

[99] This represents an annual population growth rate of 0.78% over the 24 year period.
[100] In Jamaica the latter effect is most certainly not the case. Although there is some evidence that Jamaica's emigration rate is very high (the data is not conclusive as to whether there was an increase in magnitudes towards the end of the sample.)

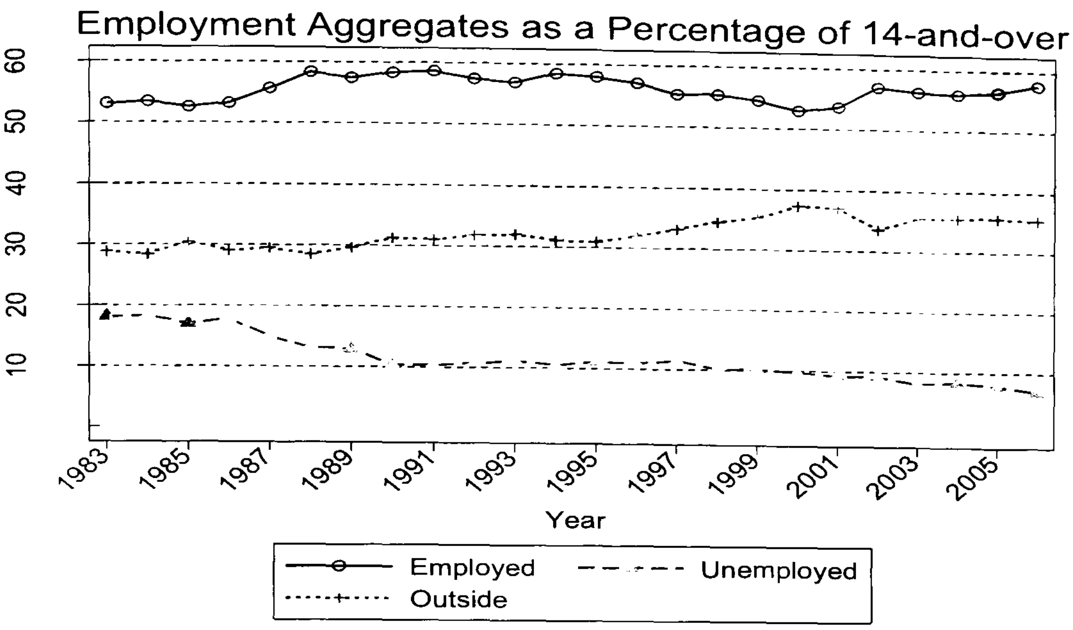


Figure 5.3 Jamaican Labour Market Aggregates (%) 1983-2006
Source: Jamaica Labour Force Survey (STATIN)

The figure above shows the percentage shares of the Jamaican population *14* years and over which are employed, unemployed or outside-the-labour force[101]. The figure reveals that there has been minimal growth in the Jamaican labour force over the period. For most of the period the share of employed workers stood at approximately 57%. In contrast, the share of the unemployed decreased from 18.1% in 1983 to 6.9% on 2006. The contrasting trends in unemployment and out-of-the labour force shares in the figure suggests that solely taking into account unemployment rates *per se* is not sufficient in understanding the labour market situation in an economy; a point well made by Summers (1990). In particular, although on the one hand the steady decline in the unemployment rate measures displayed in *Figure 5.1* could betoken a tightening of the labour market and hence an alleviation of the high unemployment problem post-1983, the very same figure also suggests that this conclusion may in fact be a spurious one. This, despite the fact that the unemployment rate more than halves its initial share realized at the beginning of the review period. In contrast, the percentage of individuals in the out-of-the labour force category shows an increase, beginning in 1990, after remaining virtually constant at 30% over much of the earlier decade. By 2006 the share had increased to 35%. Jamaica therefore experienced a concurrent increase in the proportion of individuals in the out-of-the labour force category at a time when unemployment

[101] For this figure we apply STATIN's definition of out-of-the labour force. The out of the labour force category is defined as the residual between the labour force and the population 14 years and over. This includes students, individuals engaged in home duties, individuals incapable of working and persons not wanting work or not available for work.

rates where trending downwards. Although this phenomenon appears to have begun in the late 1980's, the trend became much more noticeable from 1995 onwards and continued throughout the remainder of the sample period. It is arguable that this phenomenon observed in Jamaica suggests the possibility of a pronounced "discouraged worker" effect such that rational workers, either becoming cognizant of the futility of obtaining employment, or faced with declining present-value jobs- tend to give up the search and lapse into inactivity. These labour market developments are also consistent with the existence of an increasing average duration of unemployment over the sample period, especially where skills and desirable work habits deteriorate, the longer the unemployment spell.

Because of the fact that the out-of-the labour force category in Jamaica represents such a large and increasing proportion of the sample and hence represents a significant consideration in understanding the dynamics of high-unemployment in Jamaica we cannot exclude this category of individuals in modelling of escape probabilities from unemployment. Another compelling reason for the inclusion of this category in our sample is that; in cases of high unemployment, it is very likely that individuals may actually report having given up looking for work, and thus be routinely recorded in the out-of the labour force category, but may, in fact, be well-disposed to accepting employment, if only the opportunity were made available to them. The porous borders between various labour market states and in particular between unemployment have been well documented.

Table 5.2 presents sample proportions for the out-of-the labour force category tabulated by age, sex and educational qualifications. It is important to note that the figures in *Table 5.2* represent proportions of individuals classified within the out-of-the labour force between the ages 14-65 years[102] within the Jamaican Labour Force

[102] Figures in Table 5.2 represent proportions estimated from the Jamaican QLFS. The out-of-the labour force category was defined consistently with the definition of the Statistical Institute of Jamaica (STATIN). STATIN defines individuals who are out of the labour force and persons 14 years and older who are not classified as employed or unemployed. Included in this category are full time students, persons engaged in home duties, persons incapable of working and persons not wanting work or who are not available for work. Excluding the aforementioned groups before construction of this table is not possible given the survey design before 1998. For the sake of consistency, these groups are not removed for these years covered in the table. In constructing the estimation sample, however, these groups will be removed.

Characteristic	1983-1988	1989-1994	1995-2000	2001-2006
Gender:				
Male	**0.342**	**0.3315**	**0.4438**	**0.4017**
Female	**0.658**	**0.6685**	**0.5562**	**0.5983**
Age and Gender:				
14-20:	**0.6518**	**0.5753**	**0.3247**	**0.4369**
Male:	0.8407	0.7633	0.3591	0.5345
Female:	0.1593	0.4821	0.2971	0.3714
21-24:	**0.0587**	**0.0714**	**0.0976**	**0.0838**
Male	0.0315	0.0504	0.0982	0.0792
Female	0.0728	0.0817	0.0972	0.0869
25-29	**0.0444**	**0.0641**	**0.1061**	**0.0733**
Male	0.0173	0.0321	0.1042	0.0602
Female	0.0586	0.08	0.1076	0.0821
30-39:	**0.0539**	**0.0874**	**0.185**	**0.1358**
Male:	0.0176	0.0391	0.1650	0.1018
Female:	0.0727	0.1113	0.2009	0.1586
40-49:	**0.0461**	**0.057**	**0.1341**	**0.114**
Male :	0.0167	0.0267	0.1270	0.0948
Female:	0.0614	0.072	0.1397	0.1269
50-54:	**0.0305**	**0.0337**	**0.0528**	**0.0451**
Male:	0.009	0.0169	0.0524	0.0367
Female:	0.0416	0.0421	0.0531	0.0507
55-59:	**0.0366**	**0.0342**	**0.0425**	**0.0441**
Male:	0.0179	0.0188	0.0391	0.0376
Female:	0.0464	0.0418	0.0452	0.0485
60-65:	**0.078**	**0.0769**	**0.0573**	**0.067**
Male:	0.0494	0.0526	0.0548	0.0552
Female	0.0929	0.089	0.0593	0.0749
Education[103]				
Higher	0.0028	0.0028	0.003	0.009
Further	0.0218	0.022	0.0323	0.0232
Other	0.0736	0.0634	0.0109	0.0818
None	0.8850	0.8877	0.8465	0.8189

Table 5.2 Composition of Out-of-the-Labour Force Category 1983-2006

Source: Jamaica Labour Force Survey (STATIN)

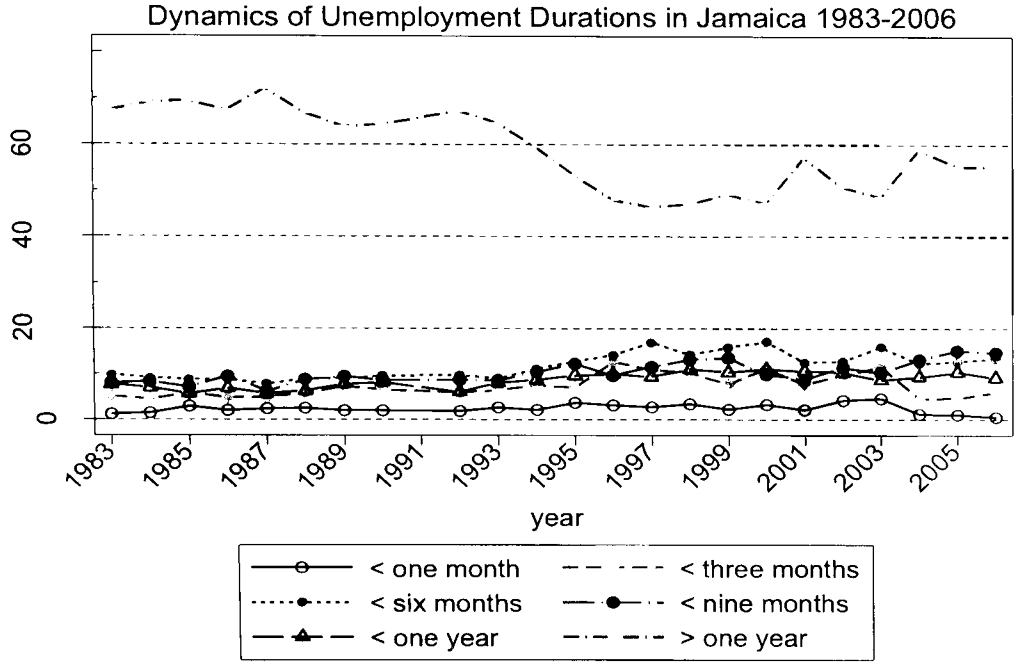
[103] Proportions do not add to 1 because we have not taken into account the non-responding individuals to the particular labour force survey question.

Survey. The first two rows of the table, displaying proportions related to gender corroborate our earlier findings of increased female participation in the Jamaican labour market. In the first period (1983-1988) women comprised 65.8% of the sample. However, with increased participation of women in the Jamaican labour market, the share of women in the out-of-the labour force category reduced to 59.83% in 2006. On the other hand, the proportion of men in the out of the labour force increased from 34.2% to 40.17%. Over the sample period covered in the table therefore there has been a noticeable shift in the gender composition of the out-of-the labour force category in Jamaica such that by the end of review period a greater proportion of males comprised this labour force category.

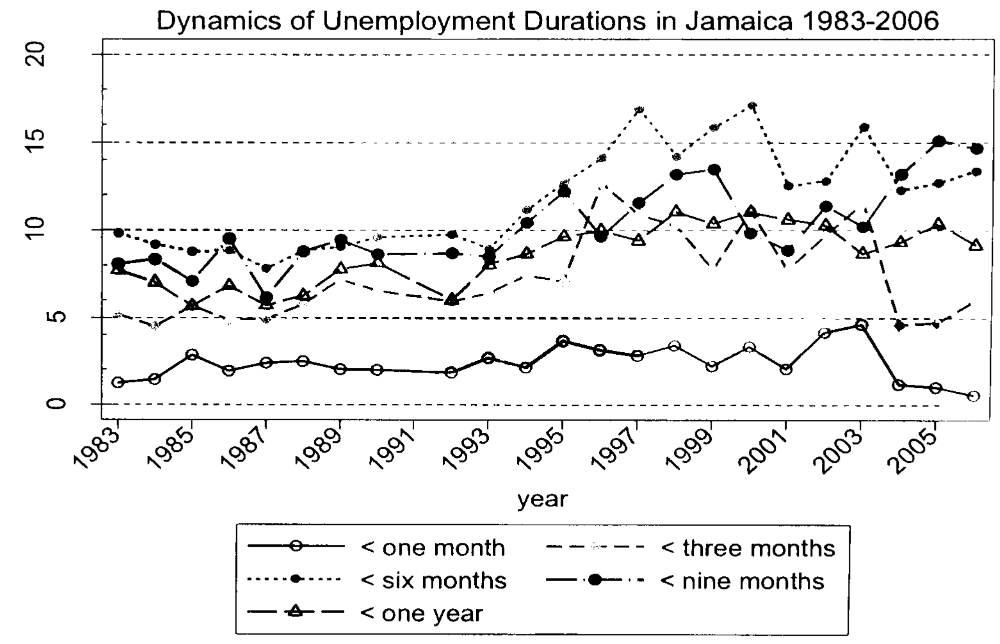
Examining the proportion of individuals in the out-of-the labour force category within selected age categories reveals that over the entire sample, by far, the majority of individuals within the out-of-the labour force category in Jamaica are in the *14-20* age range. This observation parallels our earlier finding from the unemployed sample. The greatest incidence of disemployment in Jamaican is among the youth. In addition, another interesting trend emerges from within the age category over the period. The proportion of individuals within this age bracket decreased to 32.47% in the sub-period 1995-2000 before once again increasing toward the end of the period to 43.69%. Despite these fluctuations, individuals in the 14-20 age group maintained dominance within the sample. Interestingly, at the same time that the Jamaican labour market experienced a decline in the proportion of persons in the 14-20 age-group as a proportion of the out-of-the labour market category, an increase in the proportion of individual within older age categories was also evident. The greatest increases were observed in the 30-39 and 40-49 age groups. By the end of the period the proportion of workers within these age classes more than doubled from their initial levels in the 1983-1988 sub-period. Although there were also increases in the proportion of workers outside-of-the-labour force in the 21-24 and even more so in the 25-29 age category, these increases were not as great as the increased proportions observed for individuals between the ages of 30-49 years.

The table also reveals changes in the gender distribution, by age of worker, in the out-of-the labour force category over time. In the first sub-period 1983-1988 an overwhelming majority of workers in the out-of-the labour force category were adolescent males. Contrastingly, in every other age category women dominated men by a safe margin. The table reveals that by the 1995-2000 sub-period this situation had changed significantly. In age categories such as 21-24 and 25-29 as well as in age categories over 40 years of age, the distribution of workers by gender were almost even. Furthermore, even within the few age categories where the share of female workers were substantially greater in 1983-1988 and 1989-1994 the differentials in the proportions were greatly reduced by the 1995-2000 sub-period. These proportions reveal that over the review period there has been an increase in the incidence of unemployment and non-participation among Jamaican young men.

Finally, examining sample proportions for the level of educational attainment for the out-of-the labour force category reveals that the majority of the individuals within this category possess no educational qualifications. Furthermore, throughout the period, there has been a slight decrease in the proportion of individuals without educational qualifications in the out-of the labour force category. This proportion stood at 81.8% by the end of the period under review registering a decline of 6.61% below the corresponding proportion realized in 1983-1988 sub-period. On the other hand, there is no evidence of perceptible improvements in the share of individuals receiving the highest levels of educational attainment such as *higher* and *further* qualifications over the entire period. The table shows therefore that whatever small gains achieved in educational attainment for individuals in the out-of-the labour force category were achieved among the lowest educationally qualified workers. This finding is similar to that found for employed workers in the manufacturing sector of the Jamaican labour market (as we have seen in Chapter *4*). In sum, there were shifts in the gender and age distribution of individuals within the out-of-the labour force category over the review period. The results reinforce the observation of increasing female labour market participation and an increasing proportion of male workers reporting to be out of the labour force between 21-55 years since the mid 1990's. The out-of-the labour force category in Jamaica, therefore, mostly consists of relatively young, uneducated individuals. Over time (1983-2006), this group has experienced very little improvement with respect to educational attainment.



(a)



(b)

Figure 5.4 Duration Distribution of the Unemployed in Jamaica 1983-2006

Source: Jamaica Labour Force Survey (STATIN)

Having found evidence of an increasing share of individuals within the Jamaican labour market reporting to be out-of-the labour force, we now turn our attention once more, to the unemployed category. *Figure 5.4* depicts the distribution of incomplete duration for the unemployed. Duration groups represented in the figure are retrieved from *unemployed* respondents who report on the lengths of their incomplete unemployment durations. Unfortunately, the Jamaican Labour Force Survey (like most surveys of this variety) does not elicit such detailed duration information for individuals within the out-of the labour force category of individuals regarding the length of previous completed spells of unemployment. The incomplete duration categories represented in the figure are expressed as a proportion of the stock of the unemployed within April surveys of the QLFS over the period 1983-2006.The reader is reminded that we treat only the unemployed in the figure. An analogous distribution exists for individuals within the out of the labour force category which could be potentially informative in understanding the dynamics of the Jamaican labour market. Unfortunately however, this duration distribution remains unobservable, for now,[104] because of the survey design. It is obvious from *Figure 5.4a* that the sample is dominated by individuals with (incomplete) unemployment durations in excess of one year. In fact, unemployed individuals possessing incomplete durations of lengths exceeding one year comprised greater than 63% up to 1988. So great was the share of individuals in the longest duration category that the time series depicting the sample proportions for the remaining duration categories are all cluttered together toward the bottommost section of the figure.

Interestingly, while the share of individuals within the longest duration category dominates all other duration categories for the entire period under review, the figure shows that since 1991 this duration category's share had experienced significant decline. In fact, over the review period the share of unemployed fell from 67.33% to 55.23% of the unemployed by 2006. In order to more clearly observe the evolution of duration categories of less than one year, they are plotted separately in *Figure 5.6b*. *Figure 5.6b* shows a divergence in the trends of the "less than one month" (incomplete) unemployment duration category and all other intermediate duration

[104] In order to meaningfully analyze the duration distribution of the out-of-the labour force category we will have to group the durations into broader categories and impose a few additional assumptions. These important issues are dealt with later in the chapter.

categories. Individuals having unemployment durations of less than a month have historically comprised less than 5% of the annual share of the unemployed. In fact for the majority of the period the share remained at around 2.5% before increasing in 2003 to a high of 5%. By 2006 the share had reduced to less than 1%. On the other hand, all intermediate durations categories start the period within the range 5-10% and uniformly increase until 1997. Unlike duration categories "over one year" and "less than one month" the evolution of intermediate duration categories exhibit greater volatility although they generally move together throughout the period. The volatility of all intermediate duration categories intensifies perceptibly since 1997 and the volatility persists to the end of the sample. Another feature of the intermediate duration categories in that throughout the sample period there are changes in the ordering of the series over time. For example, although in 1983 individuals with unemployment duration of "less than six months but greater than three months" dominated all other intermediate duration categories by 2006 the most dominant intermediate duration category was " less than nine months but greater than six months" category. In general however, even within the intermediate unemployment duration categories the 1983-2006 period saw a dominance of longer duration categories over duration categories of shorter durations within the sample. The dominance of the long-term unemployed (incomplete) duration categories in the Jamaican economy parallels the observation made by Machin and Manning (1999) in their review of long-term unemployment in Europe. In their paper, these authors stress that in settings where the long-term unemployed represent a large proportion of the labour force negative externalities result which could induce upward pressure on wages. They argue that this situation arises because the long- term unemployed are less effective and motivated at competing for jobs, especially if the unemployed possess specific traits or unemployment is concentrated within specific groups.

In the Jamaican case, one possible explanation which could harmonize the twin observations of the fall in the proportion of long-term duration of the unemployed as depicted in *Figure 5.4a* and the higher and growing proportion of individuals in the out-of the labour force category as can be seen from *Figure 5.3* is that toward the end of the sample, more of the long-term unemployed are lapsing into the out-of-the labour force category. However, we stress here, that lapsing of long-term unemployed into out-of the labour force is but one possible explanation of this phenomenon. The analysis of duration distributions over time recovered from stock-sampled data is primarily complicated by the fact that this distribution is censored since only incomplete unemployment duration spells are recorded for the unemployed. The analysis is further complicated by the fact that inflow and outflow rates for each duration category need to be taken into account for a comprehensive analysis. Moreover, information concerning the effect of covariates on these respective rates and about the interaction of the sorting process of firms with the employment decisions of rational individuals are needed for a more meaningful analysis. Nickell (1979) and Machin and Manning (1999) provide useful but far from satisfying discussions of the issue. As Machin *et al* points out, more research is needed in this area especially concerning the relationship between the average escape rates and the duration distribution. For the purposes of this introduction to the Jamaican data it suffices for the reader to note, that there is convincing evidence on the basis of *Figure 5.4* that, by far, a significant proportion of the majority of the unemployed individuals in Jamaica are long-term unemployed.

The Jamaican *QLFS* also elicits information from individuals within the employed, unemployed and out of the labour force categories, who have prior work experience, the reasons for their previous job separation. These aggregates, as a percentage of the labour force are presented in *Figure 5.5*. As the figure shows, between 1983 and 2006, the two most common reasons reported by jobless workers for job separations are personal reasons and reasons relating to low-demand[105]. On the one hand, personal reasons for exiting employment are many and varied and therefore there is great ambiguity in the interpretation of that particular aggregate, whereas "low-demand" is more straightforward to interpret. *Figure 5.5* shows that, on average, a mere 1.4% of the jobless in Jamaica each year will quit the job because of poor job conditions and approximately half of that proportion report separating from jobs because they had to relocate.

[105] The low-demand category represents an aggregate of workers who reported being laid-off, were victims of business failure, were made redundant, or whose jobs were completed.

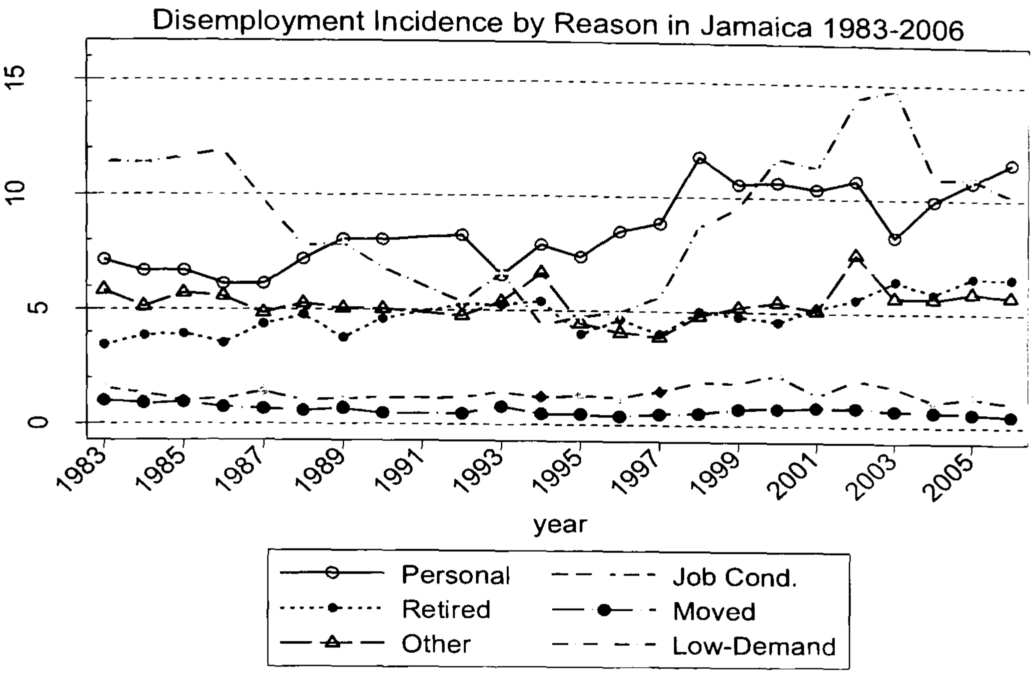


Figure 5.5 Incidence of Disemployment by Reason 1983-2006

Source: Jamaica Labour Force Survey (STATIN)

The proportion of workers claiming to have experienced job-separations due to low-demand stood at 12% in 1983. However throughout the 1980's this series exhibited a secularly declining trend. The decline in the proportion of job-separations due to declining demand coincides with the highest period of economic growth experienced over the sample period (see *Figure 2.1*). This series would reach a nadir of 5% in the mid-1990's before subsequently trending upwards indicating, a possible deterioration in labour demand over the remainder of the review period. By 2003 the "low-demand" series peaked at 15% before once again declining for the last three years shown.

The percentage of individuals citing "other" reasons for becoming unemployed remained relatively stable at 5%. Similarly, *Figure 5.5* shows that the sample proportion of the unemployed claiming to have lost jobs due to retirement was of comparable magnitude and stability to the proportion of individuals who faced with job separations for "other" reasons.

5.5.3 The HEART/NTA Programme

The Human Employment and Resource and Training/National Training Agency (HEART/NTA)[106] is the major provider of technical and vocational training in Jamaica. HEART/NTA was instituted by statute in 1982 and is financed by a 3% levy on the incomes of employers whose total gross taxable monthly payments of emoluments to workers exceeds JA$14,444. The initiatives offered by HEART/NTA constitute the major active labour market policy[107] in Jamaica and the goal of the programme is to improve employability and productivity of the workforce and to activate non-participating individuals within the labour market. Despite having received the majority of its funding through taxes, additional funding for the programme is provided through its international, regional and national partners (OAS, 2008). The requirement for entry under the HEART programme is simply that the individual be 17 years of age or older, although there is an additional, individual assessment for applicants without any educational qualifications. Assessors employed by HEART/NTA audit the skill levels of applicants; and on the basis of these assessments, existing skill sets are identified and specific training goals set along with the particular module units, institutions or academies to fill the skill deficit recommended. Upon completion of the training, the assessor files a report on the applicant's skill profile and a formal request is made for the appropriate National Vocation Qualification (NVQ) certification.

The HEART/NTA uses three modalities; enterprise-based training, community-based training and enterprise-based training. Enterprise-based training (EBT) provides on-the-job training in the workplace; institution-based training provides training through 28 formal, technical, vocational and educational (TVET) institutions and over 120 TVET special programmes island-wide; community-based training (CBT) is provided through partnerships established with the community stakeholders, including public sector entities. The institution-based, training modality comprises academic instruction at 26 training institutions-10 academies and 16 vocational training centres and relies heavily on working with partner institutions and may sometimes involve the skill upgrading of workers already employed in

[106] The HEART programme was later reformed and renamed as NTA in 1991.
[107] There are four main types of active labour market policies 1) training 2) public employment services 3) subsidized employment 4) activation. The HEART NTA programme is directed mainly towards the training and activation roles.

Jamaican industries. The key areas of training offered under the HEART/NTA programme are; Tourism and Hospitality, Financial Services, Information Communication Technology (ICT), Professional Services, Business Administration, Engineering and Construction, Services, Agriculture. Across all programmes enrolment in the HEART/NTA has been expanding rapidly. By 2006 there were 83,926 individuals enrolled in the program with growth rates in the preceding years exhibiting wide variation between 0.6% and 58%. Courses at HEART/NTA have, at a minimum, one year duration and the annual certification rates are in excess of 95% of the exiting cohort.

Calmfors (1994)[108] outlines a theoretical framework in which the effects of active labour market programmes such as the HEART/NTA programme can be analyzed. According to Calmfors (1994), such programmes may aim at improving the efficiency of the matching technology such that the Beveridge curve shifts closer to the origin; implying relatively lower unemployment rates for a given vacancy rate. Such a shift could entail an adjustment in the structure of labour supply in order to more perfectly match the skill sets that are in demand in the labour market. Active labour market programmes, such as the HEART programme could also lead to increased search behaviour of the unemployed as a result of improved counselling and monitoring of participants which could have the effect of providing a signal to prospective employers about the increased employability and productivity of programme participants. In raising the productivity of individuals, active labour market programmes may also restore the working habits of the long-term unemployed, however as Calmfors (1994) notes where these productivity gains are labour augmenting the employment-improving effects are mitigated. Furthermore, Calmfors (1994) points out that there are insider competition effects, labour participation effects as well as deadweight loss effects which may converge to either augment or diminish the intended (positive) supply-side effects of such policies.

There are, however, key theoretical considerations in the econometric evaluation of the ability of such programmes to affect labour market outcomes of the jobless. This is because, in the strictest sense, the critical question regarding the effectiveness of a

[108] See also Heckman, Lalonde and Smith (1999) for a comprehensive review of both the economic and econometric theory on these and other issues

training program involves consideration of "the counterfactual" -the comparison of two states; one in which the worker was exposed to the HEART/NTA program and the other- the differential effect if this were not the case. These issues stem primarily from the inherent sample selection bias common to this and indeed many other such applications in the labour market involving individual choice problems in which certain types of respondents are more likely to opt into such training programmes. Assessing the impact of programmes such as the HEART/NTA reduces to an analysis of whether or not the observed success of an individual escaping the ranks of the jobless is due to that individual's inherent ability, or other extraneous factors or to what extent their choice was based on exposure to the specific active labour market programme. In order to accurately sort out these effects, sample selection and other biases which could arise in the data would need to be carefully accounted for. Unfortunately, such information provided in the QLFS is not rich enough to facilitate this[109]. Moreover, as Heckman, Lalonde and Smith (1999) point out; in order to econometrically evaluate the impact of HEART/NTA training requires knowledge of counterfactual distributions (or at least counterfactual means). We include the HEART/NTA indicator variable in our model, therefore, only to improve the predictive capacity of our model but will have to infer with some caution, bearing in mind the severe limitations in our data in this respect. In any case, a more detailed assessment of the HEART/NTA programme would be better carried out on more appropriate data and would merit, as we have seen, a more comprehensive econometric treatment.

5.6 Sample Construction and Sample Means

5.6.1 Sample Construction

The sample used to for estimation of the model is created by identifying successes and failures from each Jamaican QLFS survey. The failures $y = 0\{X'\beta + u < 0\}$ are those respondents within each survey who report being unemployed but also report to have been in unemployment from 3 months earlier than the survey date. On the other hand successes $y = 1\{X'\beta + u > 0\}$ are comprised of the group of respondents within the each labour force survey who report having recently gained employment

[109] For example, the Jamaican QLFS does not have information on when the training under HEART was taken, or the labour market status of the individual before undergoing HEART/NTA training

within the last 3 months. By drawing successes and failures in this way we are then able to arrive at a representative sample of successes and failures from each Jamaican QLFS; exploiting the design of the survey. Under this method of drawing samples from the QLFS the group of those respondents within each survey who report being unemployed in excess of 3 months before the date of the current survey are the representative sample of the unemployed. They represent the set of individuals who were unemployed three months before the survey date and have failed to gain unemployment since that time. On the other hand, employed respondents within each survey who report having gained employment within the last three months, represent a representative sample of successes. The assumption of independence between individual, repeated cross-sections allows for this interpretation of the samples thus drawn.

Unemployment durations are only calculated for individuals who have worked before. The reason for this is because, within the Jamaican Labour Force Survey, unemployment durations of individuals who have worked before can be estimated by making use of the end of the last employment spell of the respondent. Individuals are asked in the survey what time their last job ended. On the other hand, for the individuals who have never worked before, the Jamaica Labour Force Survey does not provide any such information for individuals who have never had prior employment. Therefore, for individuals in the estimation sample who have never been employed there is no way to estimate their unemployment durations since we do not know, on the basis of the survey information, at what time the unemployment spells for these individuals began.

5.6.2 Key Sample Means

Table 5.3 contains proportions of key worker characteristics from the estimation sample. The columns of the table represent sub-samples of interest for which these sample proportions are separately estimated. The "worked before" column contains sample proportions from respondents from the sample who reported to have previously been employed. The "did not work before" sub-sample presented in *column 2* contains sample proportions of respondents who have reported to have never been employed before. *Column 3* depicts sample proportions that are calculated on the entire sample (the aggregate of both subsets represented in *columns 1* and *2*).

An important point to note about *Table 5.3* is that both sub-samples include "successes" as well as "failures". This follows directly from our sample construction rule. The "successes" in both the "worked before" and "did not work before" sample are the newly employed workers which have been used to for the estimation sample. In this regard, workers in each QLFS who are employed and who have worked before, but are not newly employed are not included within this sub-sample. The age profile for the "did not work before" sample is displayed in the *Figure A1* located in the Appendix.

Variable	Worked Before (1)	Did Not Work Before (2)	Total Sample (3)
Age (years)	32.94	22.93	29.22
Male	0.39	0.3754	0.3842
Higher	0.0189	0.0363	0.0254
Further	0.0028	0.0047	0.0035
Other	0.1869	0.2902	0.2256
None	0.7716	0.6211	0.7153
Urban	0.4833	0.4917	0.4831
H.E.A.R.T/NTA	0.0786	0.1081	0.0898
Vocational Trained	0.1547	0.1912	0.1679
Technical Trained	0.0289	0.0512	0.0373
Other Trained	0.1455	0.0518	0.1106
None Trained	0.6161	0.6878	0.6442
On-the-Job Trained	0.0462	n a	n a
Lost job	0.2847	n a	n/a
Personal Reason	0.3983	n/a	n a
Other Reason	0.346	n/a	n a
< Six Months	0.4049	n a	n a
< 1 Year(6 mnths. to a year)	0.2269	n a	n a
< 2 years(1 year to 2 years)	0.1849	n a	n a
2 years and above	0.1837	n a	n a
Sample size	5752	3415	9167

Table 5.3 Sample means of Key Characteristics 2004-2006
Source: Jamaica Labour Force Survey (STATIN)

An examination of the sample means for the worked before sample reveal that, on average, the respondent who has worked before in Jamaica is over 10 years older than the respondent who does not possess prior work experience. Moreover, by comparing the sample proportions relating to gender across all columns in *Table 5.3* above, reveals that almost 40% of all sub-samples is comprised of male respondents. The sub-sample with the marginally greater proportion of males is the worked-before category. The remarkable difference observed between the average age of the worked-before and never worked before subsamples may in fact be symptom of the disproportionately high youth unemployment which exists in the Jamaican labour market.

The sample proportions relating to educational qualifications reveal that individuals who have had prior work experience are uniformly, less educationally qualified. This is an interesting result since it implies that the unemployed without jobs have attained higher educational qualifications than those individuals who have worked before. Still within both groups, over 75% of the workers have absolutely no educational qualifications. This confirms earlier findings and may reflect structural problems in the educational system since it suggests that most Jamaicans have not met the necessary requirements for educational accreditation. The result also implies that there may be information asymmetries in the Jamaican labour market since, within such an environment; it may be difficult for employers to identify workers who possess the attributes that they require for a successful "job-worker" match. On the one hand, the educated workers are so few while on the other, it must be very difficult to differentiate the "good" worker among the mass of academically uncertified individuals.

One interesting result from *Table 5.3* is that the sample means depicting worker location are perceptibly equal across both the "worked- before" and the total sample. This implies that there is no bias in the distribution of workers with work experience in the urban areas as opposed to the more rural areas. This is an interesting result that is worth exploring. We already have evidence that manufacturing production is highly concentrated in the urban areas. Despite the relatively small size (in terms of employment share) of this sector one would expect a great deal of the economic activity to be concentrated in these areas and hence attract, more people looking for work causing a greater concentration of workers who have worked before being located in the urban areas. The fact that this is not the case in the Jamaican data may well suggest that the strategy of migrating to the urban centres might not have been met with success for many workers since, if the rural-to-urban migration strategy of unemployed job-seekers is not working, we would have a result in which there is an even distribution across all samples; the equilibrium observed here. It is also probable that migrating to urban centres may actually reduce ones chances of escaping unemployment which may well lead workers to return from whence they came or seek opportunities elsewhere. Further econometric analysis should permit more detailed conclusions regarding the effect of geographical location on escape probabilities.

The proportions relating to worker training indicate the relative importance of the HEART/NTA programme, introduced in the early 1980's, in determining the individual worker's experience within the Jamaican labour market. In fact, over 8% of the total sample has been trained under the programme. This statistic indicates that while coverage is low, more individuals in the sample have been exposed to HEART/NTA training than the proportion of respondents who have achieved a university degree or those who have attained advanced level certification combined. Other sample proportions estimated for training variables reveal uniformly that greater proportions of workers in the "never worked- before" sample are trained, in all categories, relative to the workers who have been employed before. This result is similar to the earlier observation on the comparison of sample proportions and implies that individuals who have never worked before are relatively more highly trained than those who have worked before and may in fact be more motivated to remain in the search (unemployed category) since they perceive that they are likely to be successful in the search. These individuals therefore prefer to remain in the search sector rather than lapsing into inactivity.

Table 5.3 also shows that over 64% of the total sample report not having undergone any training whatsoever. These results are highly suggestive that a lack of training is an exceedingly strong deterrent to productive employment in Jamaica and immediately points to an increased role of training as a means of increasing their suitability for employment.

Finally, *Table 5.3* also presents sample proportions of four duration categories. The reader should note that *Table 5.3* depicts only sample proportions for the duration variables *only* for the sub-sample of individuals who have worked before. An examination of the sample proportions reveals that 40% of that sub-sample, have been unemployed for less than *6* months. Just over half of that proportion (22%) report unemployment durations of between 6-12 months. The remainder of the worked-before sample is, however, evenly distributed between 1-2 years and *greater than 2 years* categories.

5.8 Model

We choose a latent variable formulation where the latent variable y^* is an unobserved continuous random variable capturing the individual's propensity or suitability to be successfully matched with a job and hence to escape employment. It is easy to write down this idea using the standard formulation;

$$y^* = X'\beta + u \qquad 5.21$$

This latent variable is however observed indirectly through realizations of the variable y,

$$y = 1 \text{ if } y^* > 0 \qquad 5.22$$

$$y = 0 \text{ if } y^* \leq 0 \qquad 5.23$$

Note that X is information about the relevant demographic characteristics of individuals within the sample and β is the coefficient vector containing the parameters of interest. The error component u_i is assumed to be distributed following the logistic distribution but there is no theoretical reason why a non-symmetric distribution cannot be used. However, we conform here for the sake of simplicity. Given the assumption regarding the distribution of the errors we could write;

$$P(y_i \mid X) = \Lambda(X_i\beta)^{y_i}\left[1 - \Lambda(X_i\beta\right]^{1-y_i}, \quad y_i = 0,1 \qquad 5.24$$

$$\text{where, } \Lambda(X_i\beta) = \frac{\exp(X_i\beta)}{1 + \exp(X_i\beta)} \qquad 5.25$$

The log-likelihood which is maximized in order to derive parameter estimates is then written;

$$\log L(\beta) = \sum_{i=1}^{N} y_i \ln \Lambda(X_i b) + (1 - y_i)\ln[1 - \Lambda(X_i b)] \qquad 5.26$$

Quarterly indicator variables are included in our model in order to capture the aggregate effect of factors not explicitly included among the regressors which could affect the probability of the worker finding a suitable job match.

5.9 Estimation and Results

5.9.1 Estimation and Results-Main

Table 5.4 contains results from the estimation of the model. Coefficient estimates of the logit regression along with marginal effects and their corresponding levels of significance have been presented for respondents who have "never worked before" and also for the full sample.

	Never Worked Before Sample		**Total Sample**	
Variable Name	**Coefficient (Standard error)**	**Marginal effect**	**Coefficient (Standard error)**	**Marginal effect**
Age	0.0374(0.0352)	0.0069	0.013(0.0142)	0.002
Age-squared	0.0008(0.0006)	0.0001	-0.0002(0.0002)	-0.00003
Male	0.6006(0.0891)***	0.1147	0.4789(0.0558)***	0.0764
Higher	-0.243(0.345)	-0.0422	0.2296(0.2378)	0.03779
Further	0.2028(0.5943)	0.0393	-0.078(0.4586)	-0.0117
Other	-0.1442(0.1003)	-0.0262	-0.0685(0.0701)	-0.0104
Urban	0.2594(0.085)***	0.0479	0.1592(0.0535)***	0.0246
H.E.A.R.T	-0.0322(0.1922)	-0.0059	0.3071(0.1214)**	0.05105
Vocational	-0.3506(0.1544)**	-0.061	-0.3606(0.1004)***	-0.0515
Technical	0.4248(0.2918)	0.0856	0.2274(0.2006)	0.0374
Other Trained	1.5475(0.1785)***	0.3538	0.0023(0.085)	0.0003
On-the-Job	n/a	n/a	-0.3679(0.177)**	-0.0508
Constant	-2.8214(0.5214)		-1.9108(0.2503)	
N	3415		9167	
Psuedo R-Squared	0.1186	LR=466.54*** $\chi^2(21)$	0.0167	LR=151.48*** $\chi^2(22)$

Table 5.4 Logit Estimates: Never Worked Before and Full Sample

Note: Dependant Variable=1 if the individual escaped unemployment

Standard errors in parenthesis

Statistical significance of the marginal effects are shown in Table 5.5.

***Denotes statistical significance at the 1% level

**Denotes statistical significance at the 5% level

*Denoted statistical significance at the 10% level

The base category in both regression equations is the rural, untrained, female worker, without educational qualifications who has been without a job for less than *6* months.

Table 5.4 shows that, for the sub-sample of individuals who have never worked before, only the sex of the worker, educational attainment and training variables are statistically significant in affecting escape probabilities for the "never worked before" sample. Examining the signs of the marginal effects reveals that males are more likely to exit employment when compared to workers within the base category. A similar result is observed for the coefficient on worker sex in regression estimated total sample.

The geographical location of the worker is also statistically significant, with individuals located in urban centres more likely to exit unemployment relative to the base category. Interestingly, this finding is robust across both the sub-sample of individuals who have never worked before and the total sample. Workers who have been exposed to HEART training are significantly more likely to escape unemployment for the total sample. While on the other hand, vocationally trained workers and those workers who have experienced on-the-job training outside of HEART are statistically less likely to exit unemployment relative to the base category. This result highlights the importance of HEART training in affecting the probability of success in finding a job. Statistically significant and positive marginal effects were also observed on the "other-trained" variable for the sub-sample of individuals who have not worked before. The magnitude of the marginal effect is relatively high which indicated that given the absence of educational qualifications, worker training plays an important role in affecting the labour market experiences of workers in Jamaica who have never had prior work experience.

On the other hand, it is counter-intuitive that on-the-job training appears to have registered negative marginal effects for the logit regression estimated on the total sample. This result was checked to ensure its accuracy. However after numerous checks the finding remained robust. One possible explanation for the above finding is that, in the Jamaican labour market generality of skills of those individuals who have no training makes these workers desirous of and more likely and willing to exit

Worked Before Sample		
Variable Name	**Coefficient (Standard error)**	**Marginal effect**
Age	0.0041(0.0239)	0.0003
Age-squared	-0.00001(0.0003)	0.0000
Male	0.712(0.1053)***	0.0612
Higher	0.176(0.4052)	0.0151
Further	-0.4262(0.9954)	-0.0286
Other	-0.0548(0.1243)	-0.0043
Urban	0.0471(0.0869)	0.0038
H.E.A.R.T	0.4649(0.1830)**	0.0436
Vocational	-0.2378(0.1532)*	-0.0177
Technical	-0.1393(0.3333)	-0.0105
Other Trained	-0.1295(0.1336)	-0.0099
On-the-Job	0.1093(0.2175)	0.0091
Lost job	1.0519(0.1275)***	0.1027
Personal Reason	3.1645(0.1291)***	0.3659
Skilled Prof.	0.1063(0.2015)	0.0088
Skilled Manager	1.0487(0.2066)***	0.1234
Unskilled Non-manual	0.1891(0.1454)	0.016
Agriculture	1.0263(0.2198)***	0.1183
Mining	1.091(0.5603)	0.1339
Electricity	0.5549(0.6249)	0.0554
Construction	1.0273(0.2075)***	0.1112
Wholesale	-0.0403(0.1636)	-0.0032
Transport	-0.1167(0.235)	-0.0089
Finance	-0.012(0.2464)	-0.0009
Community	0.0975(0.1742)	0.0079
6 months to 1 year	-0.8721(0.1134)***	-0.0579
1-2 years	-1.0211(0.1221)***	-0.0637
>2 years	-1.3036(0.1383)***	-0.0762
Constant	-4.0305(0.4861)	
N	5752	
Pseudo R-Squared	0.2487	LR=1236.21*** χ^2 (38)

Table 5.5 Logit Estimates: Worked before Sample

Note: Dependant Variable=1 if the individual escaped unemployment

Standard errors in parenthesis

***Denotes statistical significance at the 1% level

**Denotes statistical significance at the 5% level

*Denoted statistical significance at the 10% level

unemployment than their counterparts who have formerly been exposed to some type of training. Moreover, the fact that a worker has received on the-job-training does not necessarily imply that the worker has been certified to have completed such training. Lack of certification therefore, to a certain degree may have contributed to the negative coefficient and marginal effect on the on-the-job training variable.

Table 5.5 depicts estimates of a logit regression based on the sub-sample of individuals who "have worked before". The base category in this case is the rural, untrained, unskilled manual, manufacturing, female worker; without any educational qualifications, who has been without a job for less than *6 months*. Note that when estimating the regression model on the sub-sample of individuals who have worked before we are able to included duration variables. This is because the Jamaica Quarterly Labour Force survey elicits information from individuals who have worked before regarding the date at which their prior employment spell came to a close. This information is then combined with the date of commencement of their current job to estimate (or proxy) the length of the intervening unemployment spell of the respondent.

From the table, we observe that the marginal effect on the gender coefficient is also robustly, positive and significant indicating that males in the "worked before sample" are also more likely to escape unemployment than females. This finding accords with our results for the total sample and also with results from the sub-sample of individuals who have never worked before. There are also other similarities in the results from *Table 5.4* and those presented in *Table 5.5*. One such similarity is the fact that none of the educational variables are statistically significant in affecting the probability of escape from unemployment. On the other hand, the training variables continue to play an important role in affecting the probabilities of escape. The HEART variable, for example, again exhibits a positive and statistically significant marginal effect. By way of contrast vocational training has the opposite effect though the negative marginal effect on this variable is smaller in magnitude than the marginal effect on the HEART variable.

The reason for the respondent leaving the last job is also a statistically significant factor affecting the re-employment probabilities of Jamaican workers. Both workers who have left their previous job for personal reasons and those who have lost their jobs are more likely to obtain employment than those who have left their jobs for some other reason. It is easy to interpret the positive and statistical significant coefficient on the "personal reasons" variable as the individuals leaving jobs for personal reason may well have done so because of other available employment options.

Another remarkable feature of the Jamaican labour market is the fact that the occupational skill variables, unlike the educational attainment variables, to play a statistical significant role in determining probabilities of escape from unemployment. In particular, skilled managers are more statistically more likely to escape unemployment than any other occupational skill category. In addition, workers who have been previously employed within the agricultural and construction sector workers are more likely to exit unemployment than all other sectors. We have already provided evidence that the unemployment rate within the agricultural sector in Jamaica is relatively low and that the turnover within Jamaican construction sector is relatively high. Against this background, the results from the logit regression presented in *Table 5.5* appear to be consistent with earlier findings.

All duration variables are statistically significant and all marginal effects are negative. The larger negative effects associated with the progressively longer duration categories indicate that the Jamaican worker is less-likely to escape unemployment the longer s/he remains within that labour market state. This is suggestive of negative duration dependence in the case of Jamaica.

5.9.2 Escape Probabilities by Gender and Further Robustness Checks

Splitting the sample by gender, allows the model to be estimated separately for each sex and yields results presented in *Table 5.6* below. The table displays coefficients and marginal effects from the model estimated separately for males and females. For both regressions, the base category is the untrained, rural worker without educational qualifications who has been unemployed for less than *6* months. The columns of the *Table* show separate results by sex when the model is estimated on the total sample. The results from the table show that age and experience variables have non-linear effects on the probability of escape from unemployment for male respondents only.

The effects of age and experience are not observable when the model is estimated on the female sub-sample.

Differences in the sign and significance of estimates on the male and female sub-samples extend to the results of other variables as well. Another difference can be observed in the signs of the geographical location variable. Female workers located in urban areas exhibit a statistically significant, positive marginal effect in contrast to male workers in that location.

Yet another difference is in the effect of HEART training on male labour market performance.

Total Sample				
	Male		Female	
Variable Name	**Coefficient (Standard error)**	**Marginal effect**	**Coefficient (Standard error)**	**Marginal effect**
Age	0.0498(0.0203)**	0.0091	-0.0234(0.0202)	-0.0032
Age-squared	-0.0007(0.0003)**	-0.0001	0.0004(0.00029)	0.0001
Higher	-0.6846(0.4544)	-0.103	0.5551(0.290)*	0.0889
Further	0.0908(0.5969)	0.0169	-0.3837(0.7568)	-0.0456
Other	-0.1676(0.1138)	-0.0296	-0.0216(0.0902)	-0.0029
Urban	0.0204(0.0797)	0.0037	0.274(0.0728)***	0.0374
H.E.A.R.T	0.6976(0.2057)***	0.145	0.0884(0.1543)	0.1229
Vocational	-0.647(0.1793)***	-0.103	-0.2066(0.1219)*	-0.0268
Technical	0.4796(0.3175)	0.0971	0.0972(0.2628)	0.0136
Other Trained	-0.2076(0.1085)**	-0.0365	0.3534(0.1361)**	0.0531
On-the-Job	-0.4997(0.2608)**	-0.0798	-0.2062(0.2418)	-0.0262
Constant	-1.7875(0.3475)		-1.565(0.3478)	
N	3522		5645	
Pseudo R-Squared	0.0124	LR=48.29*** χ^2 (21)	0.0136	LR=68.77*** χ^2 (21)

Table 5.6 Logit Estimates: By Gender

Note: Dependant Variable=1 if the individual escaped unemployment

Standard errors in parenthesis

The statistical significance of the marginal effects are shown in Table 5.7.

***Denotes statistical significance at the 1% level

**Denotes statistical significance at the 5% level

*Denoted statistical significance at the 10% level

Male workers who have been exposed to HEART training are significantly more likely to exit unemployment relative to the base category in that regression. On the other hand, for the logit regression on the sub-sample of women no similar effects appear. Both males and females who report having been exposed to vocational training are less likely to get escape unemployment, relative the respective base categories used in both regressions, although the level of significance of the marginal effects on the probability of escape for females are lower. Differences can also be observed in the effect of other-trained and on-the-job training variables. In conclusion therefore suggests differences in the effect of the independent variables on the escape probabilities of male and female workers in Jamaica.

Table 5.7 shows the coefficient estimates and marginal effects of the logit regression on the sub-sample of individuals who have not worked before, again, broken down by gender.

Never Worked Before Sample				
	Male		Female	
Variable Name	Coefficient (Standard error)	Marginal effect	Coefficient (Standard error)	Marginal effect
Age	0.106(0.0596)*	0.0231	0.0077(0.0448)	0.0012
Age-squared	-0.001(0.0009)	-0.00002	0.0012(0.0007)	0.0002
Higher	-0.573(0.6001)	-0.111	-0.2567(0.4347)	-0.0387
Further	0.2658(0.738)	0.0604	-0.2316(1.111)	-0.035
Other	-0.2583(0.1315)*	-0.0562	-0.0933(0.1311)**	-0.015
Urban	0.2582(0.1598)*	0.0561	0.2385(0.1127)	0.0387
H.E.A.R.T	0.1128(0.3152)	0.0249	-0.1455(0.2471)	-0.0228
Vocational	-0.4865(0.2689)*	-0.099	-0.2603(0.1898)	-0.0403
Technical	0.1078(0.4603)	0.0239	0.6806(0.3814)	0.1295
Other Trained	1.233(0.2301)***	0.2946	1.925(0.2901)***	0.429
Constant	-3.2431(0.8356)		-2.377(0.669)	
N	1282			2133
Pseudo R-Squared	0.1294	LR=210.18*** χ^2 (20)	0.1031	LR=233.29*** χ^2 (20)

Table 5.7 Logit estimates: Never Worked before By Gender

Note: Dependant Variable=1 if the individual escaped unemployment

Standard errors in parenthesis

The statistical significance of the marginal effects are shown in Table 5.8.

***Denotes statistical significance at the 1% level

**Denotes statistical significance at the 5% level

*Denoted statistical significance at the 10% level

Once again, for both regressions, the base category is the untrained, rural worker without educational qualifications who has been unemployed for less than 6 months. Firstly, the age and experience variables do not appear to matter much in influencing the probability of escape from unemployment although the marginal effect of this variable is positive and significant at the 10% level for the male sub-sample.

The same can be said about the educational variables. However, there are negative effects for the "other" qualifications of respondents in both the male and female categories. This result is counterintuitive and suggests that educational qualifications can, in fact, have a negative impact on the probability of escape from unemployment. However with the absence of information on the duration of the respondents who have no prior work experience on which to condition our analysis we are uncertain as to how much weight to attach to such a finding.

Training variables continue to play an important role in affecting escape probabilities for the worked-before sample. Respondents who report being previously reported receiving "other" types of training besides is finding is robust across both male and female sub-samples. In an environment where educational attainment is low training, it appears, plays an important role in influencing the probability of escape from unemployment. Some types of training appear to have a greater marginal effect than others; so that in *Table 5.7* while respondents who report having been exposed to "other" types of training are statistically more likely to escape unemployment relative to the base category for both male and female workers- the opposite is true for vocationally trained workers in the case of the male sub-sample.

We also show coefficient and marginal effect estimates for the logit regression estimated on male and female sub-samples of the "worked-before sample" in *Table 5.8*. The logit model was estimated separately by gender. The base category used in the estimation of the logit is the untrained, rural worker without educational qualifications who has been unemployed for less than *6* months after leaving a manufacturing job and who left that job for reasons other than having lost the job or for some personal reason.

	Worked Before Sample			
	Male		Female	
Variable Name	Coefficient (Standard error)	Marginal effect	Coefficient (Standard error)	Marginal effect
Age	0.0677(0.0339)**	0.0075	-0.0428(0.0352)	-0.0022
Age-squared	-0.0008(0.0005)*	-0.00009	0.0006(0.0005)	0.00002
Higher	-1.5306(1.0489)***	-0.0973	0.5299(0.4766)	0.0346
Further	-1.708(1.4549)***	-0.1015	0.6258(1.1946)	0.0431
Other	-0.3076(0.2127)	-0.0313	0.0075(0.1605)	0.0004
Urban	-0.2478(0.1339)*	-0.0274	0.2937(0.1189)**	0.0154
H.E.A.R.T	1.1363(0.3278)***	0.1772	0.149(0.231)	0.0082
Vocational	-0.7703(0.2901)***	-0.0684	-0.0076(0.1854)	-0.0004
Technical	0.1044(0.5552)	0.012	-0.235(0.4356)	-0.0111
Other Trained	-0.367(0.1739)**	-0.0379	0.0887(0.2179)	0.0048
On-the-Job	-0.2945(0.3223)	-0.0286	0.4622(0.308)	0.0291
Lost job	0.4758(0.1744)**	0.0577	1.954(0.216)***	0.1529
Personal Reason	2.8344(0.1595)***	0.4641	4.09(0.2426)***	0.3296
Skilled Prof.	-0.5425(0.4437)	-0.0497	0.2269(0.2318)	0.0129
Skilled Manager	0.6672(0.4146)	0.0927	1.3068(0.253)***	0.1157
Unsk. Non-manual	0.5091(0.2819)	0.0663	-0.0134(0.1819)	-0.0007
Agriculture	0.5615(0.2842)*	0.074	1.6872(0.3619)***	0.1738
Mining	0.5555(0.6568)	0.07484	1.8134(1.118)	0.2073
Electricity	0.7848(0.6875)	0.1140	-0.0312(1.335)	-0.0016
Construction	0.5187(0.24)**	0.0612	3.2265(0.4989)***	0.5272
Wholesale	-0.1939(0.2316)	-0.0205	0.261(0.2579)	0.0137
Transport	-0.6266(0.2924)***	-0.0572	1.013(0.4312)	0.0819
Finance	0.1136(0.3479)	0.01307	0.0789(0.3777)	0.0042
Community	0.3447(0.2674)	0.0421	0.3259(0.2645)	0.0179
6 months to 1 year	-0.8348(0.1724)***	-0.0787	-1.1728(0.1624)***	-0.0378
1-2 years	-0.699(0.1958)***	-0.0643	-1.1728(0.1624)***	-0.0470
>2 years	-0.8922(0.2705)***	-0.0751	-1.3444(0.1671)***	-0.0539
Constant	-3.7513(0.656)		-4.5574(0.7339)	
N	2240		3512	
Pseudo R-Squared	0.2634	LR=580.01*** χ^2 (37)	0.2681	LR=731.02*** χ^2 (37)

Table 5.8 Logit Estimates: Worked before by Gender

Note: Dependant Variable=1 if the individual escaped unemployment

Standard errors in parenthesis

The statistical significance of the marginal effects are shown in Table 5.9.

***Denotes statistical significance at the 1% level

**Denotes statistical significance at the 5% level

*Denoted statistical significance at the 10% level

The estimation results reveal non-linear age and experience effects for the male sub-sample. This effect, we have seen, though a robust finding across all specifications of the model is not always statistically significant. However, in this case we observe statistically significant effect for the male sub-sample, implying that while relatively older Jamaican men are more likely to employed, there is a threshold above which the marginal probability of escape will begin to decline.

We also find in the case of the worked-before sample that educational attainment does not appear to play a very significant role in affecting worker' probability of escaping unemployment for female workers. However, the results for male workers are in stark contrast to that of female workers; as we can observe from *Table 5.8* that males possessing higher and further qualifications are less likely to escape unemployment relative to the base category. Put differently, male workers without educational qualifications may even be more likely to escape unemployment than

those who have acquired prior work experience. Weak results are also observed for the training variables in the case of the logistic regression on the female sub-sample. None of the variables capturing training exposure are statistically significant in this regression. On the other hand, the HEART training variable is statistically significant in the logit regression on the male sub-sample and the marginal effect of this variable on the probability in escaping from unemployment is of the largest magnitude among all independent variables within the training category. Although one must be cautious in the interpretation of the effect of this variable it would seem to appear; even from this preliminary analysis that exposure to HEART training may have had some impact on the labour market experience of Jamaican men.

Positive and statistically significant marginal effects are also found for the "lost job" and "personal reasons" indicator variables which indicate that the reason for ending the last spell of unemployment is important in affecting their likelihood of becoming re-employed. In general, individuals who have experienced job-separations for "other reasons" rather than simply losing their jobs for "personal reasons" are more likely to find new employment compared to the base category. This is another robust result across all estimations using the worked- before “sub-sample”. In addition there is a statistically significant positive marginal effect on the coefficient.

Table 5.8 also shows that workers from very few sectors have a significantly greater re-employment marginal probability relative to the base category. Male workers, who were formally employed in the agriculture and construction sector are statistically more likely to regain employment than comparable workers from manufacturing for any other one- digit sector. On the other hand, males from the transport sector are marginally, less likely to escape unemployment relative to the base sector; manufacturing. From the logit estimated on the female sub-sample we observe similar positive marginal effects on the indicator variables for agricultural and manufacturing workers indicating that workers who have previous experience working in these sectors are relatively more likely to obtain re-employment compared to the base category worker. These effects are also highly significant and are entirely consistent with results obtained in *Table 5.5* where the model was estimated on the entire worked-before sample not disaggregated by gender.

The pattern of duration dependence is also generally consistent with the earlier results estimated on the full sample. Females exhibit negative duration dependence. Males also exhibit negative duration dependence after 1 year within unemployment. In all cases individuals are more likely to obtain employment within six months of becoming unemployed. However the chances of successfully regaining employment for respondents possessing unemployment durations in excess of *6* months progressively deteriorate. For both regressions, workers who have unemployment durations of *less than 6 months* are more likely to regain employment than those unemployed for 6-12 months.

The final robustness check is carried out to differentiate the probabilities of escape from unemployment in goods-producing (primary) sectors as opposed to the secondary sectors for the sample of workers who have worked before. An indicator variable is used to identify all respondents who have prior experience in the agriculture, mining and manufacturing as opposed to those individuals who have been previously experienced service sector employment. The results of this estimation are presented in *Table 5.9*. The base category is an untrained, rural female

	Worked Before Sample	
Variable Name	Coefficient (Standard error)	Marginal effect
Age	0.0065(0.0236)	0.0005
Age-squared	0.000(0.0003)	0.000
Male	0.8215(0.0944)***	0.0742
Higher	0.2021(0.4015)	0.0181
Further	-0.3949(0.9777)	-0.0279
Other	-0.1065(0.122)	-0.0086
Urban	-0.016(0.0847)	-0.0013
H.E.A.R.T	0.4598(0.1827)**	0.0446
Vocational	-0.2618(0.1529)*	-0.0202
Technical	-0.1793(0.3342)	-0.0139
Other Trained	-0.0506(0.1316)	-0.0041
On-the-Job	0.0187(0.2076)	0.0016
Lost job	0.7988(0.12)***	0.0769
Personal Reason	2.837(0.113)***	0.3256
Skilled Prof.	0.0785(0.1991)	0.0067
Skilled Manager	0.9323(0.2011)*	0.1088
Unskilled Non-manual	0.1339(0.1425)	0.0116
Goods Producing	0.557(0.1097)***	0.0539
6 months to 1 year	1.3797(0.1365)**	0.1308
1-2 years	0.4694(0.1552)**	0.0433
>2 years	0.3283(0.1597)*	0.0296
Constant	-5.085(0.4714)	
N	5752	
Pseudo R-Squared	0.2405	LR=1195.14*** χ^2 (31)

Table 5.9 Logit estimates: Primary vs. Secondary Sectors

Note: Dependant Variable=1 if the individual escaped unemployment

Standard errors in parenthesis

***Denotes statistical significance at the 1% level

**Denotes statistical significance at the 5% level

*Denoted statistical significance at the 10% level

worker without educational qualifications who has been unemployed for *less than 6 months* after leaving a primary sector job and who left that job for reasons other than losing that job or for personal reasons. The table shows the familiar effects of age and experience variables observed first in *Table 5.5*.

None of the educational qualification variables are statistically significant; which is another familiar result. The results corroborate earlier evidence that for the Jamaican worker with previous work experience, educational qualifications are of only secondary importance in determining the individual worker's probability of escaping unemployment. On the other hand, worker training plays a statistically significant role in affecting the probability of escape from unemployment for individuals who have never worked before. We observe statistically significant and positive marginal effects on the HEART training variable. Similar robustly significant effects can be found in the reason for separation from last job as well as in the skill category where skilled managers are again the most likely group to exit unemployment judging from the sign, magnitude and significance of the marginal effects.

To test whether the probabilities of escape from unemployment differ for workers who were employed in primary or goods- producing sectors as opposed to the secondary sectors of the economy we have included an indicator variable showing the type of sector in which the worker was previously employed. It is clear from the table that individuals who were last employed in the primary sectors of the Jamaican economy (agriculture, mining and manufacturing) are in a statistical sense, significantly more likely to escape unemployment than workers in the base category at the 1% level. These results are also corroborated by a likelihood ratio test of the null hypothesis that the coefficient on the goods producing dummy variable is zero which yielded a test statistic of 10.89. This null was rejected at the 1% level of significance which suggests that there is sufficient sample evidence that the type of sector in which the players has prior work experience significantly affects his/her probability of escaping unemployment. Examining the marginal effects of the duration variables corroborates our earlier finding of negative duration dependence.

5.10 Conclusion

The goal of this chapter is to model the probability of escaping joblessness in Jamaica. We demonstrate in this chapter how use can be made of labour force survey data to estimate these escape probabilities. In Jamaica, as in many other developing countries, longitudinal datasets which are more frequently used for this type of analyses are not available and the empiricist is left with no option but to fully utilize this type of data to inform policy. Understanding the anatomy of unemployment is of particular interest because of the severity of the problem in Jamaica and other such developing countries. Identifying the principal factors driving the phenomenon, therefore, not only provides a blueprint on which to base labour market policy but also provides a means whereby productive use can be made of the available data that is so often accessible but rarely used in this way.

After reviewing the extensive literature on unemployment, the neoclassical model, though informative, was deemed an inadequate modelling framework because of its failure to adequately incorporate unemployed individuals within the model. Instead, the search theoretic approach was found to offer greater applicability and therefore a much greater scope for the sorting out the effects of key variables such as general and specific human capital, tenure, sorting and demand-side effects mentioned within the popular theories. Conveniently, the search theoretic approach also provides a unifying framework which was found to be consistent with development theories explaining unemployment under conditions of a labour surplus economy such as Jamaica.

An analysis of the Jamaican data reveals that the problem of high unemployment has been plaguing the Jamaican economy for over two decades despite secular declining unemployment rates. The secular decline in the aggregate unemployment rate was most pronounced in the mid to late 1980's and was characterized by increased female attachment to the labour market, thereby lowering the differential between male and female unemployment rates. Despite the disproportionate fall in female unemployment by the end of the sample period young males under 30 years old, construction, wholesale and community services sector workers as well as unskilled manual and non-manual workers continue to exhibit an exceptionally high incidence of unemployment. An important finding of the study is that most unemployed Jamaican workers are in fact long-term unemployed.

Since 1990 the proportion of workers lapsing into out-of- the labour force category in Jamaica has also been on the rise. This phenomenon coincides with a decline in the average (uncompleted) unemployment spells among the unemployed which far from indicating improved employment conditions in Jamaica, could instead betoken a worsening of labour market conditions and the existence of a pronounced "discouraged worker effect" in Jamaica; a feature which persists throughout the latter part of the review period. An analysis of the non-participating workers in Jamaica's labour market over the review period reveals that these, were typically uneducated youth. Moreover towards the end of the review period, an increasing proportion of individuals surveyed (around 15%) report having lost jobs (and lapsing either into unemployment or out-of the labour force category) for reasons relating to low demand.

Using cohorts from the Jamaican QLFS under the assumption of independent cross-sections logit regression was used to estimate escape probabilities over the period 2004-2006. We find statistically significant effects for socio-economic and demographic characteristics of individuals on their escape probabilities. Age and experience exhibit the typical significant non-linear effects on escape probabilities when the regression is estimated on the total sample. Workers located in urban areas and individuals who were at some time exposed to training under HEART were more likely to escape unemployment. Our analysis also provided some evidence that other types of training such as vocational and on-the-job training were not as effective in positively affecting escape probabilities in the Jamaican data.

Regression analysis undertaken on the sub-sample of individuals who have had prior work experience reveals that the sex of the worker, reasons for leaving last job HEART training and occupational skill were all key determinants of escape probabilities of escape from unemployment in Jamaica. Furthermore, the analysis of this sub-sample reveals that the Jamaican data robustly exhibits negative duration dependence. Implying that the longer the unemployment spell of the worker the less likely the marginal probability of escape.

Robustness checks carried out on the empirical model used in the chapter involved estimating the model separately by gender and evaluating the differences in the predicted probability of escape from unemployment depending on last sector of exit of the worker. When the sample was split along the lines of gender it was discovered that there were distinct differences in the effect of the independent variable on labour market performance. Escape probabilities from unemployment of Jamaican males over the review period were primarily influenced by worker age and experience and type of worker training undergone while and for females the location of the worker along with worker training and to a lesser extent education were the important determinants.

Locating in urban areas actually benefited females relative to the base category whereas the opposite was true for the male workers. There were also slight differences in the role played by educational attainment across gender groups. We also discover from our results that workers formerly employed in primary (good-producing sectors) were more likely to escape unemployment than other workers in the Jamaican labour market. The finding of negative duration dependence is generally robust across all specifications. This finding underlines the severe long-term unemployment problem in Jamaica and highlights the need for policies to facilitate job creation in a bid to mitigate whatever costs may arise as a result of the severity of the unemployment problem.

Key directions for future research could include extending the model to a mixture modelling framework where unobserved individual heterogeneity can be explicitly modelled into the estimation of the escape probabilities. A more detailed assessment of the efficacy of the HEART/NTA programme could be carried out using empirical techniques specifically suited to that purpose. In addition, the inclusion within the empirical framework, of more specific information on the macroeconomic environment could be utilized in the modelling framework the model would be more informative to policy makers concerned with programming macroeconomic policy to foster both economic and employment growth.

Chapter 6

Conclusions

6.1 Introduction

This chapter provides a summary of the main conclusions and insights of the various chapters of the thesis. Consistent with this goal, the chapter highlights- in brief- some stylized facts about labour market adjustment under trade liberalization, occupational transformation as well as unemployment adjustment. It is against this background that the main findings of each of the empirical chapters of the thesis are then presented, noting that each empirical chapter focussed on a separate dimension of the Jamaican labour market adjustment. In doing so, we point out the major contributions of the papers in the thesis as well as the limitations of our analysis. The thesis would not have been complete without mention of the prospects for future research for *Chapters 3-5*. Overall, our findings facilitate a much better understanding of the labour market and the character of adjustment in Jamaica over the review period.

6.2 Trade Liberalization and Labour Market Adjustment in Jamaica

In *Chapter 3* of the thesis we analyze the effects of trade liberalization on labour market adjustment within the Jamaican manufacturing sector over the period 1983-2006. Before the empirical analysis is carried out we briefly review the major models of trade and labour market adjustment. A major contribution of this Chapter is to provide a synthesis of the labour market adjustment under trade literature. Another major contribution of this Chapter is to quantify at the industrial level, the trade adjustment as well as the labour market adjustment taking place within the Jamaican manufacturing sector. This Chapter of the thesis represents the only empirical attempt, as far as we are aware, to sort out the possible factors behind manufacturing sector labour market adjustment to trade in Jamaica using micro-econometric data.

Starting with the basic Heckscher-Ohlin (H-O) comparative advantage theory and then moving to the Ricardo-Viner extensions to the basic model framework, the literature survey reveals that the predictions of these early trade models hinge crucially on the models' assumptions. One particularly restrictive assumption is that of full employment which underpins all of these earlier models of trade and adjustment. Another conclusion drawn from the literature is that these standard approaches to trade theory, though helpful in understanding the economic effects of trade exposure, lack direct applicability to the Jamaican case since many assumptions are too restrictive, not least among which the full employment assumption- and therefore do not accord well with important features of the Jamaican economy. Extending the review to cover more recently developed theoretical models of trade and adjustment, we cover explanations using the full gamut of the theoretical literature including, inter alia, implicit contracts theory, efficiency wages, fair wages, minimum wage and search models. We highlight the key findings, limitations and criticisms of these theories. In general, the theoretical literature review reveals that, *inter alia*, labour market institutions and customs, job-types, worker-types, the behaviour of economic agents under risk and the type of trade shocks faced by the economy were important considerations to the type of adjustment experienced in any given labour market in response to an external shock (whether the shock happens to be intra- or inter-industry in nature). The search theoretic framework was found to be broadly applicable and also consistent with the development theories of labour market adjustment under high unemployment. Moreover, a brief review of the empirical literature shows that broad generalizations regarding the relationship between trade liberalizations and labour market reallocation should be avoided and specific attention should be given to the nature of the liberalization reforms themselves and the characteristic features of the liberalizing economies. This conclusion, drawn from surveying both multi-country and country studies, was taken on board in analyzing the Jamaican experience.

Examining the Jamaican labour force survey data for the period 1983-2006 we observe a significant sectoral shift away from primary sectors such as agriculture, and manufacturing into service sectors over the period 1983-2006. In particular, the manufacturing sector at the start of the review period accounted for approximately 10% share of employment, increased to 15% by 1990 but had waned to a mere 7.16% of total employment by 2006. As regards the sector's external trade, we show that over the period the sector was a net real importer of manufacturing produce from its trading partners. Jamaica's chief manufacturing imports are therefore machinery and machinery equipment, oil, food and drink and chemicals. Over the review period all manufacturing industries experienced deterioration in industrial trade deficits.

This was also the case in the food, beverage and tobacco manufacturing industry which is the only manufacturing industry in which Jamaica enjoyed a real trade surplus over the period.

Analysis of Jamaica labour force data reveals that most of the manufacturing sector worker flow adjustment in Jamaican manufacturing over the period involved unemployment and out-of the labour force adjustment. Given the significant role played by unemployment and out-of-the labour force worker flows in the labour market adjustment in Jamaica, the general neglect of unemployment adjustment in traditional trade-theoretic models seems even more undesirable. By the end of the review period, aggregate worker outflows into unemployment or out-of-the labour force were double worker inflows into the sector. On this basis, it would seem that explicitly incorporating unemployment adjustment in modelling labour market adjustment to trade would represent a more realistic improvement to such models. In addition, an analysis of the Jamaican data reveals that inter-sectoral outflows and inflows into the sector dominate intra-sectoral flows over the period under review.

Manufacturing sector, intra-sectoral workerflows, inter-sectoral exits and worker outflows from manufacturing into unemployment or out-of-the labour force is modelled within a multinomial logit framework. The results provide a very nuanced picture of manufacturing sector worker flows. Relative industry wage levels and occupational skills are important determinants each type of worker flows. Relatively high industrial wages reduce turnover. Results on occupational skills are more complicated. While workers possessing industry-specific skill sets such as craft workers and plant-operators were less likely to change jobs intra- and inter-sectorally there is some evidence that some of these sector-specific skill sets were, in fact, the most likely to experience worker-job separations into unemployment and out-of-the labour force. Together, these sector-specific skill sets were the most likely to face manufacturing job losses over the period implying the possibility of significant adjustment costs under labour market adjustment.

Other socio-economic characteristics of the workers were important in determining the labour market adjustment. Among them, industrial trade was found to have significantly affected the labour market adjustment. The effect of trade on the adjustment proved robust regardless of whether trade was measured in terms of level of imports, IIT or UMCIT. Increases in all these trade measures led to worker outflows into unemployment (or out-of-the labour force). Intuitively, the results from our estimation show that IIT increased the likelihood of intra-sectoral mobility while UMCIT affected inter-sectoral adjustment. The coincidence of intra-sectoral mobility along with potentially more costly, worker outflows into unemployment and out-of the labour force makes the SAH highly dubious in the Jamaican case. Overall, occupational skills have played a greater role in the labour market adjustment than trade suggesting that a sudden change in demand for certain skills rather than direct import competition *per se* may have led to the adjustment in Jamaica.

6.3 Occupational and Sectoral Dimensions of Mobility in Jamaica

In *Chapter 4* of the thesis we extend the analysis of the labour market adjustment in Jamaica in two directions. Firstly, *Chapter 4* extends the analysis of labour market adjustment to include adjustment in sectors of the Jamaican economy beyond manufacturing sector adjustment to consider labour market adjustment occurring within all other sectors within the Jamaican economy. Secondly, in this chapter, we sought to investigate the possibility and nature of a concomitant occupational transformation in the Jamaican labour market over the period.

The theoretical overview presented in the chapter outlines four major approaches used to explain occupational mobility they are 1) job-matching models 2) job-search models 3) human capital models and 4) implicit contract theory. The existence of imperfect information as well as worker and job heterogeneity within the labour market are common threads tying together these non-competing theories. For example, human capital models stress the importance of job specific skills comprising human capital investment such as training, on-the-job experience and any formal training undertaken by the worker. Implicit contract theory on the other hand posits that the firms implicitly take into account varying productivity levels of workers of differing ages along with firm-specific tenure so that older and more senior workers are incentivised to remain with the firm since the resulting wage profile is steeper than their productivity. Because of this, it becomes disadvantageous for workers to change employments, thereby reducing the likelihood of labour market mobility.

Key factors identified in the empirical literature which affect occupational mobility are labour market conditions, age, tenure, experience, education, gender and even trade shocks. The empirical studies have not however been unanimous on how these factors affect mobility so that the sign of the effects may differ between studies. For example most studies reviewed tend to find that mobility reduces with age, tenure and experience. Similarly women have tended to exhibit lower levels of labour market attachment than men. Similarly, most empirical studies tend to confirm pro-cyclical variation in quit rates and anti-cyclical variation in layoff rates. On the other hand, empirical findings on the effect of education on mobility tend to be less consistent. While there are some results suggesting that education speeds up the careers of workers thus increasing the prospects for upward mobility, other results suggest that relatively more highly educated workers are rewarded with job stability. Similarly, studies attempting to investigate the effects of trade shocks on labour market mobility whether via the channel of the effect of trade on demand elasticities or alternatively through the Smooth Adjustment Hypothesis (SAH) have been met with mixed results.

A major contribution of this paper is to, for the first time, quantify occupational mobility in Jamaica. We stress in *Chapter 4* that measuring the degree of occupational mobility in Jamaica hinges crucially on the definition of an occupation; a concept which has proven inherently difficult to measure, due to the idiosyncratic nature of occupational skills. We employ occupational definitions due to Dolton and Kidd (1998) and Elliot and Lindley (2006). Two criteria met by the occupational classification schema applied to the Jamaican data were *i*) it should be possible to classify the occupational groupings in the Jamaican data using the proposed classification scheme with reasonable accuracy and *ii*) the occupational classifications of the scheme should be "wide enough" so as to ensure that the skill sets required for distinct occupational classifications are sufficiently different such that movements can be thought of as an occupational change.

Applying this occupational classification method to the Jamaican data, revealed that there has been very little improvement in skill levels in the Jamaican labour market over the period 1983-2006. In fact the data is suggestive that over 80% of the Jamaican labour force falls within the "less-skilled" category. While there has been some improvement in the skill content of the Jamaican labour force over the sample period, these improvements have been nominal at best. We also find that sectoral mobility dominates occupational mobility in the sample but that there appears to be co-movement in both series over the sample period. In particular, both series experience secular decline up to 1992 but subsequently exhibit increasing trends towards the end of the sample. For analytical purposes, all job-to-job worker transitions, within our sample, were divided into simple occupation (SS, NO), simple sectoral (NS, SO) and complex moves (NS, NO). Making use of this categorisation schema for mobility types, it was discovered that simple sectoral moves dominated the sample over the review period. In order of magnitude, the next most important mobility types are complex and then simple occupational moves respectively. Further analysis reveals while the magnitudes of these three mover types were comparable up to the early 1990's a great divergence in their magnitudes was observed from the late 1990's towards the end of the sample period. Using occupational transition matrices for selected years of the data reveals that changes in the occupational structure in Jamaica generally occurred within distinct periods and that overall the trend in the occupational transformation was a shift towards managerial and selling occupations. Almost all job-to-job mobility, observed over the period, regardless of type (whether simple occupation, simple sectoral or complex moves) involved *unskilled manual* workers within *selling*, *managerial* and *sales*, *manual* and *other* occupational category groups. The level of educational attainment was also discovered to significantly affect the labour market experiences of Jamaican workers corroborating the findings that skill specificity played an integral role in the adjustment. While educational attainment also plays a key role to increase the likelihood of simple occupational mobility as well as complex moves; this variable had little or nothing to do with simple sectoral mobility experienced within the Jamaican economy over the review period.

To sum up, *Chapter 4* demonstrates the complex links between skill specificity, mobility and labour market adjustment in Jamaica. The analysis reveals that the relationship is one that depends on a multiplicity of factors. Through careful empirical analysis it was discovered that the categorization of labour market moves into "simple" and "complex" categories may be a misnomer. though analytically convenient, because the "costliness" or "complexity" of a move appears to depend on the characteristics of the individual workers themselves (or the type of workers comprising the workforce) and the nature of the economic shocks. For this reason it would appear that the complexity of the worker moves in a true sense will differ in a highly skilled developing country setting from that existing in a low skilled developing country such as Jamaica in which most workers have low levels of educational attainment and possess low or general skills. The relatively low and general skill levels of the Jamaican workers may well have mitigated some of the direct costs of job-to- job adjustment on the one hand since these workers lose little in the way of or firm and sector specific-skills under transition. On the other hand, these worker types are more likely to languish in unemployment or within the out-of the labour force category since their skills do not make them particularly suited to employment. In a labour market where jobs are hard to find significant economic costs can easily accrue.

6.4 Escape Probabilities from Unemployment: The Jamaican Case

The main aim of the analysis carried out in *Chapter 5* is to investigate the incidence of unemployment in Jamaica and to identify factors which enhance the probability of escape from unemployment from the perspective of the individual worker. This fills a gap in the literature since recent papers exploring the issue of unemployment have *i)* not relied on micro-econometric data of the detail we have available for our use *ii)* presented explanations of unemployment in Jamaica which are limited to the effect of remittances on the reservation wage of the decision to be employed. Another major contribution of this chapter is to demonstrate how use can be made of labour force survey data to estimate escape probabilities. This latter contribution should not be underestimated since, in Jamaica, as in many other developing countries. longitudinal datasets which are more usually preferred for this type of analysis are generally not available. Researchers wishing to explore the issue of unemployment under such circumstances therefore are often forced by virtue of these constraints to fully utilize this type of data in order to understand key labour market phenomenon and also to inform policy. *Chapter 5* suggests ways in which the survey design of the repeated cross-sectional surveys can be exploited in order to investigate these issues.

We conclude that unemployment has been secularly declining in Jamaican over the period 1983-2006. The overall decline in unemployment rates over the review period is due to the simultaneous decline in the incidence of both male and female unemployment. Closer analysis reveals, however, that the rate of decline is particularly due to the fact that female unemployment has been decreasing at a faster pace than male unemployment. Despite the general decline in unemployment rates there has been a concomitant increase in the share of the adult population in the out in the out-of-the labour force category in Jamaica especially since the mid- 1990's. The simultaneous reduction in unemployment rates and the trend increase in the share of the population lapsing into out-of-the labour force is suggestive of a pronounced "discouraged worker" effect in Jamaica. Given the porous nature of the labour market classifications we examined both the unemployed and non-participatory groups in an attempt to understand the features of the Jamaican workers in these labour force categories. We found that there exists a great incidence of unemployment among the Jamaican youth. Unemployment rates in excess of 10% are regularly realized for groups even in the 40-49 age group. Historically, unskilled workers attached to the construction, community, wholesale and manufacturing sectors have experienced the greatest unemployment incidence over time; with the unevenness of the distribution of unemployment across these sectors over the period (1983-2006) reflecting a labour market undergoing significant sectoral shifts. A particularly striking feature of non-participating individuals in Jamaica is the high incidence of young, uneducated, untrained men within this category. The long-term unemployed, by far, dominate the unemployed segment of the labour force. The same is true for individuals who are in the out-of the labour force category.

In the end, we conclude that age and experience of the worker, worker location and other such socio-economic variables can significantly affect the individual's probability of escape from unemployment. The effectiveness of these variables, however, may differ depending on specific worker traits. For example, age and experience variables have a statistically significant effect on employment escape for male workers and not for female workers. On the other hand, geographic location only affects unemployment escape probabilities of female workers. In general educational attainment appears to have a relatively small effect on unemployment escape probabilities. Information regarding the economic conditions in the last sector of employment also appears to significantly affect re-employment probabilities for workers exiting certain sectors only. Jamaican unemployment data also exhibits negative duration dependence. This is suggestive that over time, unemployed workers face diminishing probabilities of escape from unemployment.

Another significant contribution of this Chapter is to provide some preliminary evidence that worker exposure to training programs and especially technical training can have a significant impact in affecting the individual's employment (or re-employment) probabilities and prospects. Specialized skills learned by way of training programs appear to gain a great deal of significance in helping to sort able workers into jobs. One possible explanation for this result is that in an environment where most workers are uncertified and unskilled acquiring such skills distinguishes the job-seeker from the masses of the unemployed. Another possible channel through which the acquisition of training can be beneficial to the employment prospects of the worker is that exposure to training of all types significantly improves worker productivity, participation and hence positively affects labour market outcomes. In general, our empirical results are robust across various specifications of the model.

6.5 Overall Conclusions and Directions for Future Research

This thesis facilitates a greater understanding of adjustment in a low-skilled, small, developing country environment. On a pedagogical level, the thesis provides a synthesis of labour market adjustment models. *Chapter 3* of the thesis explores labour market adjustment to trade in a theoretical as well as empirical context. *Chapter 4* sets out the key theoretical and empirical findings on job-to-job mobility in labour markets and elucidates the key factors that could affect job-to-job mobility where skills are low and general in nature as one might expect in a developing country setting. *Chapter 5* delves into the literature focussing on the anatomy and the empirics of unemployment. The key themes of the thesis could serve as useful revision to graduate students who are interested in understanding labour market adjustment in a developing country context. As we have shown throughout the thesis; there are important differences in the type of adjustment that will ensue in any labour market depending on the particular features of that particular economy and the distinguishing feature of its key institutions and markets; such as the labour market.

On another level, the thesis is a useful guide to appreciating the magnitude of labour market adjustment in Jamaica. It quantifies not only the extent of sectoral adjustment but facilitates an understanding of the scale of the occupational adjustment that took place in Jamaica over a period of change and transformation which coincides with increased trade exposure. It provides for the first time, as far as we are aware, a link between labour market adjustment in an era of expanding trade. The use of micro-economic data in this thesis allows us to see more clearly the highly nuanced nature of the adjustment process. We discover that adjustment is, in the end, determined, not only by the nature of the specific shock itself but also to a large extent by the characteristics of the individual workers themselves. The thesis also fills a gap in the literature on unemployment in Jamaica by pointing to deep-rooted, structural features of the Jamaican labour market which affect unemployment and suggests possible areas in which policy can be targeted in order to help to solve or mitigate the effects of the economy's chronic problem of high unemployment. This study offers an explanation which we find more satisfying than explanations from recent studies which tend to be focussed only on the neoclassical approach which emphasizes the role played by recent surge in remittance inflows into the Jamaican economy.

Inevitably, our analysis is not without its limitations, decisions regarding the definitions of a sector, or occupations are indeed critical if any analysis of mobility is to be undertaken. Definitions of this sort especially as concerns occupational moves are, in the end, made subject to the constraints of the data and the judgement of the researcher. In these cases we have availed ourselves of the methods used by prior researchers, while at the same time, critically testing the applicability of these methods to the Jamaican data. Furthermore, this study was limited by the data availability. Studies investigating individual escape probabilities from unemployment, for example, are usually carried out using longitudinal datasets which are simply not available for Jamaica. Another limitation was funding of the study which affected its time to completion.

Nevertheless, the thesis points to many prospects for future research. Firstly, any complete analysis of the effects of trade liberalization in Jamaica should include the agricultural sector. If trade flows from agricultural sectors can be matched with the respective labour market worker flows a more complete picture of the effects of the increased trade exposure facing the small island economy could be arrived at. Unfortunately this could not be achieved in this study but we acknowledge that a more complete analysis would need to include the agricultural sector more fully into analysis. Examining the robustness of the results within a cross-sectional time series context at the industry level rather than at the level of the individual could also be an interesting departure which could be pursued. Furthermore, there is a great need for empirical (and also theoretical) analysis on the impact of labour market institutions themselves on labour market adjustment and for more in-depth research linking the labour market institutions to its adjustment under trade. Yet other direction for future research involves a carefully designed study on the effect of various training programs on worker activation and escape probabilities from unemployment in low skilled environment. This would greatly enhance the efficiency of policy in mitigating the effects of chronic unemployment in countries such as Jamaica. In this vein, we conclude this thesis by hoping that our research will stimulate further work on labour market adjustment in developing country contexts and in the Jamaican labour market in particular.

6.6 Policy Implications

One striking characteristic of the Jamaican data is which urgently needs to be addressed by policy is the fact that such a large percentage of individuals in the labour force lack educational qualifications. Evidence of this fact can be seen from the examination of sample means drawn from the manufacturing sector in *Chapter 3*, the means from the job-to-job mobility data (*Chapter 4*) and is further confirmed by the analysis of the incidence of unemployment in Jamaica. This finding indicates that there needs to be some policy action or at the very least further, more detailed research into the efficiency of the Jamaican education system in transforming individuals for productive service within the Jamaican labour market. The literature is replete with studies showing the relationship between higher levels of education and greater levels of participation, greater productivity and improved labour market performance within the labour market. It seems likely therefore that if there were some improvement in the level of educational attainment of the Jamaican worker then benefits would likely accrue at both the individual as well as the macroeconomic level. On the other hand, against the background of against the background of severe fiscal constraints and "brain-drain" through emigration this policy would need to be carefully targeted and applied in order the ensure the greatest national returns on any educational investment and the retention of any incipient benefits within the Jamaican economy. Such a policy should therefore be informed by a more detailed analysis on this issue and better information about the educational system and the relative costs and benefits of any such reformative programme.

Closely related to the problem of low educational is fact that the Jamaican labour force is also characterized by very low skill levels. What is more, it is very clear from examining *Figure 4.3* of the thesis highlights the fact that over the *24* year period 1983-2006 there was very little improvement in the skill content of the employed labour force. Further analysis carried out in the chapter reveals that whatever nominal improvements in the skill content of the labour force happened to occur post the 1990's liberalization episode and generally involved the movement of lower skilled workers into managerial and relatively higher skilled trading and selling occupations. On a broad level, low degrees of skill upgrading can affect the competitiveness of an economy and impair its prospects of earning the skill- premia and value-added that is attached to high-skilled productive activities. The fact that technological changes over the past several decades have been skill-biased in nature (Acemoglu, 2002) suggests that there may well be an underutilization of the benefits of these technologies, if one were to draw a conclusion based on the low skill upgrading on the Jamaican labour force. The fact that, as we have seen in the Jamaican case, there has been a concurrent increase in wages and negligible increases in productivity over the period under review makes move into higher skilled production and higher skilled jobs a desirable area of policy focus for the Jamaican government.

On the other hand, an important question still remains to be answered regarding whether skilled jobs that are available for skilled worker types. From the analysis provided in *Chapter 5* of the thesis, it is likely that the low level of dynamism exhibited in the labour market and low levels employment growth observed could provide the supply-side stimulus needed for significant job creation and skilled job creation in particular. It would appear that market-oriented government policies to direct the economy into areas of higher value could help to improve the labour market conditions in this regard.

Moreover, higher levels of skills have been shown other positive effects on the functioning of the labour market. Machin and Manning (1999) highlight the observation that there are very low prospects of employability of the long-term unemployed and Topel (1990) points to the fact that long-term unemployment can lead to further deterioration in skill levels and the destruction of specific human capital. Therefore the creation and intensification of policies aimed at skills training, certification and re-tooling of the long-term unemployed or inactive individuals might be beneficial in improving labour market performance.

Another key area for policy focus is the manufacturing sector. This thesis has provided some evidence of unfavourable performance of the sector with respect to its relatively higher wage costs (when compared to an economy-wide index), the decline of the sector in its industrial trade performance as well as its employment share. The fact that we have also seen declines in the agriculture sector, implies that the goods producing sector of the Jamaican economy needs to be given careful analysis. Despite the fact that services sectors have shown significant relative employment growth over the period it does seem both unlikely and undesirable the future of Jamaica that any sustainable policy on economic development in Jamaica would exclude the goods producing sector. The absence of the economies of scale in the agricultural sector in small island economies such as Jamaica and the heavy subsidisation of this sector by Jamaica's major trading partners in their own economies, makes the Jamaican manufacturing sector an even more attractive candidate for targeted policy attention with a view to that sector playing an important role in the country's development strategy. Issues such as financing costs, energy costs, market access, and entrepreneurial skills as well as the sector's easy access to a skilled and productive, an available and reliable skilled and educated labour supply are likely key areas of policy focus.

Finally, a very important area for policy focus regards an improvement in the quality and availability of labour market data and to increase its availability to researchers interested in understanding the Jamaican labour market. It is clear that the dataset by STATIN enhanced our knowledge of the labour market adjustment in Jamaica. There is a need to understand these labour market issues better and also for the collection more informative datasets, possible of a longitudinal nature with more details on employment histories and wages could greatly aid in improving our understanding of labour market adjustment in the Jamaican labour market.

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Appendix

Variable	Definition
Male	(0,1): dummy-takes a value of 1 if sex is male
Age	Age of respondent
Age-squared	Squared age of respondent
Urban	(0,1): dummy-takes a value of 1 if the worker is located in Kingston, St. Catherine, St. James, St. Ann or St. Andrew.
Higher	(0,1): dummy- Takes a value of 1 if worker had attained a University degree
Further	(0,1): dummy- Takes a value of 1 if worker had attained at least 1 GCE "A" Level or between 1-2 CAPE subjects.
Other	(0,1): dummy- Takes a value of 1 if worker had attained a Basic ordinary level subject up to 5or more G.C.E. or C.X.C. examination passes
None	(0,1): dummy- Takes a value of 1 if worker has reported to not having any of the above qualifications whatsoever.
Skilled	(0,1): dummy- Takes a value of 1 if worker is or has been employed as a director or skilled manager within an organisation degree
Professional	(0,1): dummy- Takes a value of 1 if worker is being/has been employed in a semi-skilled professional , managerial or associate professional and technical occupation
Clerical	(0,1): dummy- Takes a value of 1 if worker is being/has been employed in a clerical occupation
Craft	(0,1): dummy- Takes a value of 1 if worker is being/has been employed in a craft or related occupation
Personal	(0,1): dummy- Takes a value of 1 if worker is being or has worked in a personal or protective service occupation
Plantoper	(0,1): dummy- Takes a value of 1 if worker is currently working or has worked as a plant or machinery or equipment operator.
Manual	(0,1): dummy- Takes a value of 1 if worker has worked or is being employed in manual occupation.

Table A1 Human Capital Variable Definitions

Variable	Definition
Relative sub-industry pay	Using data from the Large Establishments Survey (STATIN) we calculate for each 2- digit industry, the proportion of the average weekly wage for that industry compared to the average wage for manufacturing sector as a whole.
Relative sub-industry pay to non-manufacturing sector	Using data from the Large Establishments Survey (STATIN) we calculate for each 2-digit industry, the proportion of the average weekly wage for that industry compared to the average wage for the economy as a whole. The Large Establishments Survey provides average wage levels for the entire economy.
Relative Unemployment rate compared to manufacturing sector	These were calculated from the LFS dataset itself. We calculate the ratio between unemployment in the 2-digit industry of the worker and the unemployment rate for the entire one-digit JSIC manufacturing sector
Relative Non-employment rate to Non-manufacturing sector	These were calculated from the LFS dataset. We calculate the ratio between the JSIC 2-digit non-employment and the non-employment rate for non-manufacturing (i.e. all other sectors within the economy)
IIT	GL index that measures the share of trade at the 2-digit level that is intra-industry in nature where GL=2*min(exports, imports)/ imports+ exports
High IIT	(0,1): dummy if IIT takes a greater value than the average for the period.
UMCIT	Unmatched changes in trade of- UMCIT= $\mid \Delta imports - \Delta exports \mid$ -measures the amount of unmatched net trade change that requires inter-industry factor reallocation.
High UMCIT	(0,1): dummy if UMCIT takes a greater value than the average for the period.

Table A2 Industrial Variable Definitions

Abbreviation	Industry Category	JSIC 1987 code
Food	Manufacture of Food, Beverages, and Tobacco	2000-2200
Text.	Manufacture of Textile Wearing Apparel and Leather Products	2200-2300
Wood	Manufacture of Wood, Wood Products and Furniture	2300-2400
Paper	Manufacture of Paper and Paper Products: Printing and Publishing	2400-2500
Chem.	Manufacture of Chemicals and Chemical Products	2500-2600
Petrol.	Manufacture of Petroleum Products	2600-2700
Rubber	Manufacture of Rubber and Plastic Products(except shoes)	2700-2800
Non-metal	Manufacture of Other Non-Metallic Mineral Products	2800-2900
Metal-excl.	Manufacturing (Excluding Metal Products, Machinery and Equipment)	2900-3000
Metal	Manufacture of Metal Products, Machinery and Equipment	3000-3200
Fab-Met.	Manufacture of Fabricated Metal Products(Except Machinery, Equipment)	3200-3300
Mach.	Manufacture of Machinery and Equipment, except transport Equipment	3300-3400
Transp.	Manufacture of Transport Equipment	3400-4000
Not-Empl.	This is the combined set of unemployed individuals and those out- of- the labour Force	-
Unempl.	Unemployed	-
Outempl.	Out –of- the labour Force	-

Table A3 Industry Categories and Codes used in Jamaican QLFS

1983-1994	1995-2006	Employment Status	Question Detail
Q3.8	Q38m	Employed	What kind of work were you doing survey week?
Q3.9	Q3.9m	Employed	In what kind of business or industry were you working?
Q3.10	Q3.11	Employed	For how long have you been working in your current job?
Q3.11	Q3.12	Employed	Have you worked previously either for others or in your own business?
Q3.13	Q3.14	Employed	In what industry were you working in your job prior ot the current one?
Q3.14	Q3.15	Employed	When did you stop working?
Q4.6	Q4.6	Unemployed	When did you stop working either for someone or in your own business?
Q4.16	Q4.16	Unemployed	What kind of work were you doing when you last worked?
Q4.17	Q4.17	Unemployed	In what industry did you work?
Q5.2	Q5.2	Out of the Labour Force	What kind of work were you doing at the time?
Q5.3	Q5.3	Out of the Labour Force	In what industry were you working?
Q5.4	Q5.4	Out of the Labour Force	When did you stop working?

TableA4 Key Jamaican Quarterly Labour Force Survey Questions

DK Class	Description
1	Legal Professions
2	Financial Occupations
3	Personnel Occupations
4	Economist
5	Computer Occupations
6	Marketing Sales
7	Statutory and other inspectors
8	Administrators-central government
9	Administrators-local government
10	Other professions supporting management
11	Education professions
12	Social and behavioural scientists
13	Welfare workers
14	Health Professionals
15	Other Professional and related workers in education, welfare and health
16	Literary, artistic and sports
17	Professional and related science
18	Professional and related engineering and technology
19	Professional and related building
20	Scientific and technological support staff
21	Ship, aircraft officers, air traffic control
22	Production managers
23	Building and civil engineering managers
24	Managers-transport etc.
25	Office managers
26	Managers-retail and wholesale
27	Managers-hotel and catering
28	Farmers
29	Armed forces
30	Security occupations
31	Other managers
32	Clerical and related
33	Selling
34	Security and protective
35	Catering, cleaning and personal service
36	Farming, fishing and related
37	Material processing, making and repairing
38	Processing, making and repairing
39	Painitng, assembly, inspection and packing
40	Construction, mining etc.
41	Transport operating, material moving and storage
42	Miscellaneous

Table A5 List of DK Two-Digit Classifications for Occupational Status

JSIC	Occupational Categories	DK- Two-digit classification codes
1	Teacher	11
2	Engineer	18
3	Scientist	17
4	Technical	5, 19-21
5	Managerial and sales	3,6-10,22-31
6	Legal, financial and economist	1,2,4
7	Social scientist and health professionals	12, 14-15
8	Welfare workers	13
9	Clerical and related	32
10	Selling and catering	33,35
11	Manual	37-41
12	Other	16,34,36,42

Table A6 List of Modified One-Digit Classifications for Occupational Status

Skill group	DK- Two-digit classification codes
Skilled Professionals	1,2,4-5,11-21
Skilled Managers	3,6-10,22-27,31
Less-skilled non-manual workers	29,32
Less-skilled manual workers	28,30,33-42

Table A7 List of Skilled and Less-Skilled Worker Classifications

JSIC One Digit Sector	Industry Name
1	Agriculture, Forestry And Fishing
2	Mining, Quarrying and Refining
3	Manufacture
4	Electricity,Gas and Water
5	Contruction and Installation
6	Wholesale & Retail,Hotel and Restaurant Services
7	Transport Storage and Communications
8	Financing, Insurance, Real Est. & Business Services
9	Community, Social and Personal Services

Table A8 JIC One- Digit Sectors and Codes

	Stayer (SS, SO)		New Occupation(SS,NO)		New Sector(NS,SO)		Complex Mover(NS,NO)	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Qualifications								
Higher	0.0342	0.0004	0.0382	0.0058	0.0218	0.0022	0.0166	0.0024
Further	0.0186	0.0003	0.04	0.0058	0.0316	0.003	0.0187	0.0025
Other	0.1269	0.0007	0.2039	0.0123	0.1634	0.0055	0.1203	0.00611
No. Qualification	0.7673	0.0009	0.675	0.0143	0.7216	0.0067	0.8127	0.0073
One Digit Sectors								
Agriculture	0.2662	0.00097	0.151	0.0109	0.0272	0.0024	0.1326	0.0063
Mining	0.0064	0.0002	0.0037	0.0019	0.0033	0.00086	0.0074	0.0016
Manufacturing	0.0985	0.0007	0.0941	0.0089	0.0535	0.0034	0.1422	0.0066
Electricity Gas and Water	0.007	0.0002	-	-	0.0007	0.0004	0.0038	0.0012
Construction	0.0689	0.0006	0.0625	0.0074	0.0254	0.0023	0.1429	0.0066
Wholesale and Retail	0.184	0.0009	0.411	0.015	0.0684	0.0038	0.2243	0.0078
Transport	0.047	0.0005	0.0214	0.0044	0.0205	0.0021	0.066	0.0047
Financing	0.0405	0.0004	0.0382	0.0059	0.0172	0.0019	0.0434	0.0038
Community	0.2594	0.001	0.2069	0.0124	0.0965	0.0044	0.2049	0.0076
Occupation								
Teacher	0.0355	0.0004	0.0233	0.0046	0.0016	0.0006	0.0138	0.0021
Engineer	0.0023	0.0001	0	0	0.0027	0.0008	0.0004	0.0004
Scientist	0.0011	0.0001	0.0009	0.0009	0.0013	0.0005	0.0021	0.0009
Technicians	0.0078	0.0002	0.0093	0.0029	0.0078	0.0013	0.0053	0.0014
Managers	0.2477	0.0009	0.1556	0.0111	0.0896	0.0043	0.1249	0.0062
Legal	0.0266	0.0004	0.0466	0.0064	0.0399	0.0029	0.1905	0.0027
Social	0.0126	0.0002	0.0158	0.0038	0.0027	0.0008	0.0039	0.0012

Table A9 Sample Means of Key Characteristics

	Stayer (SS, SO)		New Occupation(SS,NO)		New Sector(NS,SO)		Complex Mover(NS,NO)	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Occupations cont'd								
Welfare workers	0.004	0.0001	0.0056	0.0023	0.0004	0.0003	0.0011	0.0006
Clerical	0.0727	0.0005	0.1314	0.0103	0.1371	0.0051	0.0804	0.0051
Selling	0.2081	0.0009	0.3029	0.014	0.302	0.0069	0.2734	0.0084
Manual	0.2323	0.0009	0.1948	0.0121	0.3417	0.0071	0.3658	0.009
Other occupation	0.0795	0.0006	0.1137	0.0097	0.0584	0.0035	0.11	0.0059
Skill Groups								
Unskilled manual	0.6898	0.001	0.7614	0.013	0.7406	0.0065	0.8688	0.0063
Unskilled non-manual	0.07269	0.0006	0.1314	0.0103	0.1371	0.0051	0.0804	0.0051
Skilled Managers	0.0004	0.00004	0.0047	0.0021	0.0004	0.0003	0.0035	0.0011
Skilled professional	0.1673	0.0008	0.1025	0.0093	0.107	0.0046	0.0473	0.004
Training								
On-the-job	0.0682	0.0006	0.055	0.007	0.0506	0.0033	0.0487	0.004
Vocational	0.0469	0.0005	0.0755	0.0081	0.0495	0.0032	0.0363	0.0035
Technical	0.0654	0.0005	0.0596	0.0072	0.0321	0.0026	0.025	0.0029
Other	0.0307	0.0004	0.0242	0.0047	0.0403	0.0029	0.0328	0.0033
None	0.7814	0.0009	0.7856	0.0125	0.8275	0.0056	0.8571	0.0066
N	207469		1073		4487		2835	

Table A9 Sample Means of Key Characteristics- Continued

Table A10
Bivariate Probit for Occupational and Sectoral Mobility, Jamaican Labour Force Survey 1983-2006

	New Occupation (SS, NO) $M_i = 1$ if moved occupation, 0 if otherwise		New Sector(NS, SO) $I_i = 1$ if moved sector. 0 if otherwise	
Variable	**Coefficient**	**SE**	**Coefficient**	**SE**
Age	-0.0142	0.0021***	-0.0137	0.0021***
Age-squared	0.0001	0.00002***	0.0001	0.00002***
Male	0.0603	0.0145***	-0.0099	0.0141
Urban	-0.065	0.0144***	-0.0151	0.0141
Higher	0.2959	0.0566***	0.2306	0.0573***
Further	0.2972	0.0486***	0.1846	0.0483***
Other	0.1641	0.0229***	0.1062	0.0226***
On-the-Job	-0.2195	0.0312***	-0.2415	0.0297***
Vocational	-0.1059	0.0314***	-0.1542	0.031***
Technical	-0.2269	0.0458***	-0.3163	0.0459***
Other(Training)	-0.2269	0.0404***	-0.2552	0.0407***
Agriculture	0.0831	0.0283	-0.0877	0.0276***
Mining	-0.1169	0.0823	-0.0372	0.0757
Electricity	-0.5436	0.1204***	-0.4941	0.1077***
Construction	0.0233	0.0283*	0.0082	0.0272
Wholesale	0.0676	0.0235***	-0.077	0.0227***
Transport	-0.1369	0.035***	-0.0685	0.0322**
Finance	-0.0159	0.0388	0.0176	0.0367
Community	-0.1161	0.0241***	-0.1059	0.0227***
Skilled Prof.	-0.2858	0.0330***	-0.3648	0.0334***
Skilled Managers	-1.637	0.0779***	-0.9109	0.0328***
Unsk. non-manual	-0.102	0.0254	-0.0482	0.0243
Constant	-1.3577	0.0558***	-1.2025	0.0536***
Correlation	0.9492	0.0021		
Wald Test of $\rho = 0$	$\chi^2(1) = 17239.6$	Prob> χ =0.0000		
N	195690			

*means significant at the 10% level of significance
** means significant at the 5% level of significance
***means significant at the 1% level of significance

Table A11
Bivariate Probit for Occupational and Sectoral Mobility, Jamaican Labour Force Survey 1983-1994

	New Occupation (SS, NO) $M_i = 1$ *if moved occupation, 0 if otherwise*		*New Sector(NS, SO)* $I_i = 1$ *if moved sector, 0 if otherwise*	
Variable	*Coefficient*	*SE*	*Coefficient*	*SE*
Age	-0.0073	0.0043*	-0.0123	0.0038***
Age-squared	-0.00004	0.0001	0.00003	0.00005
Male	0.1462	0.0244***	-0.0116	0.0223
Urban	-0.0344	0.0228	0.0086	0.0213
Higher	0.3507	0.1021***	0.0816	0.1064
Further	0.1712	0.0773**	0.0773	0.0733
Other	0.1051	0.0386***	0.0316	0.0359
On-the-Job	-0.2374	0.0435***	-0.2781	0.0407***
Vocational	-0.1529	0.0518***	-0.1705	0.0473***
Technical	-0.2665	0.0681***	-0.2585	0.0637***
Other(Training)	-0.1382	0.1858	0.0277	0.1487
Agriculture	0.1072	0.0381***	-0.0759	0.0369**
Mining	0.0989	0.106	0.2067	0.0955**
Electricity	-0.8079	0.2579***	-0.7188	0.2133***
Construction	0.1565	0.0419***	0.1421	0.0398***
Wholesale	0.0412	0.0348	-0.0965	0.0328***
Transport	-0.0791	0.0602	0.0575	0.0516
Finance	0.0752	0.0644	0.0214	0.0610
Community	0.0084	0.0355	0.08	0.0317**
Skilled Prof.	-0.0251	0.0499***	-0.3501	0.0478***
Skilled Managers	-1.4804	0.1119***	-0.8021	0.0486***
Unsk. non-manual	-0.1049	0.0393***	-0.0529	0.0354
Constant	-1.5582	0.0911***	-1.2706	0.0825***
Correlation	0.9249	0.029		
Wald Test of $\rho = 0$	$\chi^2(1) = 6326.98$	Prob> χ =0.0000		
N	90102			

*means significant at the 10% level of significance
** means significant at the 5% level of significance
***means significant at the 1% level of significance

Table A12
Bivariate Probits for Occupational and Sectoral Mobility, Jamaican Labour Force Survey 1998-2006

	New Occupation (SS, NO) $M_i = 1$ if moved occupation, 0 if otherwise		New Sector(NS, SO) $I_i = 1$ if moved sector, 0 if otherwise	
Variable	**Coefficient**	**SE**	**Coefficient**	**SE**
Age	-0.0153	0.0025***	-0.0146	0.0025***
Age-squared	0.0001	0.00003***	0.0001	0.00003***
Male	-0.0051	0.0185	-0.0389	0.0185
Urban	-0.0911	0.0188***	-0.0359	0.0189*
Higher	0.3086	0.0719***	0.3855	0.0742***
Further	0.3593	0.0635***	0.2493	0.0648***
Other	0.184	0.0289***	0.1374	0.0292***
On-the-Job	-0.2220	0.0457***	-0.2045	0.0439***
Vocational	-0.0713	0.0399*	-0.1346	0.0412***
Technical	-0.2683	0.0631***	-0.4037	0.0674***
Other(Training)	-0.2103	0.0415***	0.1346	0.0292***
Agriculture	0.0732	0.0435*	-0.0843	0.0429**
Mining	-0.4385	0.1402***	-0.3842	0.1306***
Electricity	-0.438	0.1375***	-0.4274	0.1292***
Construction	-0.0941	0.0394**	-0.1235	0.0381***
Wholesale	0.0717	0.03319**	-0.0967	0.0326***
Transport	-0.1896	0.0447***	-0.1836	0.0426***
Finance	-0.0794	0.0501	-0.0344	0.0477
Community	-0.2215	0.0341***	-0.2863	0.0331***
Skilled Prof.	-0.3122	0.0455***	-0.4074	0.0482***
Skilled Managers	-1.8229	0.1203***	-1.0311	0.04532***
Unsk. non-manual	-0.0923	0.034***	-0.0477	0.0338
Constant	-1.4632	0.062***	-1.3758	0.0611***
Correlation	96.52	0.002		
Wald Test of $\rho = 0$	$\chi^2(1) = 10953$	Prob> χ =0.0000		
N	105588			

*means significant at the 10% level of significance
** means significant at the 5% level of significance
***means significant at the 1% level of significance

Labour Market Status	Question No.	Question
Employed	Q3.10	How many months did you work during the last 12 months?
Employed	Q3.11	For how long have you been working in your current job?
Employed	Q3.12	Over the past 5 years have you ever worked in any other job ?
Employed	Q3.15	When did you change jobs? (most recent)
Unemployed	Q4.5	Have you ever worked?
Unemployed	Q4.6	When did you stop working either for someone or in your own business?
Unemployed	Q4.7	How long did that job last?
Out–of-the lab. For.	Q5.2	Have you ever worked?
Out–of-the lab. For.	Q5.4	When did you stop working?

Table A13 Key Jamaica QLFS questions for Identification

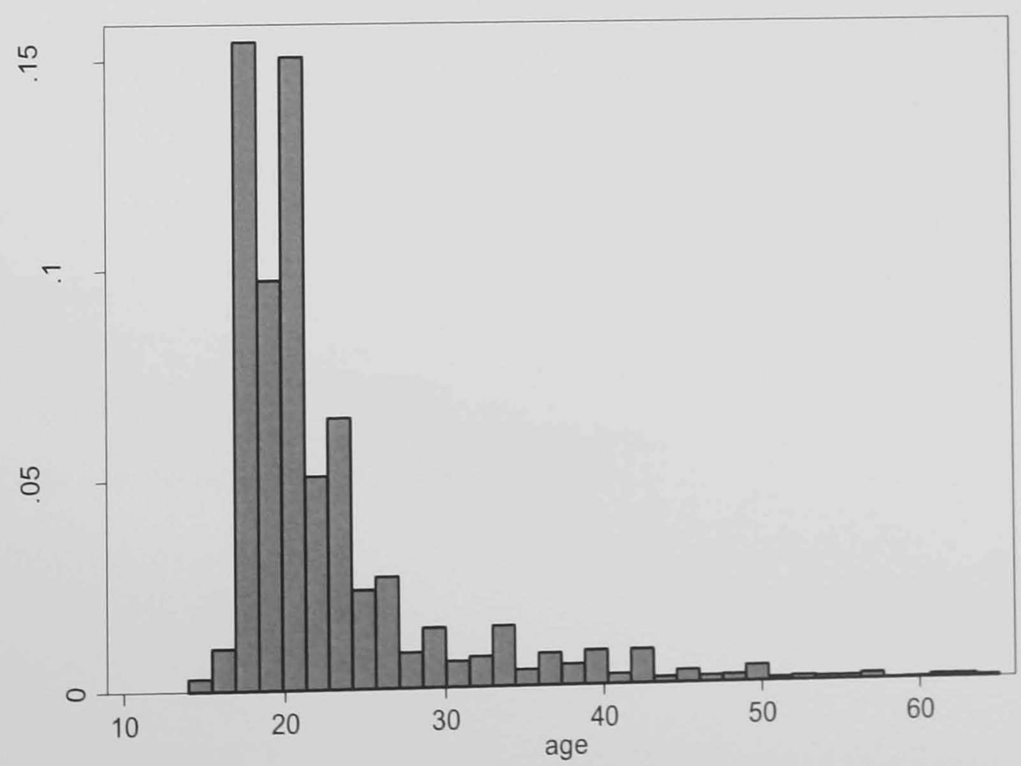

Figure A1 Key Jamaica QLFS questions for Identification

Variable Name	Variable Definition
Age	Age of the respondent
Age-squared	Square of respondent's age
Higher	(0,1): dummy- Takes a value of 1 if worker had attained a University degree
Further	(0,1): dummy- Takes a value of 1 if worker had attained at least 1 GCE "A" Level or between 1-2 CAPE subjects.
Other	(0,1): dummy- Takes a value of 1 if worker had attained a Basic ordinary level subject up to 5or more G.C.E. or C.X.C. examination passes
None	(0,1): dummy- Takes a value of 1 if worker has reported to not having any of the above qualifications whatsoever.
Urban	(0,1): dummy-takes a value of 1 if the worker is located in Kingston, St. Catherine, St. James, St. Ann or St. Andrew.
H.E.A.R.T	(0,1): dummy-takes a value of 1 if the respondent has reported being exposed to HEART training at some point.
Vocational	(0,1): dummy-takes a value of 1 if the respondent has reported being exposed to any type of vocational training over his/her lifetime
Technical	(0,1): dummy-takes a value of 1 if the respondent has reported being exposed to any type of technical training over his/her lifetime
On-the-Job	(0,1): dummy-takes a value of 1 if the respondent has reported being exposed to on-the-job training over his/her lifetime
Other Trained	(0,1): dummy-takes a value of 1 if the respondent has reported being exposed to any other type of training over his/her lifetime
Lost job	(0,1): dummy-takes a value of 1 if the respondent has reported having lost his/her former job.
Personal Reason	(0,1): dummy-takes a value of 1 if the respondent has cited personal reasons for having lost his/her job.
Skilled Prof.	(0,1): dummy takes a value of 1 if the respondent is a skilled professional according to the Dolton and Kidd classification
Skilled Manager	(0,1): dummy takes a value of 1 if the respondent is a skilled managers according to the Dolton and Kidd classification
Unsk. Non-manual	(0,1): dummy takes a value of 1 if the respondent is less-skilled non-manual workers according to the Dolton and Kidd classification
Unsk. Manual	(0,1): dummy takes a value of 1 if the respondent is less-skilled manual workers
Agriculture	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Agriculture, Forestry And Fishing.
Mining	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Mining, Quarrying and Refining
Manufacturing	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Manufacturing
Electricity	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Electricity,Gas and Water
Construction	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Contruction and Installation
Wholesale	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Wholesale & Retail,Hotel and Restaurant Services
Transport	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Transport Storage and Communications
Finance	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Financing, Insurance, Real Est. & Business Services
Community	(0,1): dummy takes a value of 1 if the respondent's sector of origin is Community, Social and Personal Services

Table A14 Variable Definitions for Chapter 5