STRUCTURAL CHANGE IN OUTPUT AND EMPLOYMENT: EXPERIENCE OF SELECTED COUNTRIES IN SUB-SAHARAN AFRICA WITH SPECIAL REFERENCE TO ETHIOPIA

Thesis submitted to Jawaharlal Nehru University

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CERTIFICATE

This is to certify that the thesis entitled **"Structural change in Output and Employment: Experience of Selected Countries in Sub-Saharan Africa with Special Reference to Ethiopia"** submitted by me for the award of the degree of **Doctor of Philosophy** of this university is my original work. The thesis has not been previously submitted, in part or full, for the award of any other degree of this university or any other university.

ABDI SEIDO HASSEN

We recommend that this thesis be placed before the examiners for evaluation.

PROF. PRABHAT PATNAIK	DR. PRAVEEN JHA	PROF. ARUN KUMAR
Supervisor	Co-supervisor	Chairperson

To my parents

Fatum and Seido

And

To my Sheikh

Ahmed Tawhida

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CHAPTER 1

INTRODUCTION

Economic performance in Sub-Saharan Africa[1] (henceforth SSA) has been markedly worse than that of other developing regions. The abysmal performance of the region during 1980s and early 1990s was a continuation of the decline that started in the late 1970s. Indeed the decade of the 1980s has been labelled as the lost decade for the region. SSA's average GDP growth during 1980s was 2.2 per cent which was less than the average population growth rate of about 3 per cent resulting in negative growth rate of per capita income. Apart from the low growth rate, the 1980s were also characterised by high volatility of growth. However, since the mid-1990s, average real GDP growth in SSA has accelerated to 3.9 per cent and the performance has become widespread across many countries. The main factors behind the recent recovery are increased commodity demand and prices, increased utilisation of the existing capacity made possible by a relaxation of the foreign exchange constraint, debt relief and improved performance in non-oil sectors such as agriculture.

Economic conditions in SSA in the 1980s were largely influenced by structural adjustment programmes (SAPs). During the 1980s, some 36 countries in SSA formally adopted the structural adjustment programmes of the World Bank or the stabilisation agreements of the IMF. However, after a decade of structural adjustment, little had

[1] In this study the Sub-Saharan Africa (SSA) region does not include South Africa, unless otherwise stated.

changed as far as the performances of these economies are concerned and very little structural change has taken place. In fact, many of the countries that have performed relatively well after the mid-1990s in terms of output growth, investment and export growth are not among those countries identified by World Bank as pursuing sound macroeconomic policies.

Though there is a wide diversity of experience among the countries of SSA which requires country specific analysis, one can still generalise to an extent since there are certain characteristics which are common to most of the SSA economies. The region's economic performance is characterised by a relatively low rate of capital accumulation, low level of labour productivity growth and limited structural transformation.

One of the major factors which explains SSA's poor economic performance relative to other regions is that SSA has a low investment ratio. The ratio of investment to GDP remained almost stagnant in SSA excluding South Africa (at around 18 per cent) since the mid-1980s, which is lower than all other developing regions. In fact, the region was not able to recover to the level of investment rate it had during the 1970s. However, this figure may even understate the extent of investment shortfall in SSA since capital goods tend to be more costly in Africa than other regions. Therefore, when investment is measured in international prices, it is even much lower than in other regions. Moreover, the low level of domestic savings rate shows SSA's dependence on external finance to close the gap between investment and savings.

SSA's slow growth is also characterised by low productivity growth. For the region as a whole, more than 70 per cent of real GDP growth during 1993-2005 can be attributed to employment growth. Only a few countries in the region were able to strike a balance between employment and productivity growth. Even the level of productivity in the region is comparatively low, one reason for which is the fact that a large share of the labour force is engaged in agriculture. Generally, labour productivity in the agricultural sector tends to be lower compared to the national average. Thus, the larger the share of the labour force in agriculture the lower the overall labour productivity. Moreover, labour productivity in SSA is also lower in the non-agricultural sector. The stagnation of the share of labour force in industry and the transference of labour from agriculture to low productivity services sector also contributes to lowering overall labour productivity growth.

Most of the economies in SSA at present are in their very early stages of structural transformation. The concept and meaning of structural change in development economics refers to the relative importance of sectors in the economy in terms of production and factor use. Historically, structural transformation of economies has provided the bedrock of accelerated and sustained growth. A good deal of the literature on economic development considered economic growth as intrinsically linked to changes in the structure of production in a circular way. Nicholas Kaldor (1966; 1967), for example, argued that it is not possible to understand the growth process without taking a sectoral approach, distinguishing between increasing and decreasing returns activities. Most neoclassical economists, however, regard structural change as a secondary issue, rather than a necessary condition for economic growth.

Historically, rapid economic growth is associated with the expansion of the industrial sector. As development proceeds, both the share of agriculture in GDP and the share of labour force in agricultural sector decline. In the case of SSA excluding South Africa, there was a marginal rise in the share of industry in GDP from around 34 to 36 per cent between 1980 and 2005, while the share agriculture in GDP declined from 29 to 27 per cent. The share of services has remained stagnant at around 37 per cent. The rise in the share of industry was mainly due to a rise in the share of mining and its ancillary activities. On the other hand, the share of manufacturing output in total output has declined by 3 per cent between 1980 and 2005 and hovers around 8 per cent in 2005.

In terms of employment, traditional agriculture continues to absorb the majority of the labour force in the region. Between 1996 and 2005, the share of employment in agriculture in the region fell from 68 to 63 per cent. However, the share of employment in industry has stagnated at around 9 per cent, whereas the share of employment in services increased from around 23 to 28 percent. On the other hand, there is a marginal decline in the share of employment in manufacturing from 6.2 to 5.5 per cent between 1980 and 2000.

Export diversification is another area in which the structural transformation of SSA economies has been limited. Most economies in SSA depend on primary commodities for their export earnings. Primary commodities account for more than 80 per cent of total exports of the region, while exports of manufactured goods account for about 18 per cent.

This study is limited in scope and does not delve into many intricacies. It mainly attempts to provide a broad analysis of the performance of SSA economies by focusing on structural change and capital accumulation. The study focuses on 26 countries in SSA for the period of 1980-2005. The choice of the sample countries is based on population size and data availability for key variables of interest to our study. Effort has been made to include all those countries with population size of more than 5 million in 2005 and for which a critical mass of data were available from 1980 to 2005. Moreover, we have also included 7 small countries in order to make the sample as representative as possible (see Table A1.1 in appendix). However, we have excluded D. R. Congo which is the third largest country in SSA in terms of population primarily due to lack of confidence in the reliability of data[2]. Between them these countries account for more than 75 per cent of the population and more than 80 per cent of the GDP of SSA excluding South Africa.

1.1 OBJECTIVES OF THE STUDY

The general objective of this study is to analyse the growth experience of selected countries in Sub-Saharan Africa in the context of structural change. More specifically, this study attempts to address the following interrelated objectives:

1. To describe the patterns of economic growth in the selected countries.
2. To identify the main determinants of economic growth.
3. To analyse the extent of structural change in terms of output and employment and assess to what extent SSA's growth experience in the last two and half decades has been accompanied by structural change.
4. To examine the role of different sectors in the growth process in a Kaldorian (Kaldor, 1966; 1967) framework.

[2] Easterly (2002) observed that D.R. Congo's statistical office had collapsed by 1999 due to the civil war.

5. To investigate whether GDP growth of the selected countries is positively related to how fast their industrial sector is growing.

1.2 STRUCTURE OF THE STUDY

The study is organised into seven chapters. The second chapter provides an overview of SSA's growth experience over the last two and half decades. It attempts to periodise growth patterns of SSA countries. The long period of 1980-2005 has been divided into two periods based on the structural break in the GDP growth trend that occurred around mid-1990s in many countries in the region as well as for the region as a whole. The chapter then compares the two periods in terms of volatility of output growth, investment patterns and trade performance. It also decomposes output growth rate into employment growth and labour productivity growth. The chapter concludes with the discussion of the impact of structural adjustment programme.

The third chapter attempts to identify the main determinants of economic growth in the selected countries. Specifically, it deals with the role of investment. Various theories of growth and development have viewed investment ratio as one of the main determinants of growth. In order to analyse the role of capital formation, both cross-section and panel regression techniques are used. The chapter also takes up the issue of causality between output growth and investment ratio and tries to determine empirically the direction of causation.

Chapter Four analyses the extent of structural change in terms of output and employment and tries to assess whether the growth process in SSA has been accompanied by structural change. The chapter begins with a brief review of the literature that deals with the issue of structural change. Then it goes on to analyse the patterns of structural change in terms of output, export and employment. It also decomposes aggregate labour productivity growth into two parts: within-sector productivity growth and reallocation gains. Finally, it examines briefly the relationship between investment and structural change.

The fifth chapter uses a Kaldorian framework to analyse the role of different sectors in the growth process. Specifically, it investigates whether industry in general and manufacturing in particular serves as 'an engine of growth' in SSA countries. The chapter uses both cross-section and panel cointegration method (depending on the availability of data) to test the relevance of Kaldor's model for the selected countries.

Chapter Six deals exclusively with Ethiopia. Starting with the summary of economic development policies in Ethiopia, it goes on to analyse the performance of the economy, with a special focus on structural change. The chapter ends with the discussion about the Agricultural Development Led Industrialisation (ADLI) strategy and its impact on the structural transformation of the economy. Finally, Chapter Seven presents concluding remarks and policy implications.

CHAPTER 2

AN OVERVIEW OF LONG-RUN ECONOMIC PERFORMANCE

The economic performance of Sub-Saharan African countries during 1980s was characterised by negative per capita income growth, followed by a weak recovery in the 1990s. Both domestic and external factors have contributed to this disappointing overall performance. The external environment, characterized by sharp declines in world commodity prices and substantial losses in the terms of trade, has been generally unfavourable. For many countries, the effects of these adverse external developments have been compounded by unfavourable weather, rapid population growth, low human capital development and inadequate infrastructure at home.

The initial industrialisation effort had some positive results during 1960s and early 1970s. However, these gains were reversed in the 1980s due to the economic crisis which was caused mainly by the oil crises of 1973 and 1979, which precipitated the recession in the developed countries, declining demand for raw materials and high interest rates (Mkandawire and Soludo, 1999). The crisis led to an increase in the current account deficit and the drying up of external resources to finance the widening gap between investment and savings. Thus, this paved the way for a major shift in economic policies with a focus on macroeconomic stabilisation policies aimed at short-term goals. However the shift in economic policies did not result in better economic performance.

SSA remains the region most dependent on agriculture for livelihood, exports, and employment although there is some diversity across countries within the region. Traditional agriculture continues to absorb the majority of the labour force (around 63 per cent) in the region (ILO, 2007). This lack of diversity in economic activities has been reflected in the region's low level of income. According to World Bank's classification of economies based on income, only six countries in SSA belong to the upper-middle income category in 2005 while other six countries belong to the lower-middle income. The remaining 36 countries in the region were all classified as low-income economies (Table A2.1 in appendix). Out of the 48 countries identified by UN as least developed, 33 belong to SSA.

2.1 PATTERNS OF OUTPUT GROWTH

Average GDP growth for SSA excluding South Africa was 2.2 per cent per annum during 1980-1989 and 2.6 per cent during 1990-1999 before recovering to 4.8 per cent in 2000-2005. Many of the individual countries in the region have also shown growth recovery during the 1990s and early 2000s. The recovery in most of the countries was driven by increased commodity demand and prices, increased utilisation of the existing capacity made possible by a relaxation of the foreign exchange constraint, increased capital flows, debt relief and improved performance in non-oil sectors such as agriculture (UNECA, 2008 and UNCTAD, 1998). The countries in the sample which did not experience growth acceleration during the later periods compared to the 1980s are Botswana, Cameroon, Guinea-Bissau, Kenya, Mauritius and Zimbabwe (Table 2.1). In the 1980s Botswana experienced a boom and real GDP growth rate averaged over 10 per cent per annum. But the economy plunged into recession in the early 1990s and GDP growth rate averaged at around 5.6 per cent per annum during 1990s and early 2000s. This was due to the decline in the price of diamonds on the world market. In fact, this highlights the problem of many of the SSA countries that depend on one commodity as a major source of export earnings. In Cameroon, Kenya and Mauritius there was slowdown in GDP growth rate in later periods compared to the decade of 1980s, whereas Guinea-Bissau and Zimbabwe had negative growth rate in 2000-2005. Côte d'Ivoire also had negative growth rate during the same period though there was some improvement in growth rate during the 1990s. In most of the countries, sectoral growth rates also followed the same trend as that of real GDP growth during 1980-2005.

The performance of per capita income growth in the region was also bleak. Population growth rates have been running ahead of real output growth rates, implying that GDP per capita has been declining. Per capita growth rates of output during the decade of 1980s were negative for two-thirds of the countries in the sample (Table 2.1). However, this figure has come down during the subsequent periods. In the 1990s the number of countries which had negative per capita growth rates was eight while the figure has reduced to five during the period 2000-2005. But still around half of the countries in the sample had less than 2 per cent per capita output growth in 2000-2005.

Table 2.1 Growth rates of GDP and sectoral value added, 1980-2005 (percentage)

Country	Period	GDP per capita	GDP	Agriculture	Industry	Services
Benin	1980-89	-0.7	2.7	5.2	3.3	1.1
	1990-99	1.3	4.7	5.8	4.1	4.0
	2000-05	0.6	3.9	4.6	3.8	3.2
Botswana	1980-89	7.5	10.9	1.8	11.8	14.8
	1990-99	3.3	5.6	-0.9	5.0	8.0
	2000-05	5.5	5.6	-1.1	5.2	5.6
Burkina Faso	1980-89	1.3	3.9	3.6	4.2	3.9
	1990-99	1.2	4.1	4.3	2.2	4.6
	2000-05	2.3	5.6	2.1	2.7	8.2
Cameroon	1980-89	1.6	4.5	2.5	7.5	3.5
	1990-99	-1.2	1.3	5.3	-2.0	0.0
	2000-05	1.8	3.7	3.7	0.2	6.7
Côte d'Ivoire	1980-89	-3.5	0.7	-0.4	5.1	-0.1
	1990-99	0.6	3.5	3.2	6.6	2.5
	2000-05	-2.1	-0.5	0.5	-2.7	-0.1
Ethiopia	1980-89	-1.0	2.1	0.1	4.7	3.9
	1990-99	0.6	3.5	2.7	3.5	4.8
	2000-05	2.6	5.2	3.3	8.3	6.4
Gabon	1980-89	-2.7	0.5	1.5	0.4	0.3
	1990-99	-0.1	2.9	1.9	2.8	3.2
	2000-05	-0.1	1.6	0.4	2.0	1.4
Gambia	1980-89	-0.2	3.5	1.2	4.3	2.5
	1990-99	-0.8	2.7	2.2	0.7	3.9
	2000-05	0.8	3.7	1.4	5.9	5.4
Ghana	1980-89	-0.6	2.6	0.9	2.6	5.3
	1990-99	1.7	4.3	3.3	2.3	5.9
	2000-05	2.8	5.1	5.0	4.6	5.3
Guinea	1980-89	0.5	3.0			
	1990-99	1.2	4.4	4.4	4.8	3.7
	2000-05	0.7	2.9	4.1	3.2	1.9
Guinea-Bissau	1980-89	1.4	3.8	5.0	1.3	3.1
	1990-99	-1.6	1.4	4.3	-2.5	-0.7
	2000-05	-3.5	-0.5	4.0	3.6	0.7
Kenya	1980-89	0.3	4.1	3.2	3.7	4.9
	1990-99	-0.6	2.2	1.8	1.5	3.4
	2000-05	1.1	3.4	2.8	4.5	3.1
Lesotho	1980-89	1.8	4.1	2.1	4.1	3.9
	1990-99	3.0	4.3	1.8	5.4	4.8
	2000-05	2.9	2.9	-3.2	4.9	3.7
Malawi	1980-89	-1.9	2.4	2.1	2.4	3.2
	1990-99	2.0	3.8	8.5	2.0	1.9
	2000-05	1.2	3.4	0.5	3.8	3.2

(continued)

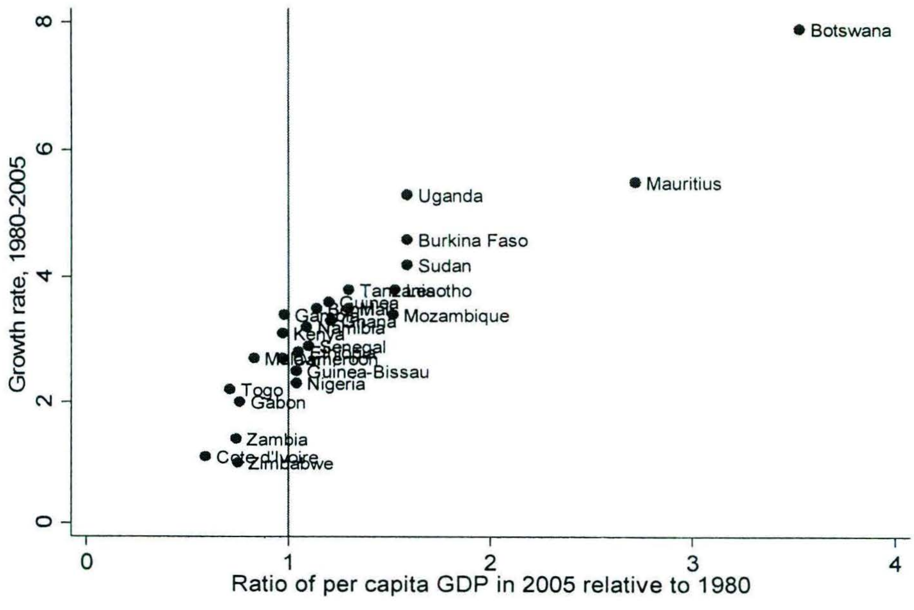
Table 2.1 (continued)

Country	Period	GDP per capita	GDP	Agriculture	Industry	Services
Mali	1980-89	-1.9	0.5	2.6	4.7	2.1
	1990-99	1.2	3.9	3.1	6.4	2.8
	2000-05	2.8	5.9	4.9	5.1	6.2
Mauritius	1980-89	4.9	5.9	3.1	9.0	4.8
	1990-99	4.0	5.3	0.7	5.5	6.4
	2000-05	3.0	4.0	2.0	1.9	5.9
Mozambique	1980-89	-1.9	-0.9	7.3	-4.5	7.2
	1990-99	2.5	5.7	5.5	11.9	3.4
	2000-05	6.2	8.4	8.3	10.0	7.7
Namibia	1980-89	-2.3	1.1	1.3	-0.3	3.7
	1990-99	0.8	4.0	3.5	2.5	4.6
	2000-05	3.3	4.7	1.6	6.8	4.7
Nigeria	1980-89	-2.0	0.8	2.9	-2.1	2.7
	1990-99	-0.3	2.4	3.3	0.9	3.1
	2000-05	3.4	5.8	5.8	5.5	6.3
Senegal	1980-89	-0.3	2.7	2.5	3.3	2.3
	1990-99	0.2	2.8	2.1	3.7	2.7
	2000-05	2.1	4.5	1.1	5.5	5.1
Sudan	1980-89	-0.4	2.4	2.3	1.7	4.3
	1990-99	2.8	5.3	9.1	6.0	2.2
	2000-05	4.1	6.1	1.6	8.2	8.7
Tanzania	1980-89					
	1990-99	-0.2	2.7	3.2	2.5	2.4
	2000-05	4.5	6.5	5.0	9.6	6.1
Togo	1980-89	-2.1	1.5	5.7	0.7	-0.5
	1990-99	0.5	3.6	4.5	1.7	3.7
	2000-05	-0.3	2.5	2.8	8.1	-0.7
Uganda	1980-89	-1.3	2.3	1.5	4.4	2.1
	1990-99	3.9	7.2	3.6	12.6	8.3
	2000-05	2.0	5.6	4.1	7.3	7.4
Zambia	1980-89	-2.3	1.0	4.1	0.7	0.0
	1990-99	-2.2	0.2	4.3	-4.4	2.0
	2000-05	3.0	4.7	1.4	9.6	4.0
Zimbabwe	1980-89	-0.5	3.3	2.8	2.9	2.8
	1990-99	0.8	2.7	4.2	1.1	3.4
	2000-05	-6.3	-5.7	-8.5	-10	-10.0
SSA excluding South Africa	1980-89	-0.8	2.2	2.1	1.1	2.7
	1990-99	0.0	2.6	3.5	1.9	2.2
	2000-05	2.4	4.8	3.9	6.0	4.1

Note: Growth rates have been calculated using the least-squares method.
Source: World Bank (2008).

Figure 2.1 depicts the ratio of per capita income in 2005 relative to 1980 versus average growth rates of GDP for the period 1980-2005. The ratio is measured as per capita income in 2005 to per capita income in 1980. Countries on the left side of the vertical line are those for which per capita income has regressed in 2005 compared to the levels in 1980. Out of the 26 countries, per capita income has regressed in 9 of them, out of which 5 countries suffered income losses exceeding 20 per cent (see also last column in Table 2.2). On the other hand, Botswana and Mauritius have done exceptionally well. In Botswana, the per capita income has more than tripled compared to the 1980 levels whereas in Mauritius it has more than doubled. To some extent Burkina Faso, Lesotho, Mozambique, Sudan and Uganda have also shown some improvement in the levels of per capita income in 2005 relative to 1980. The remaining countries are concentrated around the vertical line implying that per capita income has stagnated over the last two and half decades.

Figure 2.1 Per capita GDP in 2005 relative to 1980



2.1.1 Periodisation of Growth Patterns

A priori imposition of sub-periods on the time span of the data to analyse growth episodes is problematic. This is because the pre-specified trend can create fluctuations and cycles, which are not originally there in the data if the trend is not a satisfactory description of the actual data (Mukherjee, 2001). This is especially so when there is structural break in the data. Therefore, it is necessary to find a good description of the data before computing growth rates. The approach followed here is to first describe the data using a statistical tool and then fit a trend accordingly. We employ a simple smoothing technique known as LOWESS (Locally Weighted Scatterplot Smoothing) proposed by Cleveland (1979) which allows us to visually inspect whether there is any break in the trend[1]. Taking constant growth rate as a reference, any clear bend from a straight line in the LOWESS fit would indicate changing growth rates. If there is a break in the trend then a piecewise log-linear trend can be fitted by least squares with an appropriate dummy variable to estimate the differing slopes[2]. However, we also need to check whether the piecewise semi log-linear trend fitted is a satisfactory description by examining the nature of residuals left by this trend. If the residuals show no pronounced pattern then it can be concluded that the trend fitted is a satisfactory description (Mukherjee, 2001). Thus, a piecewise semi log-linear trend fitted is:

$$lnY = \alpha + \beta_1 t + \beta_2 D + \varepsilon \qquad (2.1)$$

[1] LOWESS does the smoothing by fitting (moving) weighted least squares models instead of averaging over the length (Mukherjee, 2009).
[2] For constant growth rate, a simple log-linear regression method is used.

where lnY is log of GDP, t is time, D is dummy variable and e is error term. The results of this fit are presented in Table 2.2 and Figure A2.1 in appendix.

There was typically a single main break in the growth trends for most of the countries in the sample occurring at some point during the 1990s (there are five countries for which the break occurred during the 1980s). For Cameroon and Côte d'Ivoire there were two break points whereas in the case of Gambia, Malawi and Mauritius there was no break in the trend. More than half of the 26 countries studied exhibited growth acceleration after the break point compared to the pervious period. In addition, the countries that were rapid growers before the 1990s are not the same as those that grew faster after the 1990s. Some countries such as Côte d'Ivoire, Guinea-Bissau and Zimbabwe have registered negative growth rates after the recent break point (Table 2.2 and Figure A2.1 in appendix). In the case of Zimbabwe the decline was exceptionally high. Since 1998, Zimbabwe's economy has declined on average by around 5 per cent per annum making it one of the worst performing economies in the entire region. The decline in Zimbabwe was triggered mainly by the political crisis gripping the country since the late 1990s. The region as a whole excluding South Africa also had break in the growth trend at 1994. The GDP growth rate for the whole region prior to the break was 2 per cent and accelerated to 3.9 per cent thereafter. On the whole, therefore, the above exploration seems to indicate that the growth in many of the SSA countries started recovering since 1990s.

Table 2.2 Periodisation of growth rates and ratio of per capita GDP in 2005 relative to 1980

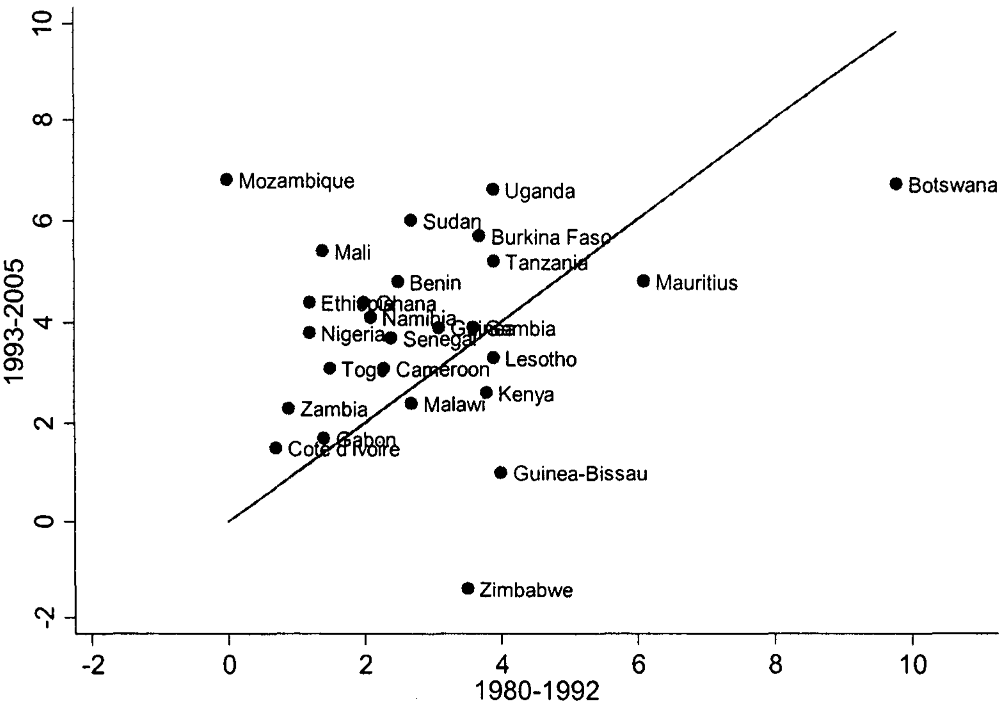
Country	Break Point (year)	Growth Rates (percentage)[1] Before the Break	After the Break	1980-2005	1980-1992	1993-2005	Ratio of Per Capita GDP[2]
Acceleration							
Benin	1990	2.2	4.5	3.5	2.5	4.8	1.14
Burkina Faso	1994	3.5	6.1	4.6	3.7	5.7	1.59
Cameroon	1986	8.0	-4.0				
	1994		4.5	2.7	2.3	3.1	0.97
Ethiopia	1993	1.3	4.4	2.8	1.3	4.4	1.05
Ghana	1983	-3.4	4.5	3.3	2.0	4.4	1.21
Guinea	1984	1.6	4.1	3.6	3.1	3.9	1.20
Mali	1994	1.6	6.1	3.5	1.4	5.4	1.30
Mozambique	1986	-5.0	6.4	3.2	0.1	7.6	1.52
Namibia	1990	1.7	4.2	3.2	2.1	4.1	1.09
Nigeria	1987	0.0	3.3	2.3	1.2	3.8	1.04
Senegal	1994	2.0	4.0	2.9	2.4	3.7	1.10
Sudan	1990	2.2	5.7	4.2	2.7	6.0	1.59
Tanzania[3]	1995	3.2	4.8	3.8	3.9	5.2	1.30
Togo	1994	1.2	3.5	2.2	1.5	3.1	0.71
Uganda	1986	0.0	7.3	5.3	3.9	6.6	1.59
Zambia	1998	0.5	3.9	1.4	0.9	2.3	0.74
Deceleration							
Botswana	1991	10.1	6.0	7.9	9.8	6.7	3.53
Côte d'Ivoire	1994	0.7	5.1				
	1999		-1.2	1.1	0.7	1.5	0.59
Gabon	1998	2.4	1.2	2.0	1.4	1.7	0.76
Guinea-Bissau	1997	4.1	-0.9	2.5	4.0	1.0	1.04
Kenya	1990	4.0	2.4	3.1	3.8	2.6	0.97
Lesotho	1997	4.3	2.7	3.8	3.9	3.3	1.53
Zimbabwe	1998	3.4	-5.3	1.0	3.5	-1.4	0.75
No break							
Gambia	no break			3.4	3.6	3.9	0.98
Malawi	no break			2.7	2.7	2.4	0.83
Mauritius	no break			5.5	6.1	4.8	2.72
SSA excluding South Africa	1994	2.0	3.9	2.8	2.3	3.6	1.02

Note: All growth rates are statistically significant at 5 per cent level.
[1]GDP is measured in constant 2000 USD
[2]It is computed as the ratio of per capita income in 2005 to per capita income in 1980 measured in 2005 international dollars.
[3]Data for Tanzania is from 1985 onward and is taken from African Development Bank database.
Source: World Bank's African Development Indicators online database.

Figure 2.2 shows output growth rates for the period 1980-1992 compared to the period 1993-2005. The reason for this periodisation is that since there was structural break in the GDP growth trend around the early 1990s in many of the countries, two long periods equally divided around the first half of 1990s seem appropriate. Countries which lie above the 45 degree line are those that had faster growth rates during 1993-2005 compared to the 1980-1992 period. The remaining countries which lie below the line are those whose growth have decelerated in the later period compared to 1980-1992. The furthest the countries are from the line the better or poorer their performance compared to the pervious period. The notable ones in this regard are Botswana, Guinea-Bissau, Zimbabwe and Mozambique. The first three countries performed badly compared to the pervious period. In the case of Mozambique, however, there was significant growth acceleration in the later period. For the entire period of 1980-2005, the performance of most of the countries in the region was less than satisfactory, with a few exceptions such as Botswana, Mauritius and Uganda which had grown by more than 5 per cent (Table 2.2).

The period of 1993-2005 also had a reasonable degree of macroeconomic stability compared to the period of 1980-1992. Growth acceleration in most countries during 1993-2005 has been associated with lower inflation rate relative to the earlier period. The rate of inflation has declined in almost all the countries barring a few during 1993-2005 (Table A2.2 in appendix). However, almost half of the countries in the sample still have inflation rates of more than 10 per cent. Especially in Zimbabwe the rate has been extremely high surpassing 100 per cent during 1993-2005 compared to 16 per cent of the earlier period.

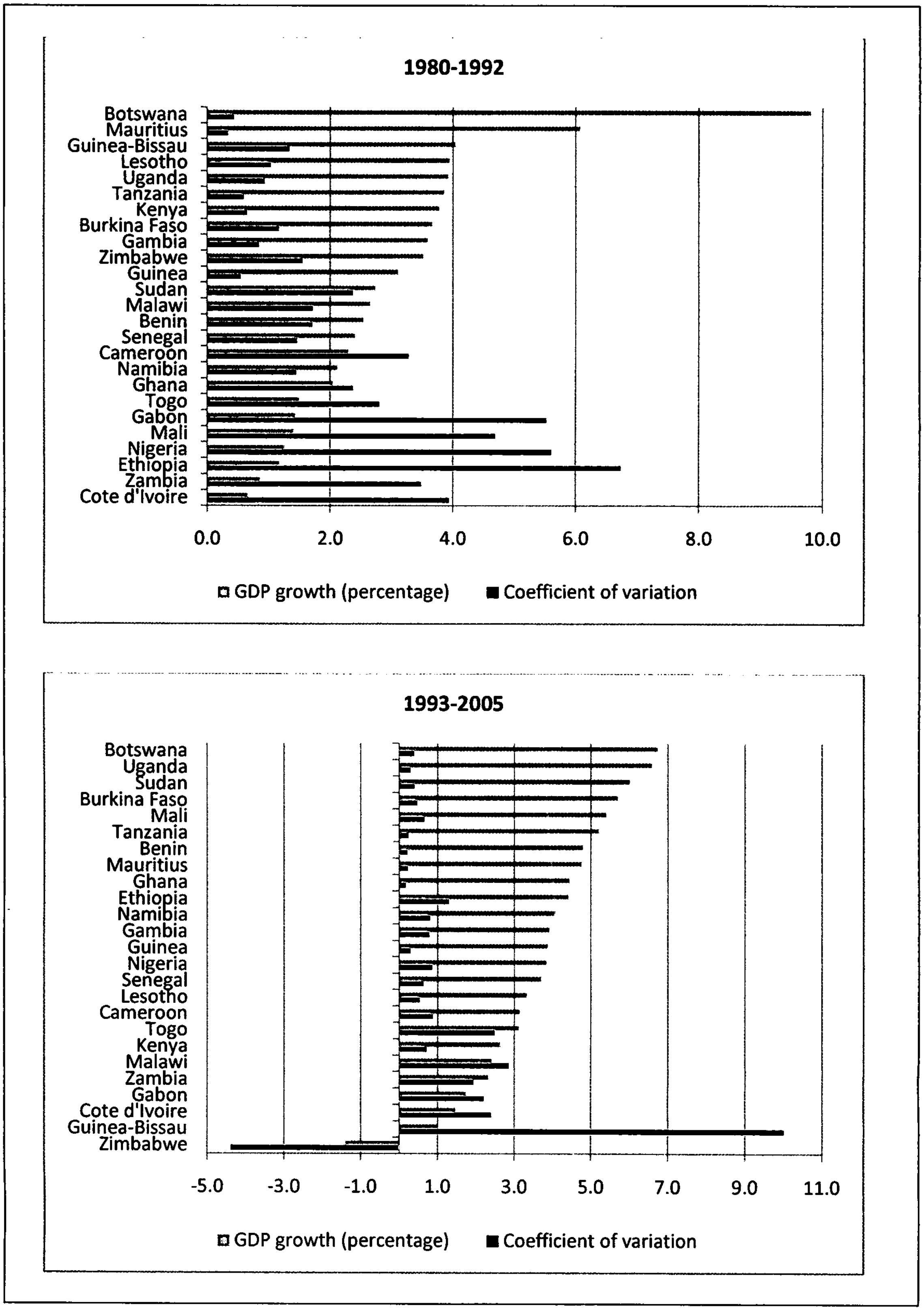
Figure 2.2 Average GDP growth rates of 1980-1992 compared to 1993-2005



2.1.2 Volatility of output growth

Apart from the low growth rates, volatility of growth has also been a characteristic of SSA's growth experience. Coefficient of variation of year-to year growth rates is taken as the measure of volatility. The coefficient is computed for two periods of 1980-1992 and 1993-2005. In many of the SSA economies, the real economy was much more volatile during the period 1980-1992 compared to the later period of 1993-2005 (Figure 2.3). This was true for the entire region as well. Moreover, as growth accelerated in later period many of the countries were able to reduce volatility. As Figure 2.3 shows, high volatility appears to be associated with lower growth rates. This is further confirmed with simple correlation exercise. The correlation coefficient between GDP growth and coefficient of variation is -0.67 for the period of 1980-1992 and -0.17 during 1993-2005 (the formal statistical analysis is presented in Chapter 3). Volatility of growth has been the highest in Ethiopia and the lowest in Mauritius during the first period and highest in Guinea-Bissau and lowest in Uganda during the second period. Some of the main factors for the volatility of output growth in the region are fluctuations in world commodity prices, weather conditions and political instability. As pointed out by Elhiraika (2008), the volatility of SSA's growth reflects the narrow production base both in terms of size and range of products. After examining the relationship between manufacturing share in output and growth volatility using data from 36 African countries, he concluded that an increased share of manufacturing in total output has the potential to raise GDP growth and reduce growth volatility.

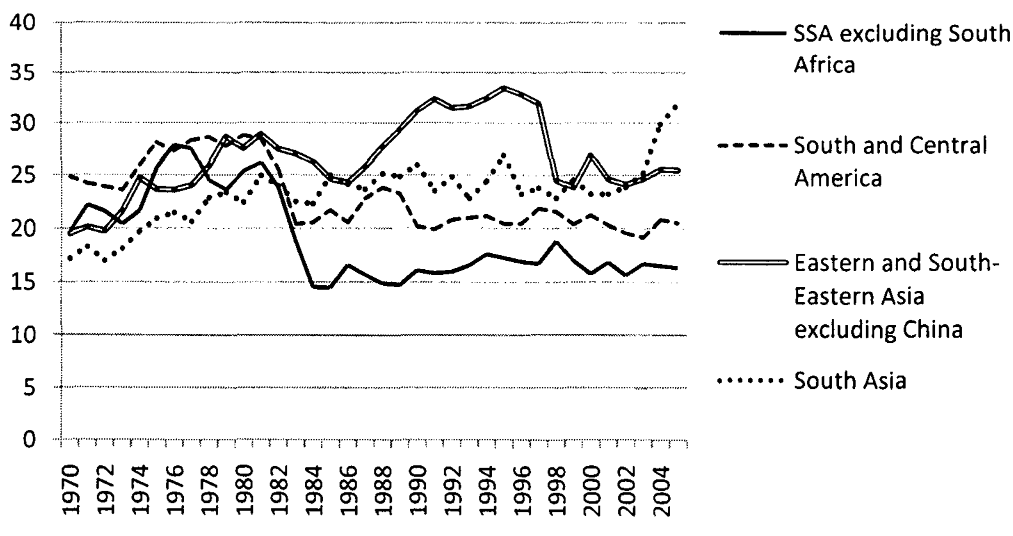
Figure 2.3 Average GDP growth and volatility



2.2 INVESTMENT PATTERNS

One of the major factors which explain SSA's poor economic performance relative to other regions is the low investment ratio. The fragility of growth in SSA is a result of the region's low rates of capital accumulation. Countries that experienced fast growth and high level of structural transformation such as East and South East Asian countries and China were able to increase their investment ratio substantially overtime. However, the ratio of gross capital formation to GDP remained virtually stagnant in SSA since the mid-1980s (Figure 2.4). In fact, the region was not able to recover to the level of investment rate it had during the 1970s. Rodrik (1999) pointed out that investment transition in several African countries occurred before the early 1980s[3]. Public investment played a major role in the growth of aggregate investment during 1970s.

Figure 2.4 Gross capital formation as percentage of GDP in selected regions, 1970-2005



Source: UNCTADstat online database

[3] An investment transition is defined as a rapid rise in the investment rate sustained for at least five years.

Table 2.3 Capital formation, savings and financing gap as percentage of GDP and real investment per capita in constant 2000 US$, 1980-2005

Country	Gross Capital Formation 1980-1992	Gross Capital Formation 1993-2005	Gross Domestic Savings 1980-1992	Gross Domestic Savings 1993-2005	Financing Gap[1] 1980-1992	Financing Gap[1] 1993-2005	Real Investment per capita 1980-1992	Real Investment per capita 1993-2005	Change[2] (%)
Acceleration[3]									
Benin	14.9	17.9	-1.5	5.3	-16.4	-12.6	32	50	57.5
Burkina Faso	18.4	20.4	0.5	6.4	-17.9	-14.0	38	45	17.2
Cameroon	22.1	16.2	23.1	18.3	1.1	2.1	229	109	-52.3
Côte d'Ivoire	14.3	11.9	17.6	20.6	3.3	8.7	129	73	-43.7
Ethiopia	14.7	20.5	9.7	9.4	-5.0	-11.1	28	26	-6.2
Ghana	9.3	23.7	4.7	7.7	-4.6	-16.0	37	70	86.4
Guinea	19.1	17.6	16.7	14.2	-2.4	-3.5	98	70	-29.0
Mali	18.5	23.1	1.0	9.9	-17.4	-13.1	53	60	14.1
Mozambique	13.8	22.3	-6.7	4.0	-20.5	-18.3	29	51	72.5
Namibia	19.8	20.6	10.6	14.6	-9.3	-6.0	298	383	28.5
Nigeria	17.3	20.9	19.8	26.7	2.5	5.8	37	62	66.5
Senegal	15.0	17.1	3.9	8.0	-11.1	-9.1	88	84	-4.1
Sudan	13.2	18.3	5.2	12.1	-8.0	-6.2	19	57	198.4
Tanzania		18.4		6.1		-12.4		50	
Togo	19.6	16.6	11.8	3.6	-7.8	-12.9	80	44	-45.3
Uganda	9.9	18.4	1.9	6.9	-8.0	-11.5	30	47	57.2
Zambia	15.5	18.3	12.7	10.2	-2.7	-8.0	33	45	37.9
Deceleration[3]									
Botswana	30.8	33.3	36.3	45.6	5.5	12.4	492	1043	112.2
Guinea-Bissau	33.1	19.2	0.0	-0.8	-33.0	-20.0	28	18	-34.5
Kenya	22.6	17.1	18.3	11.4	-4.3	-5.7	67	64	-5.0
Mauritius	24.9	25.8	21.0	23.9	-3.9	-1.9	469	908	93.7
Zimbabwe	17.6	16.3	16.1	12.9	-1.6	-3.4	103	91	-12.2
Unchanged[3]									
Gabon	32.0	25.4	42.7	49.2	10.7	23.7	1914	1106	-42.2
Gambia	20.3	20.6	7.3	7.8	-12.9	-12.8	60	59	-2.1
Malawi	19.8	17.0	11.9	0.9	-7.8	-16.1	63	32	-49.2
SSA excluding South Africa	17.2	18.7	14.4	16.6	-2.8	-2.2	61	59	-3.8

Notes: [1]Financing gap is gross domestic savings minus gross capital formation.

[2]Change refers to percentage change in real investment per capita between 1980-1992 and 1993-2005.

[3]'Acceleration' and 'deceleration' refer to the change in GDP growth rates during 1993-2005 compared the period 1980-1992, while 'unchanged' refers to the unchanged growth rates between 1980-1992 and 1993-2005, i.e. the growth rates for the two periods are statistically no different from each other.

Source: World Bank's African development Indicators online database.

However, as pointed out by Mkandawire and Soludo (1999), such levels of investment were no longer sustainable after the external shocks of the mid-1970s. Thus, investment collapsed in some countries, while the others sustained the trend by borrowing from abroad thereby substantially increasing their external debt.

Moreover, apart from being low, investment also tends to be more costly in Africa than in other regions. When investment is measured in international prices (that allow for Africa's higher costs), investment rates are a third lower in Africa than in other regions (World Bank, 2000).

The recent acceleration in the annual average growth rates of GDP in many of the SSA countries has not been accompanied by an adequate level of investment though investment ratio has increased in 12 countries out of the 17 countries in the sample for which growth has accelerated during 1993-2005 compared to 1980-1992 (Table 2.3). A 20 per cent share of investment in GDP has been identified as a target threshold for poorer economies while 25 per cent is identified for middle-income countries (UNCTAD, 2003). Out of the 16 countries for which growth has accelerated only 7 have attained the 20 per cent threshold. Overall, 10 countries had investment ratio of 20 per cent or above including those countries for which growth has decelerated or remained unchanged.

Investment in the region has been constrained in part by weak resource mobilisation. Incomes are too close to subsistence levels in many countries to allow for savings. For the region as a whole, domestic savings rates of around 16 per cent are much lower than the rate in developing Asia, showing SSA's dependence on external finance. As far as individual countries are concerned, only 6 in the sample had more than the regional average of 16 per cent savings rate during the period 1993-2005 (Table 2.3). For half of the countries in the sample, external finance supported more than 50 per cent of capital formation during 1993-2005.

The low savings rates in SSA countries are partly explained by the low level of per capita income. Hussein and Thirlwall (1999) and Masson et al. (1998) pointed out that there is a non-linear relationship between savings rate and the level of per capita income, i.e. the savings ratio rises as per capita income increases but at a decreasing rate. Following Masson et al. (1998), the relationship between savings ratio and the level of per capita income can be specified as a quadratic one. Thus, the regression equation to be estimated is:

$$S/Y = \alpha + \beta_{pcy} + \beta_{pcy^2} \tag{2.2}$$

where *S/Y* is savings ratio, *pcy* is per capita income and pcy^2 is included to account for the non-linearity of the relationship. Taking 25 countries over the period 1985-2005, we get the following result:

$$S/Y = 5.385 + 0.011_{pcy} - 6.30\text{e-}07_{pcy^2}$$
$$(2.296) \quad (0.005) \quad (1.26\text{e-}06) \qquad\qquad R^2 = 0.68$$

The coefficient for *pcy* is significant at 5 per cent level while the coefficient for pcy^2 is not significant though with the expected sign. The equation also satisfies the diagnostic tests. Thus, it seems that the capacity to save depends strongly on the level of per capita income. However, this does not mean that SSA's problems will automatically disappear if only the GDP growth rate exceeded population growth rate.

Economic growth is also strongly associated with increases in per capita investment. For the region as a whole, real investment per capita has declined from \$61 to \$59 between 1980-1992 and 1993-2005 (Table 2.3). Per capita investment has also declined in almost half of the countries in the sample including some countries for which growth has accelerated in recent years. In the remaining half, it has increased during 1993-2005 compared to the earlier period. However, only 8 of them have registered more than 50 per cent increase. Sudan and Botswana recorded the largest increases in per capita investment followed by Mauritius. The large increase in Sudan is mainly due to the recent oil discovery. Levels of per capita investment in SSA are also very low compared to all other developing regions. During 1993-2005, average per capita investment in East Asia & Pacific, Latin America & Caribbean and South Asia were \$332, \$735 and \$109 respectively in constant 2000 US\$ compared to the SSA average of \$59 (World Bank database). Between 1980-1992 and 1993-2005, per capita investment levels more than doubled in East Asia & Pacific, while it increased by 80 per cent in South Asia and 18 per cent in Latin America & Caribbean regions.

2.3 TRADE PERFORMANCE

Most economies in SSA are primary product exporters, except for a few economies such as Botswana, Lesotho, Mauritius, South Africa and Togo where manufactures account for more than 50 percent of total exports. Between 1995 and 2005, export concentration index[4] of SSA increased by 68 per cent, from 0.35 to 0.59, reflecting

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[4]The index is also known as Herfindahl-Hirschman Index. It measures export concentration. Higher values indicate that exports are concentrated in fewer products. The formula is given in Chapter 4.

the region's increasing dependence on a limited number of commodities (UNCTAD, online database).

The share of exports in GDP for the region as a whole improved by about 9 percentage points to 33 per cent, while the share of imports increased from around 28 to 36 per cent between 1980-1992 and 1993-2005 (Table 2.4). The region also saw a slight improvement in its trade balance over the same period. However, despite the increase in the share of trade in GDP, the share of the region in world trade has declined sharply since the 1980s. At the individual country level, only six out of the seventeen countries which had growth acceleration were able to increase their export to GDP ratio by more than 5 percentage points (Table 2.4). Overall, export ratio has increased by more than 5 percentage points in around half of the countries in the sample. There was also a slight improvement in the trade balance in around half of the countries out of which 10 are those countries for which growth has accelerated.

Export performance cannot be examined by looking at the ratio of exports to GDP alone. It is also necessary to examine trends in export values as well as volumes. Over the period 1993-2005, the value of exports in many of the SSA countries has increased compared to the previous period. In particular, 8 countries had substantial growth in export values of more than 10 per cent, out of which 6 are those for which growth has accelerated (Table 2.5). In countries where growth has decelerated or remained unchanged, the growth in export values has either slowed down or declined except in Guinea-Bissau and Lesotho.

Table 2.4 Exports, imports and trade balance as percentage of GDP, 1980-2005

Country	Exports		Imports		Trade Balance	
	1980-1992	1993-2005	1980-1992	1993-2005	1980-1992	1993-2005
Acceleration[1]						
Benin	16.2	15.7	32.6	28.3	-16.4	-12.6
Burkina Faso	9.7	10.6	27.6	24.6	-17.9	-14.0
Cameroon	24.4	21.1	23.4	19.0	1.1	2.1
Côte d'Ivoire	35.7	42.4	32.4	33.7	3.3	8.7
Ethiopia	6.0	11.4	11.1	22.4	-5.0	-11.1
Ghana	12.5	34.6	17.1	50.5	-4.6	-16.0
Guinea	29.4	23.0	29.1	26.4	0.3	-3.5
Mali	16.1	25.1	33.5	38.3	-17.4	-13.1
Mozambique	7.6	20.0	28.2	38.3	-20.5	-18.3
Namibia	59.1	45.5	68.4	51.5	-9.3	-6.0
Nigeria	25.9	43.0	23.4	36.7	2.6	6.3
Senegal	26.6	27.5	37.6	36.6	-11.1	-9.1
Sudan	6.7	10.2	14.6	16.4	-8.0	-6.2
Tanzania		18.5		30.9		-12.4
Togo	42.7	31.7	50.5	44.6	-7.8	-12.9
Uganda	10.7	11.3	18.7	22.8	-8.0	-11.5
Zambia	34.7	31.2	37.4	39.3	-2.7	-8.0
Deceleration[1]						
Botswana	59.7	49.4	54.2	37.0	5.5	12.4
Guinea-Bissau	9.5	22.4	42.6	42.4	-33.0	-20.0
Kenya	25.9	26.6	30.2	32.4	-4.3	-5.7
Lesotho	16.8	36.5	124.6	110.8	-107.8	-74.3
Mauritius	55.4	60.4	59.3	62.4	-3.9	-1.9
Zimbabwe	22.2	35.4	23.7	38.8	-1.6	-3.4
Unchanged[1]						
Gabon	51.7	58.8	41.1	35.1	10.7	23.7
Gambia	51.1	45.8	64.0	58.6	-12.9	-12.8
Malawi	23.6	26.4	31.5	43.2	-7.8	-16.8
SSA excluding South Africa	24.1	33.5	27.6	35.6	-3.5	-2.0

Note: [1]As in Table 2.2, note no. 3

Source: World Bank's African development Indicators online database.

The growth in export values was also accompanied by similar growth in export volumes in most of the countries which partly explains the rise in the total value of exports. The reasons for the increase in export volumes vary from country to country. For instance, in Ethiopia and Mozambique the rise was due to the return of normalcy after many years of conflict. Mali, Senegal, Togo and Uganda were able to exploit better their natural resources and increase the production of their agricultural products, while Sudan had significant rise in export volumes due to large increase in oil exports. On the other hand, Lesotho benefited from trade preferences which helped the country to increase its production of manufactures, particularly textiles.

SSA's over-dependence on primary commodities, which accounts for more than 80 per cent of total exports, makes the region vulnerable to external shocks. During 1980-1992, the barter terms of trade have moved against many countries in SSA (Table 2.5). The declines during this period were associated with rising prices of manufactures and falling prices of commodities. In fact, World prices for most commodities exported by SSA were at historically low levels in the late 1980s and early 1990s (UNCTAD, 1998).

However, there is some improvement during the later period. The long term downward trend has been temporarily interrupted by demand increases for many commodities from fast growing developing countries. But the improvement in terms of trade during the later period was largely confined to mineral and oil rich countries such as Cameroon, Gabon, Ghana, Guinea, Namibia, Nigeria and Sudan (Table 2.5). Terms of trade have also improved slightly in Côte d'Ivoire, Kenya and Zambia. In the remaining countries, they have either deteriorated or remained the same.

Table 2.5 Growth rates of value of exports and volume of exports and changes in terms of trade, 1980-2005 (percentage)

Country	Value of Exports		Volume of Exports		Terms of Trade	
	1980-1992	1993-2005	1980-1992	1993-2005	1980-1992	1993-2005
Acceleration[1]						
Benin	1.3	1.6	14.7	1.8	0.8	0.9
Burkina Faso	1.0	4.7	-1.8	13.0	5.1	-2.0
Cameroon	4.3	4.7	8.4	-0.6	1.5	6.3
Côte d'Ivoire	1.9	7.0	1.9	4.8	-1.2	1.3
Ethiopia	2.0	12.4	-5.3	8.3	2.1	-2.2
Ghana	3.9	5.8	8.2	2.6	-5.0	2.8
Guinea	3.4	0.9	6.5	1.2	-5.7	4.6
Mali	5.3	10.8	5.4	9.2	0.0	0.0
Mozambique	-2.9	19.6	-4.8	27.4	-4.1	-1.6
Namibia	1.8	2.9		2.1	-2.8	2.7
Nigeria	1.1	2.4	-3.9	1.0	-6.1	10.3
Senegal	0.8	3.0	0.2	9.5	0.9	-3.7
Sudan	-6.8	20.1	-0.8	17.7	0.9	4.0
Tanzania		7.5		7.6		0.1
Togo	-0.7	3.7	-0.7	12.7	0.7	-1.7
Uganda	2.1	12.4	-8.5	12.1	-0.9	0.5
Zambia	-2.8	17.9	-2.2	5.3	-1.1	1.2
Deceleration[1]						
Botswana	10.1	4.3	10.9	5.3	0.5	0.6
Guinea-Bissau	-0.3	13.2	-2.4	7.0	0.8	-0.2
Kenya	4.8	2.0	2.9	3.5	-1.4	1.1
Lesotho	5.8	14.6	7.3	16.6	-0.4	-1.2
Mauritius	9.9	4.2	10.0	2.4	0.2	0.0
Zimbabwe	4.8	2.4	3.5	2.0	1.6	-0.6
Unchanged[1]						
Gabon	4.2	-2.7	3.4	3.2	-5.5	2.2
Gambia	2.4	1.0	1.3	-11.7	-4.2	-0.9
Malawi	2.7	-1.4	2.9	3.4	-1.5	-2.9

Note: Growth rates have been calculated using the least-squares method.
[1]As in Table 2.2, note no. 3
Source: World Bank's African development Indicators online database and UNCTADstat online database.

2.4 EMPLOYMENT, PRODUCTIVITY AND GROWTH

SSA's slow growth is also characterised by low productivity growth. Table 2.6 shows the decomposition of GDP growth into employment and labour productivity growth during the period 1993-2005 for which data on employment were available. In half of the countries in the sample, more than 70 per cent of GDP growth can be attributed to employment growth. Labour productivity growth was negative in 9 out of the 26 countries; thus, employment growth explains more than 100 per cent of GDP growth in these countries. Only few economies were able to strike a balance between employment and productivity growth. Botswana, Burkina Faso, Mozambique, Sudan, Tanzania and Uganda experienced relatively robust GDP growth, together with both employment and productivity gains during 1993-2005.

Dividing the countries into three groups i.e. in which growth has accelerated, decelerated or remained unchanged during 1993-2005 compared to 1980-1992, it can be seen that the decline in GDP, in countries in which growth has decelerated, was absorbed by the decline in productivity with the exception of Botswana which still managed to have both high productivity and employment growth and Mauritius which had high productivity growth but with lower employment growth (Table 2.6). On the other hand, all those countries which have registered more than 5 per cent of GDP growth also had more than 2 per cent productivity growth during 1993-2005.

Table 2.6 Decomposition of GDP growth, 1993-2005 (percentage)

Country	GDP Growth	Employment Growth	Labour Productivity Growth
Acceleration[1]			
Benin	4.8	3.4	1.4
Burkina Faso	5.7	3.3	2.4
Cameroon	3.1	3.1	0.1
Côte d'Ivoire	1.5	2.7	-1.0
Ethiopia	4.4	3.3	1.3
Ghana	4.4	2.7	1.7
Guinea	3.9	2.4	1.4
Mali	5.4	1.9	3.7
Mozambique	7.6	2.7	4.8
Namibia	4.1	2.5	1.5
Nigeria	3.8	2.7	1.1
Senegal	3.7	2.9	1.0
Sudan	6.0	2.9	3.1
Tanzania	5.2	2.2	2.7
Togo	3.1	3.6	-0.3
Uganda	6.6	3.2	3.3
Zambia	2.3	3.1	-0.7
Deceleration[1]			
Botswana	6.7	2.0	4.6
Guinea-Bissau	1.0	2.2	-1.4
Kenya	2.6	3.4	-0.7
Lesotho	3.3	4.2	-1.1
Mauritius	4.8	1.2	3.4
Zimbabwe	-1.4	0.9	-2.3
Unchanged[1]			
Gabon	1.7	2.8	-1.2
Gambia	3.9	3.5	0.4
Malawi	2.4	2.8	-0.3
SSA excluding South Africa	3.6	2.9	1.1

Notes: Growth rates have been calculated using the least-squares method.
[1]As in Table 2.2, note no. 3

Sources: ILO's KILM 6th edition for the employment data and World Bank's African development Indicators for the output data.

SSA's abysmal rate of productivity growth is also reflected in the fact that a large share of the labour force in the region is engaged in agriculture. In addition to this, there is also a gradual shift of labour from agriculture to low productivity services sector which in turn lowers the overall productivity growth. Between 1996 and 2005, the share of employment in agriculture in SSA as a whole fell from 68 to 63 per cent. However, the shift of the workforce from agriculture is more towards services than industry since the share of employment in industry remained almost stagnant at around 9 per cent during the same period, while employment in services increased from around 23 to 28 percent (ILO, 2007). The trend is also quite similar for most of the individual countries.

2.5 THE IMPACT OF STRUCTURAL ADJUSTMENT PROGRAMME

Structural adjustment programme (SAP) was launched in SSA in the early 1980s as a result of the debt crisis that has hit the region. Among the early adjusters were Kenya, Malawi and Sudan. Soon after, other countries in the region also followed suit with the exception of Botswana, Namibia and South Africa. Some countries have even implemented two or three rounds of adjustment programmes under different agreements with the World Bank and IMF.

The impact of structural adjustment programmes on the economic performance of SSA has been intensively investigated in the literature (see, for example, Adepoju, 1993; and Mkandawire and Soludo, 1999; 2002). Many critics feel that structural adjustment programmes have badly damaged an initially frail manufacturing base through a combination of fiscal and monetary contraction, devaluation and trade liberalisation, and yet no coherent strategies focusing explicitly on the industrial sector were included in adjustment programmes (Stein, 2006). Trade liberalisation has also resulted in large inflows of cheaper commodities, thus effectively reducing demand for domestically produced goods and exerting downward pressure on prices. On the other hand, the corresponding devaluation not only increased cost of production, but also increased the costs of servicing foreign loans and replacement of investments.

World Bank (1994) has created an aggregate index which summarises changes in fiscal, monetary and exchange rate policies. The bank had used this index to assess the improvements made in overall macroeconomic policies in SSA countries following the implementation of SAPs. Based on this index, countries were divided into three categories: those which have made large improvements, those which have made small improvements and those for which performance deteriorated. 18 countries in our sample are among those countries for which the bank has computed the index of change in overall macroeconomic policies. Of the 18 countries, according to the World Bank, 6 have made large improvements in their macroeconomic policies, 5 have made small improvements while 7 countries suffered deteriorations in policies (Table 2.7).

Table 2.7 Structural adjustment periods and improvement in overall macroeconomic policies.

Country	Adjustment Period[1]	Improvement in Macroeconomic Policies
Burkina Faso	1991-1995	Large improvement
Gambia	1987-1991	Large improvement
Ghana	1983-1987	Large improvement
Nigeria	1987-1991	Large improvement
Tanzania	1987-1991	Large improvement
Zimbabwe	1992-1996	Large improvement
Kenya	1980-1984	Small improvement
Malawi	1981-1985	Small improvement
Mali	1988-1992	Small improvement
Senegal	1986-1990	Small improvement
Uganda	1988-1992	Small improvement
Benin	1989-1993	Deterioration
Cameroon	1989-1993	Deterioration
Côte d'Ivoire	1982-1986	Deterioration
Gabon	1988-1992	Deterioration
Mozambique	1988-1992	Deterioration
Togo	1983-1987	Deterioration
Zambia	1991-1995	Deterioration
Ethiopia	1992-1996[2]	N.A.
Guinea	1986-1990[2]	N.A.
Guinea-Bissau	1985-1989	N.A.
Lesotho	1988-1990[2]	N.A.
Mauritius	1981-1985	N.A.
Sudan	1980-1984	N.A.
Botswana	Did not implement[2]	
Namibia	Did not implement[2]	

Nqtes: N.A. refers to information not available.
[1]Adjustment period refers to the initial adjustment period of each country. Some countries have implemented two or three rounds of adjustment programmes.
[2]Information are from other sources than the one mentioned below.
Sources: World Bank (1994) and Noorbakhsh & Paloni (2001)

Among the 6 countries which the World Bank (1994) had found to have made large improvements in macroeconomic policies, growth has decelerated in one (i.e. Zimbabwe) and stagnated in other (i.e. Gambia) during 1993-2005 compared to 1980-1992. In the case of Zimbabwe, however, the political turmoil explains much of the decline rather than the failure of SAP alone. On the other hand, among those 5 countries that had been found to have made small improvements, 3 of them (Mali, Senegal and Uganda) in fact have done reasonably well. Particularly, Mali and Uganda are among the strong performers in the region registering more than 5 per cent growth rate over the period 1993-2005. Lastly, among the 7 countries that have suffered deteriorations according to the World Bank index, 5 have actually shown growth acceleration during the 1993-2005 period compared to the pervious period. One of them (i.e. Mozambique) was in fact a star performer which had the highest growth rate of 7.6 per cent among all the countries in the sample during 1993-2005.

The implementation of these programmes did not also result in raising investment ratio. In fact, following structural adjustment programmes, some countries in the region have seen a reduction in investment ratio. Investment ratio in SSA is now much lower than any other developing region. Of the 18 countries only 4 (i.e. Ghana, Mali, Mozambique and Uganda) were able to raise their investment ratio by 5 percentage points or more between 1980-1992 and 1993-2005. Out of these 4 countries only Ghana was among those 6 countries that had been found to have made large improvements in macroeconomic policy.

As far as growth in value of exports is concerned, out of the 6 countries that experienced large improvements in macroeconomic policy, only 3 (Burkina Faso, Ghana and Tanzania) had high export growth during 1993-2005. In the case of Gambia the growth rate of export was lower during this period compared to 1980-1992. Among the 5 countries that experienced small improvements, Mali and Uganda had more than 10 per cent growth. Of the 7 countries which the World Bank report considered as having deteriorating policy performance, Côte d'Ivoire had more than 5 per cent growth, while Mozambique and Zambia had more than 15 per cent growth in export.

Thus, the above analysis shows that the majority of countries which have performed relatively well after 1993 in terms of output growth, investment and export growth are in fact not those countries that were thought to be pursuing sound macroeconomic policies according to the World Bank (1994) analysis.

2.6 SUMMARY

The chapter provided an overview of SSA's growth experience since 1980. It was found that there was typically a single main break in the GDP growth trends for most of the countries in the sample occurring at some point during the 1990s. Based on this, the period of 1980-2005 has been divided into two periods: 1980-1992 and 1993-2005. Comparing the two periods, it can be seen that GDP growth has accelerated in many of the SSA countries during 1993-2005 compared to 1980-1992. Apart from the low growth rate, the period of 1980-1992 was also characterised by high volatility of growth. In most of the countries, the growth acceleration during 1993-2005 has been associated with positive growth in labour productivity.

However, the recent acceleration in GDP growth in many of the SSA countries has not been accompanied by an adequate level of investment though investment ratio has increased in 12 countries out of the 17 countries in the sample for which growth has accelerated during 1993-2005 compared to 1980-1992. Moreover, the gap between savings and investment has also remained large. For half of the countries in the sample, external finance supported more than 50 per cent of capital formation during 1993-2005. One of the factors which accounts for the low rate of savings in the region is the low level of per capita income. As far as trade performance is concerned, there was improvement in the share of exports in GDP as well as in the growth of export values in many of the countries in the region during 1993-2005 compared to 1980-1992.

Economic conditions in SSA in the 1980s were largely influenced by structural adjustment programmes. All countries in our sample, with the exception of Botswana and Namibia, have adopted structural adjustment programmes (SAPs). However, in many of these countries SAPs did not result in better performance.

CHAPTER 3

DETERMINANTS OF ECONOMIC GROWTH: THE ROLE OF CAPITAL FORMATION

3.1 THE ROLE OF CAPITAL FORMATION IN THEORIES OF GROWTH

The question of why the pace of development differs between countries has preoccupied the mind of many great economists at least since the publication of Adam Smith's *Wealth of Nations* (1776), if not before. The link between growth and capital formation is at the core of various economic growth models. Factors governing capital accumulation and the effects of varying rates of accumulation on output are the fundamental question of economic growth (Chaudhuri, 1989). And its importance as a determinant of economic growth has also been ascertained in many empirical works. However, there is no uniform opinion about the actual degree of importance to be attached to capital formation as the causative factor of growth.

Physical capital formation results when there is addition to the existing capital stock of a nation in the form of new factories, machinery, equipment and materials. This additional investment to the capital stock helps in raising the productive capacity of an economy. Investment, although not sufficient, is a necessary requirement for long-run economic growth and structural transformation. The same investment to GDP ratio may yield different growth rates in different countries, depending on the efficiency of capital utilisation. Economic growth is also affected by utilisation of capacity, technological progress and shifts in the composition of output. But there is little doubt that investment is the dominant determining factor in explaining growth differences between countries.

However, exclusive emphasis on the accumulation of physical capital has come under criticism and human capital formation has been recognised as an additional factor in developing productive capacities. For instance, Schultz (1961) has pointed out that education and skills are complementary to physical capital. Recent empirical work has tended to confirm the idea that human capital also plays an important role in growth (see Barro, 1991 and Mankiw et al., 1992).

This section summarises how the role of capital formation[1] in the process of economic growth has been addressed in the literature. It does not aim to give a complete review of the literature, but to highlight the main ones.

3.1.1 Classical Growth Theory

The classical economists recognised capital accumulation as the principal impetus to economic growth. There was no sharp distinction between the analysis of economic growth and other areas of political economy. The problems of economic growth were analysed by using general economic principles rather than any specific theory of economic growth (Harris, 1987). The Classical growth models consist primarily of the pioneering work of Adam Smith and David Ricardo.

Adam Smith's theory explains, in a simple manner, "what constitutes the core of the problem of continuous capital formation" (Chaudhuri, 1989:19). His conception of

[1] In this study the term capital formation is used interchangeably with physical capital formation, unless otherwise specified.

economic growth was built around the idea of the "division of labour" and the "extent of the market". Both together determined the level of profit and therefore the rate of capital formation. The division of labour is limited by the extent of the market and the extent of the market partly depends on the division of labour because this determines the level of productivity, per capita income and purchasing power (Thrilwall, 2002). Accumulation allows the extent of the market to rise, encouraging the division of labour and hence productivity. Therefore, what we have here is a circular cumulative process which exhibits increasing returns to scale. However, Smith believed that increasing returns was more of a characteristic of industry than agriculture.

In Smith's analysis there was no danger that the process of accumulation might come to an end either due to insufficient supply of labour or due to the diminishing returns to capital. According to him, the supply of labour is generated endogenously within the socio-economic system, the determinant being the rate of capital accumulation (Kurz & Salvadori, 2003). "Diminishing returns due to scarce natural resources are set aside or taken to be compensated by the increase in productivity due to the division of labour" (Kurz & Salvadori, 2003: 6)

The stagnationist thesis of David Ricardo, on the other hand, emerged out of the fear of diminishing returns in agriculture. Unlike Smith, Ricardo believed that accumulation would eventually stop as the economy reaches a "stationary state". This stationary state is brought about by a declining profit rate, which then discourages further capital accumulation and hence retards growth. The rate of accumulation is determined by profit, but profit gets squeezed between subsistence wage and rising rent to landowners which rises due to increase in food prices as a result of diminishing returns in agriculture and rising marginal cost. However, he believed that the stationary state can be delayed with the availability of cheap import of food. Ricardo underestimated the importance of technical progress in agriculture which can offset diminishing returns.

3.1.2 The Harrod-Domar Model

With the advent of marginalists in late nineteen century, the economics profession lost interest in growth theory and rather focused the attention on the problem of efficient allocation of resources through the market mechanism (Fine, 2006). This sate of affair continued until Roy Harrod (1939) developed his growth model in the wake of the Keynesian revolution, which brought the question of economic growth to the forefront. Domar (1947) also arrived independently at Harrod's fundamental result, though in a different way. In essence the Harrod-Domar model is an extension of the Keynesian model to the long run. Harrod and Domar emphasised the dual role of investment as a component of aggregate demand and as a vehicle for creating productive capacity on the supply side. In this sense, the model can be considered as a cross between the classical and the Keynesian theories since the Keynesians concentrate only upon the former role, and the classicists emphasized the latter (Ghatak, 2003). The model can be taken as the beginning of modern growth theory. It also provided a framework for economic planning in developing countries.

The rate of capital accumulation is the central variable in Harrod-Domar model of growth. According to this model, to increase the growth rate, the ratio of investment to output (investment ratio) should be increased. Harrod introduced three different growth concepts: the actual growth rate (g), the warranted growth rate (g_w) and the natural growth rate (g_n). The actual growth rate (g) is defined as:

$$g = {}^{s}\!/_{c}$$

where s is the ratio of savings to income and c is the incremental capital-output ratio, which can be viewed as a measure of the efficiency of capital. In the model c is assumed to be constant. The above equation holds under the Keynesian equilibrium between saving and investment. We can see this from the following equation.

$$ {}^{s}\!/_{c} = \frac{{}^{S}\!/_{Y}}{{}^{I}\!/_{\Delta Y}} = {}^{\Delta Y}\!/_{Y} $$

where S is saving, I is investment, Y is output, and ? Y/Y is the growth rate (g). Under the assumption of constant c, g increases proportionally with s. Therefore, the model implies that an increase in investment rate is needed to accelerate economic growth. However, the actual rate of growth does not necessarily guarantee a moving equilibrium through time in the sense of keeping plans to invest and plans to save in line with one another (Thirlwall, 2002).

The warranted growth rate, on the other hand, is the rate that keeps capital fully employed. It can be defined as:

$$g_w = {}^{s}\!/_{c^*}$$

where c^* is the desired incremental capital-output ratio of entrepreneurs. This is a unique growth path, which, if the economy happens to be on it, will be sustained into the future (Patnaik, 1997). Thus, the warranted rate can be thought as some sort of a weighted average rate that underlies a given pattern of entrepreneurial expectations (Chaudhuri, 1989).

If actual growth is equal to the warranted growth rate then the economy is in equilibrium. However, if $g > g_w$ then $c < c^*$ which means that actual investment falls below the level required to meet the increase in output. Thus, this will give signal for more investment and the actual growth rate will be above the warranted rate. On the other hand, if $g < g_w$ then $c > c^*$ which means that entrepreneurs would scale down their investment plans and growth will fall below the warranted rate. Therefore, if the actual rate differs from the warranted rate, then far from there being a tendency towards convergence, the departure from equilibrium will be self-aggravating (Patnaik, 1997).

However, even if the actual growth rate is equal to the warranted rate, this still cannot guarantee the full employment of labour which depends on the natural rate of growth. Natural rate of growth is the rate of growth of the labour force in efficiency unit. The natural rate of growth sets the upper limit to the actual growth rate. On the other hand, the warranted rate and the natural rate can converge only accidentally. Therefore, "the only rate of steady growth which the economy could possibly experience, given its technology and investment and savings behaviour, is a rate that may spell growing unemployment or run into supply bottlenecks in the form of labour shortage" (Patnaik, 1997: 19).

3.1.3 Neoclassical Growth Theory

The neoclassical growth model, which originated with the work of Solow (1956) and Swan (1956), introduced a different perspective on the role of investment in growth.

It assumed that the rate of growth of labour force is exogenously given and hence if the rate of capital accumulation exceeds this, then output-capital ratio will keep declining. In the reverse case the opposite happens. The implication of this assumption is that the accumulation process will have only transitory effect on the rate of growth. The model assumes that capital-output ratio is determined endogenously rather than being constant.

The model is based on three main assumptions. The first one is that the labour force and labour-saving technical progress grow at a constant exogenous rate. The second assumption is that all saving is invested; there is no independent investment function. And the third assumption is that output is a function of capital and labour and the production function exhibits constant returns to scale and diminishing marginal productivity to individual factors of production. Swan's model used the Cobb-Douglas production function which assumes unit elasticity of substitution between the various factor inputs. The function takes the form:

$$Y = AK^{\alpha}L^{1-\alpha}$$

where a and $1\text{-}a$ represent the elasticity of output with respect to capital and labour respectively, Y is output, K is capital, L is labour, and A is a constant whose value depends on the level of technology. Dividing both sides of the equation by L gives us output per worker as a function of capital per worker:

$$y = A(k)^{\alpha}$$

where y is output per worker and k is capital per worker or capital-labour ratio.

Most interest in this model centres on its long run or steady state implications. According to this model, the long run rate of growth is exogenously determined. The basic prediction which follows from this model with respect to the role of investment is that in the long-run steady state, the growth of output is independent of the savings-investment ratio and is determined by the exogenously given rates of growth of the labour force and labour productivity (determined by technical progress). This is because a higher savings or investment ratio is offset by a higher capital–output ratio or a lower productivity of capital because of the assumption of diminishing marginal productivity of capital. However, capital accumulation can affect growth in the steady state if there is a link between accumulation and technical progress, but this is ruled out by assumption because technical progress in the neoclassical model is assumed to be exogenously determined (Thirlwall, 2003). Therefore, an increase in the investment ratio will have an immediate beneficial effect in the short run, but the long-run growth prospects of the economy will remain unaltered (Chaudhuri, 1989).

3.1.4 Endogenous Growth Theory

By the late 1980s, there was dissatisfaction with the assumption that long run growth rates are determined exogenously and independently of saving/investment ratio. It was also felt that the pace of technological progress, which is a determinant of economic growth in the neoclassical framework, must have some economic explanations. This dissatisfaction gave rise to a body of literature known as endogenous growth models, which was largely influenced by the work of Romer (1986; 1990) and Lucas (1988). The development of endogenous growth models has sparked a number of empirical studies.

Unlike the neoclassical model, technological progress is considered to be endogenous and capital accumulation is not subject to the assumption of diminishing returns.

While several different modelling approaches have been applied to this theory, it is the non-diminishing returns to capital that lies at the heart of all these approaches. For instance, Lucas (1988) broadens the definition of capital to include human capital accumulation. Another approach incorporates the accumulation of knowledge, either through learning by doing (Romer, 1986) or through R&D (Romer, 1990 and Aghion & Howitt, 1992). In these models the production function exhibits constant or increasing returns to individual factors of production.

According to these models, there are assumed to be positive externalities associated with human capital formation and R&D that prevent the capital-output ratio from rising. One of the simplest models of endogenous growth is expressed as:

$$Y = AK^{\alpha}$$

where Y is output, K is physical capital plus other types of reproducible capital, A is a constant on the assumption of constant returns to capital, and $a=1$. This model is also known as the AK model

Hussein and Thirlwall (2000) have shown that if K is defined as physical capital, then the above equation is equivalent to the Harrod-Domar growth equation. Totally differentiating the above equation and dividing it by Y gives:

$$\frac{dY}{Y} = A\left(\frac{dK}{Y}\right) = A\left(\frac{I}{Y}\right)$$

where $\frac{dY}{Y}$ is the growth rate, $\frac{I}{Y}$ is the investment ratio, and A is the productivity of physical capital $\frac{dY}{I}$ which is the reciprocal of the incremental capital-output ratio. This is the same as the Harrod growth equation $g = s/c$, where s is the savings ratio and c is the incremental capital-output ratio. However, the underlying assumptions about K in the two models are different. In the Harrod-Domar model K includes only physical capital, whereas K in the endogenous growth model includes both physical and other types of reproducible capital.

The theory demonstrates that simple changes to the production function or the definition of capital can dramatically alter the predictions about the relationship between investment and economic growth. If there are no diminishing returns to capital, then the capital-output ratio will not rise as more investment takes place and therefore changes in the investment rate can have long run implications for economic growth. Growth is endogenously determined in this sense and not simply determined by the exogenous rate of growth of the labour force and technical progress. However, Thirlwall (2002) and Nelson (1997) pointed out that most of the basic premises of the endogenous growth theory are not new at all.

3.1.5 The Empirical Growth Literature

Disagreement also persists in the empirical growth literature about the role of investment in the growth process. Nevertheless, there is strong empirical support for the role of investment as one of the main determinant of economic growth. Some pioneering studies on cross-country growth rate differences such as Kormendi and MeGuire (1985);

Barro and Lee (1993); Mankiw et al. (1992); Levine and Renelt (1992), and Knight et al. (1993) have shown that investment ratio plays the crucial role in determining the growth rate. Kormendi and Maguire (1985) taking 47 countries as their sample over the period 1950-77 found that growth is positively related to the investment ratio and most variables affect economic growth through the investment channel. Mankiw et al. (1992) suggested an important role for investment in explaining differences in income per capita across countries. Barro and Lee (1993) analysed 116 countries over the period 1965-85 and found that investment ratio is one of the five factors which differentiated between slow-growing and fast-growing countries. Levine and Renelt (1992) identified investment ratio as one of the few robust variables in cross-country growth regressions.

Other authors have also concluded that investment has been the main factor in explaining economic growth. Patnaik and Chandrasekhar (1996) taking 25 major developing countries over the period 1968-88, found that investment alone explains more than 70 per cent of growth rate differences between these countries. They also found that the relative export performance across these countries depends on the relative investment ratios. In a study for East Asia, Young (1994) concluded that investment was the main source of growth in the experience of the East Asian economies. Some studies have focused on specific categories of investment. For instance, De Long and Summers (1991) have emphasized the role of equipment investment as a main determinant of a country's economic growth. Others have found evidence of a positive correlation between growth and private investment (Kahn & Kumar, 1997 and Kahn & Reinhart, 1990).

Turning to the specific empirical literature on growth in Africa, the causes of the region's growth tragedy have long attracted much empirical interest. Among others Barro

(1991; 1997) and Levin and Renelt (1992) found that the coefficient on a dummy variable for sub-Saharan African countries is negative and significant. The interpretation of this variable was that the growth rate of Sub-Saharan African countries was on average lower than that of the countries in the other regions by some unexplained factors. That is, the analysis does not fully capture the characteristics of a typical country in the region (Barro, 1991). However, the practice of studying the sub-Saharan African case with a simple slope dummy in a general cross-country regression is not satisfactory. Therefore, some authors have taken a different approach by including only sub-Saharan African countries in their sample.

For instance, Ghura and Hadjimichael (1996) investigated long run growth in sub-Saharan Africa over the period 1981-1992. Using feasible generalised least squares techniques on a panel of 29 Sub-Saharan African countries; they found that both private and public investment had a positive and significant effect on growth. Other variables that affected long run growth significantly were the budget deficit, inflation, real exchange rate, and population growth. Savvides (1995) studied the determinants of per capita growth rates across Africa for the period 1960-1987. Using a fixed effects panel model based on endogenous growth theory, the paper found that both economic and political variables influence growth in Africa. The economic variables include – investment, initial conditions, population growth, trade variable, inflation, financial development, and government expenditure. Ojo and Oshikoya (1995) also studied the determinants of long term growth in a cross-section of African countries over the period 1970-91. The paper found that on average investment, external debt, population growth, human capital and proxies for macroeconomic environment (i.e. inflation and exchange rates) appear to have more relative importance in influencing long term growth. Hadjimichael et al. (1995) showed that public investment has a higher coefficient in a cross-country growth regression of African countries. Furthermore, they found that the coefficient on private investment is not statistically significant when macroeconomic policy variables are included in the regression.

A review of the empirical literature on Africa shows that most of the studies on growth are based on data not beyond the first half of the 1990s. The current study extends the time period, spanning from 1980 to 2005. This is particularly relevant since many of the countries in SSA have shown growth recovery from the second half of the 1990s.

3.2 EMPIRICAL VERIFICATION IN THE CONTEXT OF THE SELECTED COUNTRIES

The empirical growth literature uses cross-section or panel data regression models in order to study the statistical relationship between long term growth rate and a wide array of economic, political and institutional variables suggested by theory. This section analyses the determinants of economic growth in selected countries of Sub-Saharan Africa by taking average growth rate of GDP as dependent variable and various explanatory variables.

The sample includes 26 countries in Sub-Saharan Africa over the period of 1985-2005[2]. The data used are taken from the World Bank's *African Development Indicators*

[2] The analysis is done for the period starting from 1985-2005 because the period from 1980-1985 will be used later as an instrumental variable for investment ratio in the panel data estimation; and in order to

(online database) and Heston et al. (2009) for the real per capita GDP data. The main focus of the analysis will be on the entire period.

The equations are estimated using both cross-section and panel regression technique. However, the main result comes from the cross-section regression. The cross-section regression model produces consistent long run coefficients by averaging cyclical fluctuations in the variables. Therefore, the cross section result is more appropriate than the panel data estimates to understand between-country variations. The cross-section equation to be estimated is a cross-country regression of the form

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon \tag{3.1}$$

where y is the vector of the average rate of growth of output, and $x_1, \dots, x_n$ are vectors of potential explanatory variables.

Turning to the panel data model, the estimator used is the seemingly unrelated regression (SUR) technique which was proposed by Zellner (1962)[3]. The SUR estimator allows for different error variances in each period and for the correlation of the errors across the periods. It estimates all the identified structural equations together as a set, instead of estimating the structural parameters of each equation separately. It provides consistent estimates for a system of linear equations with correlated error terms. Two important cases when SUR is equivalent to OLS are: either when the error terms are in

maintain comparability between the specifications the same time dimension is used in both cross-section and panel data estimation.

[3] Some studies use fixed-effects estimation technique by allowing for an unobserved fixed effect for each country. However, the fixed effects technique eliminates the cross-sectional information. See Barro (1997) for detail.

fact uncorrelated between the equations, or when each equation contains exactly the same set of regressors. In these cases no gains can be realized from estimating the system jointly. Consider a system of m equations written in vector form as

$$\mathbf{y}_i = \mathbf{X}_i \beta_i + \varepsilon_i, \qquad i = 1, 2, \ldots, m. \tag{3.2}$$

where $\mathbf{y}_i$ is a vector of dependent variable, $\mathbf{X}_i$ is a matrix of the exogenous variables, β_i is the coefficient vector, ε_i is a vector of the disturbance terms and i refers to the ith equation. If we stack these m vector equations on top of each other the system takes the form

$$\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_m \end{pmatrix} = \begin{pmatrix} X_1 & 0 & \ldots & 0 \\ 0 & X_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & X_m \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_m \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_m \end{pmatrix}$$

The assumption of the model is that error terms ε_i are independent between observations, but may have cross-equation contemporaneous correlations. The estimation procedure is to formulate one equation per decade or at five-year intervals, constrain the coefficients to equality across periods, and run SUR on the resulting system of equations.

The use of panel data set gives more information especially for variables that have varied over time within countries. However, it is prone to the time series cyclicality of the data which might exacerbate measurement error. In order to overcome the cyclical effects of the data we adopt the approach followed by Barro (1997) and Islam (1995) which takes either the decade or the five-year averages instead of yearly observation. The ten-year and five-year time intervals are less sensitive to temporary factors associated with business cycles than yearly data. The observations are either the average values over each ten-year and five-year period or initial values at the beginning of each ten-year and five-year period. Considering the period from 1985 to 2005, we have two data points in the case of the ten-year averages (i.e. 1985-1995 and 1995-2005) and four data points for the five-year averages (i.e. 1985-1990, 1990-1995, 1995-2000 and 2000-2005) for each country. Therefore, the total structural equations to be estimated by SUR are two for the ten-year setting and four for the five-year setting. This goes with the underlying theories of growth, which do not attempt to explain short-run business fluctuations. However, the five-year span is still influenced considerably by the short-run fluctuations.

3.2.1 Investment Ratio

This section investigates how the variations in the long term average growth rate can be accounted for by differences in the investment ratio. We follow specific to general approach which allows us to see the strength of bivariate relationships between growth rate of output and investment ratio. In the next section, other relevant explanatory variables are included. Gross investment to GDP ratio averaged over the relevant period is used as a proxy for physical capital. GDP growth rate for each of the countries is estimated by fitting piecewise semi-log trends as discussed in chapter 2. Simple cross-section regression analysis is used and the relationship is analysed without controlling for other explanatory variables.

However, before running the regression, we should look at the scatter plot of the rate of growth of output against investment ratio to see if there are any outliers or influential points which might exert undue influence on the whole regression result. The presence of outliers in the data set, especially if the sample size is small, can strongly distort the classical least squares estimator and lead to unreliable results.

Figure 3.1 Scatter plot of rate of growth of GDP versus investment ratio, 1985-2005

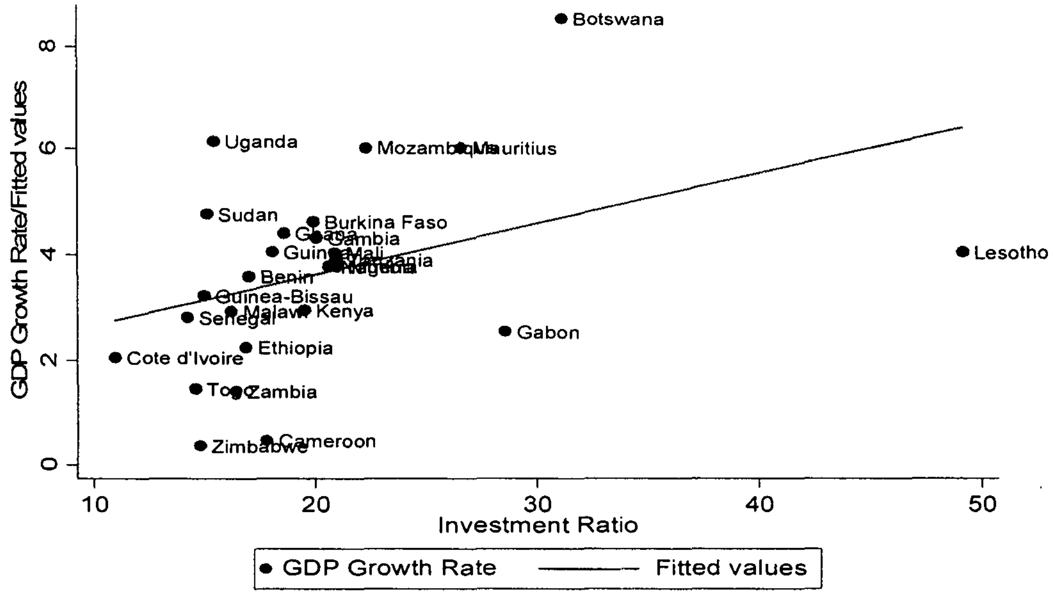

Figure 3.1 clearly shows that Lesotho is an extreme outlier highly influencing the fitted line. To a lesser extent Gabon also seems to be an outlier. So if we go on to estimate equation (3.1) without addressing the problem of the outlier, we cannot obtain reliable estimate. The dangers of using OLS under this condition were emphasised by Mukherjee et al. (1998, p. 139): "...the least squares regression line is neither resistant nor robust. In other words, least squares performs well under ideal circumstances, but not when the assumptions of classical normal linear regression are seriously violated in practice." To deal with this, two courses of actions have been suggested in the literature. The first one is to drop the observation which is an outlier and the other one is to use a

more robust estimator that is less sensitive to outliers than OLS, such as median based estimator or least trimmed squares. Here we chose the first course of action since the outlier is one or at the most two observations.

Starting with a simple model, the following equation shows the regression of average rate of growth of output on investment ratio for the whole sample of the 26 countries for the period 1985 to 2005.

$$\begin{aligned} y &= 1.735 + 0.095_{I/Y} \\ &\quad (0.981) \quad (0.046) \qquad R^2 = 0.15 \end{aligned} \tag{3.3}$$

Diagnostic tests

Normality χ^2 (2)	*= 0.37*	*Prob > χ^2 = 0.83*
Heteroscedasticity F(1, 24)	*= 3.11*	*Prob > F = 0.09*
Functional Form F(3, 21)	*= 2.00*	*Prob > F = 0.14*

The terms shown in parentheses in all equations are standard errors[4]. Now dropping the observation for Lesotho from the sample since it is an influential outlier, the estimated result for the rest of the 25 countries for the period 1985-2005 is as follows:

$$\begin{aligned} y &= -0.771 + 0.232_{I/Y} \\ &\quad (1.322) \quad (0.068) \qquad R^2 = 0.34 \end{aligned} \tag{3.4}$$

Diagnostic tests

Normality χ^2 (2)	*= 1.13*	*Prob > χ^2 = 0.56*
Heteroscedasticity F(1, 23)	*= 0.84*	*Prob > F = 0.36*
Functional Form F(3, 20)	*= 0.59*	*Prob > F = 0.62*

[4] All results are significant at 5 per cent level or above. Moreover, all equations with the exception of equation (3.7) satisfy the diagnostic tests at 5 per cent significance level.

We can see from equation (3.4) that when we exclude Lesotho from the sample, the R-squared value as well as the estimated coefficient increases substantially. Investment ratio accounts for over 30 per cent of the cross country variations in growth rates. If we further exclude Gabon from the sample we get:

$$y = -2.098 + 0.311_{I/Y} \qquad (3.5)$$
$$(1.263) \quad (0.066) \qquad R^2 = 0.50$$

Diagnostic tests

Normality χ^2 (2)	*= 3.92*	*Prob > χ^2 = 0.14*
Heteroscedasticity F(1, 22)	*= 1.41*	*Prob > F = 0.24*
Functional Form F(3, 19)	*= 0.39*	*Prob > F = 0.76*

However, Devarajan, et al. (2001) claim that public investment has no discernible effect on growth while the positive and significant coefficient on private investment is driven by Botswana's presence in the sample. Therefore, they conclude that higher investment in Africa would not by itself produce faster growth. Though we agree that investment cannot be a sufficient condition by itself to result in faster growth rate, it is nonetheless a necessary condition for accelerating GDP growth. The main problem with Deverajan, et al. study is the dataset itself. While total investment data can easily be obtained from the national accounts, the segregation of it into private and public investment is problematic. Since there is no standardized dataset for these variables, Deverajan, et al. rely on their own estimation. Therefore, the result obtained from such dataset cannot be conclusive evidence. We have also re-estimated equation (3.1) by further excluding Botswana from the sample apart from the two outliers: Lesotho and Gabon. The estimated coefficient on the total investment variable is 0.26 (0.086) and significant at the 99 per cent confidence level with the R^2 of 0.31. This result is almost the same with that of equation (3.4).

Dividing the period into two sub-periods each, we obtain the following estimation:

for 1985-1995

$$y = -0.976 + 0.231_{I/Y} \qquad (3.6)$$
$$(1.827) \quad (0.095) \qquad R^2 = 0.21$$

Diagnostic tests

Normality χ^2 (2)	*= 4.42*	*Prob > χ^2 = 0.11*
Heteroscedasticity F(1, 23)	*= 0.80*	*Prob > F = 0.38*
Functional Form F(3, 20)	*= 0.72*	*Prob > F = 0.55*

for 1995-2005

$$y = -0.365 + 0.216_{I/Y} \qquad (3.7)$$
$$(1.256) \quad (0.063) \qquad R^2 = 0.34$$

Diagnostic tests

Normality χ^2 (2)	*= 8.07*	*Prob > χ^2 = 0.02*
Heteroscedasticity F(1, 23)	*= 0.01*	*Prob > F =0.93*
Functional Form F(3, 20)	*= 3.55*	*Prob > F =0.03*

In both the above equations Lesotho is excluded. The estimated coefficients on the investment ratio in both the equations are almost the same with the coefficient of equation (3.4) which is for the whole period. The R^2 for the period 1985-1995 is less compared to the later period. However, equation (3.7) fails to pass the normality test and the Ramsey test for functional form at 5 per cent significance level.

3.2.2 Effects of Other Variables

This section extends the analysis to include human capital and other relevant variables to determine the robustness of the link between growth rate of output and investment ratio. Researchers have identified a number of possible determinants of economic growth often without clear theoretical underpinnings. Apart from the economic variables, the list includes a variety of institutional, political, and geographical variables. However, the relationship between growth and many of the political variables are found to be fragile (Levine & Renelt, 1992). Here we examine only the economic variables which are explained by the existing theory. However, before turning to regression analysis, some discussion of the explanatory variables is in order.

Human Capital: A consistent theme across the studies inspired by endogenous growth models is the notion that the accumulation of human capital stands out as one of the main variables in explaining cross country growth variations. For example, Lucas (1988) emphasised the crucial role of human capital in long-run growth and how the effects of human capital could counteract the forces of diminishing returns in physical capital. Mankiw et al. (1992) found that the fit of the Solow model could be improved by extending the model to include human capital. Following Barro (1991) and Mankiw et al. (1992) gross secondary school enrolment rate is used as a proxy for human capital.

Initial Per Capita GDP: According to the neoclassical growth model, the initial level of per capita income is an important variable in explaining growth rate differences between countries. The convergence hypothesis maintains that poor countries, with low ratios of capital to labour, have high marginal products of capital and thereby tend to grow at high rates (Barro, 1991). The conditional convergence is evidenced by the negative relationship between the growth rate of GDP and the initial level of GDP per capita after controlling for other relevant variables. Empirically, the initial level of per capita GDP enters into the regression equation in the form $log(y_{t-1})$ so that the coefficient on this variable represents the rate of convergence. Levine and Renelt (1992) identified initial level of per capita GDP along with human capital and investment ratio as the only variables that are robust across specifications.

Export Growth: Openness measured by the ratio of imports plus exports to GDP has been used extensively in the literature as a major determinant of growth performance. However, following the work of Thirlwall and Sanna (1996) we use export growth as an explanatory variable instead of the usual variable of openness. Many of the studies do not include export growth as an explanatory variable. Export growth influences the growth of output both from the demand and supply side. On the demand side it helps in relieving balance of payment constraints which in turn enables other components of demand, such as investment, consumption and government expenditure, to grow faster without the constraints arising (Thirlwall & Sanna, 1996). It also impacts growth from the supply-side as more foreign exchange from export allows the import of more capital goods.

Volatility: One of the features of Sub-Saharan African countries growth performance is its volatility. Some of the main factors for the volatility of output growth in the region are fluctuations in world commodity prices, weather conditions and political instability. We expect that volatility should be linked negatively to growth. For instance, Ramey and Ramey (1995) have found a significant and negative relationship between output growth and its volatility. The variable used to measure volatility is the standard deviation of annual growth rates of GDP over time for each country.

Debt-Service Ratio: It is the ratio of debt service payments to export of goods and services. It is one of the most important ratios used to assess the debt burden. A high debt-service ratio acts as an impediment to economic growth because of the fact that highly indebted poor countries divert resources, including foreign aid, to take care of pressing debt service obligations. This imposes foreign exchange constraints on demand and reduces the capacity to import. This is particularly relevant in the case of Sub-Saharan African countries.

Table 3.1 presents the descriptive statistics of the variables either averaged over the period 1985-2005 or just for 1985 (initial level). The descriptive statistics show the mean, the dispersion (standard deviation) and the minimum/maximum values of each of the variables. Table 3.2 presents the pairwise correlations of the variables.

Table 3.1 Descriptive Statistics of Explanatory and Dependent Variables (1985-2005 averages)

Variables	No. Obs.	Mean	Standard Deviation	Minimum	Maximum
GDP growth rate	25	3.62	1.86	0.36	8.56
Investment ratio	25	18.90	4.65	10.96	31.14
Log of initial per capita GDP	25	7.26	0.87	6.14	9.55
Secondary school enrolment rate	25	20.06	12.88	3.31	48.58
Export growth	25	5.13	3.54	0.61	13.13
Volatility	25	4.63	2.22	0.71	9.28
Debt-service ratio	25	19.41	9.65	2.21	37

Table 3.2 Pairwise Correlations of the Variables (1985-2005 averages)

	GDP growth rate	Investment ratio	Log of initial per capita GDP	Secondary school enrolment rate	Export growth	Volatility	Debt-service ratio
GDP growth rate	1.000						
Investment ratio	0.580	1.000					
Log of initial per capita GDP	-0.028	0.487	1.000				
Secondary school enrolment rate	-0.024	0.377	0.750	1.000			
Export growth	0.339	0.003	-0.308	-0.165	1.000		
Volatility	-0.078	0.305	0.312	0.134	-0.031	1.000	
Debt-service ratio	-0.315	-0.530	-0.436	-0.328	0.406	-0.266	1.000

3.2.3 Analysis of the Results

Table 3.3 reports both the cross-section and panel data estimation. Seemingly Unrelated Regression (SUR) model is used for panel data estimation as discussed earlier. The sample comprises 25 countries[5]. The dependent variable is real GDP growth rate for each of the countries estimated by fitting piecewise semi-log trends over the period 1985-2005 for the cross section regression. For the panel data, however, growth rate of real GDP is measured as the average growth rate for each decade and for each five-year period. This yields two equations in the ten-year setting (i.e. 1985-1995 and 1995-2005) and four equations in the five-year setting (i.e. 1985-1990, 1990-1995, 1995-2000, and 2000-2005). The main results come from the cross-section regression as this produces consistent long run coefficients by averaging cyclical fluctuations in the variables.

[5] Lesotho is excluded since it is an outlier.

Table 3.3 Regressions for GDP Growth Rate, 1985-2005

Explanatory Variables	(1) Cross-Section	(2) Panel (with Data at 10-Year Intervals)	(3) Panel (with Data at 5-Year Intervals)	(4) p Value[1]
Investment ratio	0.247***	0.24***	0.208***	
	(0.077)	(0.047)	(0.034)	0.93
Log of initial level of per capita GDP	-0.341	-0.436	-0.661	
	(0.540)	(0.435)	(0.409)	0.86
Secondary school enrolment rate	-0.021	-0.028	-0.026	
	(0.032)	(0.023)	(0.02)	0.84
Export growth	0.206**	0.101***	0.06***	
	(0.091)	(0.037)	(0.023)	0.26
Volatility	-0.231*	-0.183**	-0.248***	
	(0.132)	(0.083)	(0.06)	0.72
Debt-service ratio	-0.065*	-0.03	-0.023	
	(0.037)	(0.023)	(0.02)	0.36
Intercept	3.139	3.558	7.293**	
	(3.554)	(2.826)	(2.975)	0.91
Intercept, 1990-1995			5.216*	
			(2.868)	
Intercept, 1995-2000			6.252**	
			(2.79)	
Intercept, 2000-2005			6.001**	
			(2.708)	
			-0.11, 0.06	
R^2	0.63	0.21, 0.72	0.53, 0.74	
Number of observations	**25**	**25, 25**	**25, 25, 25, 25**	

Notes:

Standard errors are shown in parentheses. Cross-section regression satisfies all diagnostic tests. The R^2 values and number of observations in columns 2 and 3 apply to each period individually. Column 3 estimated with period specific intercepts since a joint test for equality of the intercepts across the time periods is rejected with a low p value.

*** indicates coefficient is significant at 1 per cent level

** indicates significance at 5 per cent level.

* indicates significance at 10 per cent level.

[1] The p values refer to Wald tests of equality of the coefficients from columns 1 and 2.

The investment ratio enters into the regressions as average over the period 1985-2005 in the cross-section regression and as averages for each of the ten-year and five-year periods in the panel data regression. The coefficients are highly significant with the expected sign in all the three specifications. The estimated coefficients are 0.25(s.e.=0.077) , 0.24(0.047) and 0.21(0.034) in columns 1, 2 and 3 respectively. The estimated coefficient on investment ratio, obtained from the cross section estimate in table 3.3, is almost the same with that of the earlier estimate of equation (3.4) which did not control for other explanatory variables with almost the same standard error. In terms of the magnitude, the coefficient on investment ratio ranks first in both columns 1 and 2. The result supports all previous studies which advocated investment as one of the main determinants of growth.

The initial level of per capita GDP is measured by taking log of real GDP per capita of 1985 for the cross section regression. For the ten-year average panel regression log of the 1985 and 1995 level of real GDP per capita are taken. In the case of the five-year intervals, the log of the 1985, 1990, 1995, and 2000 level of real GDP per capita enter into the regression of the four equations of 1985-1990, 1990-1995, 1995-2000, and 2000-2005 respectively. The results are not significant, though with the theoretically predicted sign, in all the specifications. This finding differs with many of the other studies on convergence. Therefore, we can conclude that there is no evidence of convergence among these countries.

The secondary school enrolment rate which is a proxy for human capital refers to the 1985 rate in the cross-section regression. For the panel data specification, it is observed at the start of each period. The coefficient turns out not to be significantly related to growth rate with negative sign in all the specifications which is at odds with our a priori assumption. The significant effect of educational attainment on growth is disputed in the cross-country growth empirics. While Barro (1991; 1997) and Mankiw et al. (1992) found a significantly positive effect of human capital on growth, other studies like that of Pritchett (1999) found that increases in measured educational attainment are not related to output growth especially in developing countries. He has put forward three possibilities that could account for this:

- The newly created educational capital has gone into piracy; that is, privately remunerative but socially unproductive activities.
- There has been slow growth in the demand for educated labour, so the supply of educational capital has outstripped demand and returns to schooling have declined rapidly.
- The education system has failed, so a year of schooling provides few (or no) skills.

Similarly, Reinert (2008) argued that in countries which specialise in non-mechanized production, raising the level of education of the population may not help to increase the level of wealth. Therefore, he emphasised the need to formulate an industrial policy that provides work for educated people if a strategy based on education has to succeed.

Export growth is obtained by fitting semi-log trends over the period 1985-2005 for each country in the cross-section regression. For the panel data, however, the growth rate of exports is measured as the average growth rate over each ten-year and five-year period. The coefficient is found to be positively related to economic growth. It is highly significant in all the three specifications. The partial coefficient is 0.21(0.091) in the cross-section specification, which implies that a one percentage point difference in the export growth rate results in 0.2 percentage point difference in GDP growth rate. However, the magnitude of the panel data estimate is quite low.

Volatility is measured by standard deviation of annual growth rates of GDP over the period 1985-2005 in the cross-section equation and over each ten-year and five-year periods in the panel data specification. The coefficient is significantly negative at 5 and 10 per cent level in columns 2 and 1 respectively. This implies that countries with higher volatility have lower growth. This result is consistent with the findings of Ramey and Ramey (1995). Several theories link volatility to growth via investment. In order to check this theory, we dropped investment ratio from both columns 1 and 2 and found that the volatility variable turns out to be insignificant at least in the cross section regression while it still remains significant at 10 per cent level in the panel specification.

The debt-service ratio enters into the regressions as average over the whole period and as averages over each of the ten-year and five-year periods in the cross-section and panel data specifications, respectively. The coefficient is significant at the 10 per cent level in the cross-section specification. The estimated coefficient is 0.07(0.04). The magnitude of the estimated coefficient implies that countries with a debt-service ratio 10 percentage points above the average had growth of 0.7 percentage points below the average.

Column 3 is estimated with period specific intercepts. The three time dummies of 1990-1995, 1995-2000, and 2000-2005 are significant and positive indicating that the rate of economic growth in these countries seems to have risen from 1985 to 2005. The fits of the equations in the five-year setting, as indicated by low R-squared values, is poorer than those of the ten-year setting. This suggests that growth performances over short time intervals are highly influenced by short-term forces.

The last column of Table 3.3 reports the Wald test. It refers to the hypothesis that the coefficients are the same across the two specifications. The result shows considerable stability between the two specifications of columns 1 and 2 which is evidenced by high p value. Therefore, we can affirm the individual equality of the coefficients across the two specifications. A joint test for equality of all coefficients across the time periods in the ten-year setting is rejected with a very low p value. However, when the variables are considered individually, the results show considerable stability across the two time periods of 1985-1995 and 1995-2005 since the only p value that is less than 0.05 is for secondary schooling.

The striking finding from Table 3.3 is the extent of stability of the coefficients across the specifications. Except debt-service ratio, all the three variables, namely investment ratio, export growth, and volatility are significant across the specifications.

The magnitude of the coefficients on investment ratio and volatility is also almost the same in all the three specifications[6].

3.2.4 Endogeneity

Turning to the issue of causality, we know that statistical correlation does not imply causation. Therefore, the above finding raises the familiar question of whether investment itself should be treated as an endogenous variable. In other words, any effect from contemporaneous investment on growth may reflect reverse causation because investment rate is measured by the average ratio of investment to GDP over the period in which growth is also measured. A variable is said to be endogenous if it is correlated with the disturbance. In the model

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon \tag{3.8}$$

x_j is endogenous if $Cov[x_j, \varepsilon]$? 0 and x_j is exogenous if $Cov[x_j, \varepsilon] = 0$, $j = 1, 2, \dots, n$.

Empirically, there are two ways to determine the endogeneity of investment ratio. The first one is to use the Durbin-Wu-Hausman test which provides a way to test whether a regressor is endogenous. This test leads us to the statistic, $F^{1}_{92} = 0.17$ and $Prob > F =$ 0.68 and the acceptance of the null hypothesis that investment ratio is exogenous.

The other way of determining the endogeneity of investment ratio is by adopting the instrumental variables estimation technique that uses lagged values of investment rate as instruments for the contemporaneous investment. Following Barro and Sala-i-Martin

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[6] We have also estimated the model by including inflation rate. However, the inclusion or exclusion of the variable did not affect the result in any way.

(2004), the average value of investment ratio over the preceding five-year period (i.e. 1980-1985 and 1990-1995 in the equations of 1985-1995 and 1995-2005 respectively in the ten-year setting and 1980-1985, 1985-1990, 1990-1995, and 1995-2000 in the equations of 1985-1990, 1990-1995, 1995-2000, and 2000-2005 respectively in the five-year setting) is used as an instrument. Given that it relies on past values as instruments, this method only allows current values of the explanatory variables to be affected by the error term. Therefore, the endogeneity of investment ratio can be analysed by using one period lagged value of the investment ratio as an instrument.

Estimation is by three-stage least squares (3SLS). It is similar with the SUR model of equation (3.2) except that 3SLS incorporates instrumental variable techniques. This estimator was proposed by Zellner and Theil (1962) and also used by Barro (1997) and Barro and Sala-i-Martin (2004). The 3SLS method combines the ideas of SUR with two-stage least squares (2SLS) estimation and allows for different error variances in each period and for correlation of these errors over time. It improves upon the efficiency of equation-by-equation estimation by taking into account such correlations across equations. Unlike the 2SLS approach for a system of equations, which would estimate the coefficients of each structural equation separately, the three-stage least squares estimates all coefficients simultaneously. 3SLS is generally consistent and asymptotically more efficient than 2SLS. However, if the disturbances in the different structural equations are uncorrelated (i.e. the contemporaneous variance-covariance matrix of the disturbances is diagonal), 3SLS reduces to 2SLS.

Table 3.4 Regressions for GDP Growth Rate with Instrumental variable, 1985-2005

Explanatory Variables	(1) Panel (with Data at 10-Year Intervals)	(2) Panel (with Data at 5-Year Intervals)
Investment ratio	0.245***	0.194***
	(0.064)	(0.031)
Log of initial level of per capita GDP	-0.442	-0.773**
	(0.432)	(0.321)
Secondary school enrolment rate	-0.026	-0.025
	(0.023)	(0.015)
Export Growth	0.1***	0.052***
	(.038)	(0.021)
Volatility	-0.22***	-0.203***
	(0.082)	(0.054)
Debt-service ratio	-0.022	-0.032
	(0.023)	(0.021)
Intercept	3.446	8.328***
	(2.766)	(2.364)
Intercept, 1990-1995		5.658***
		(2.156)
Intercept, 1995-2000		7.39***
		(2.201)
Intercept, 2000-2005		7.104***
		(2.136)
R^2	0.19, 0.73	-0.06, 0.06 0.50, 0.72
Number of observations	**25, 25**	**25, 25, 25, 25**

Notes:
Standard errors are shown in parentheses. The R^2 values and number of observations apply to each period individually. Column 2 is estimated with period specific intercepts since a joint test for equality of the intercepts across the time periods is rejected with a low *p* value.
*** indicates coefficient is significant at 1 per cent level.
** indicates significance at 5 per cent level.
* indicates significance at 10 per cent level.

Table 3.4 presents the estimated result. The first column uses ten-year average and is more consistent than column 2, which uses five-year average since it reduces the impact of cyclicality in the data. The investment variable still remains highly significant and positive at 99 per cent confidence level in both the specifications even after lagged values of the investment ratio are used as instruments for the contemporaneous investment rates. The magnitude of the coefficients also remains almost the same with the earlier estimation from columns 2 and 3 of Table 3.3. Therefore, these results suggest the positive effect of an exogenously higher investment ratio on the growth rate of output. These findings differ from that of Blomström et al. (1996) who found reverse causation from growth to investment, rather than the other way round. However, Barro and Sala-i-Martin (2004) found that even after the inclusion of an instrument, investment ratio still remains significant implying that investment is instrumental and precedes growth rather than the reverse.

3.2.5 Robustness

A variant of the approach adopted by Levine and Renelt (1992) is used to test for the robustness of the variables. According to this approach the relationship between growth rate and a particular variable of interest is considered to be robust "if it remains statistically significant and of the theoretically predicted sign when the conditioning set of variables in the regression change." Otherwise, it is considered as fragile. The authors took 119 countries over the period 1960-1989 and used per capita GDP growth rate as the dependent variable. They identified investment ratio, the initial level of per capita GDP, and human capital measured by the secondary school enrolment rate as the only robust variables across specifications. Consider the following equation

$$y = \alpha + \beta_i I + \beta_z Z + \varepsilon \qquad (3.9)$$

where y is growth rate of output, I is the variable of interest and Z is other economic variables identified in the growth literature as potentially important in explaining growth.

First the regression is run only with the variable of interest (*I*) and then other (*Z*) variables are included. If the coefficient of the variable of interest remains statistically significant with the theoretically predicted sign as the other variables are included, then we conclude that the variable is robust. Each variable is tested for robustness.

The finding of the analysis is that investment ratio always remains robust whatever other variables are included in the equations in all the specifications. On the other hand, export growth remains robust only in the panel data regression and its significance depends on the inclusion of other *Z* variables in the cross-section regression. The significance of the other two variables, namely volatility and debt-service ratio depends on the conditioning variables, i.e. which other *Z* variables are introduced.

3.3 SUMMARY

In this chapter attempt has been made to identify the main determinants of economic growth in SSA with special focus on capital formation. Both cross-section and panel estimation techniques were used. We started with bivariate analysis to assess the relationship between growth rate of output and investment ratio. The finding of the analysis is that investment ratio accounts for over 30 per cent of the cross country variations in growth rates. However, in order to determine the robustness of the link between GDP growth and investment ratio, we need to control for other relevant variables. Therefore, human capital, initial per capita GDP, export growth, volatility and debt-service ratio have been included in the model. From this analysis we conclude that investment ratio along with these variables explain over 60 per cent of the cross country variations in growth rates. Moreover, investment ratio always remains robust whatever other variables are included in the equations in all the specifications with causality running from investment ratio to output growth.

CHAPTER 4

STRUCTURAL CHANGE IN OUTPUT AND EMPLOYMENT

Structural change refers to long-term and persistent shifts in the sectoral composition of economic systems. Ishikawa (1987) defines it as 'a change in the relative weight of significant components of the aggregative indicators of the economy, such as national product and expenditure, exports and imports, and the population and labour force'. Thus, industrialisation is the central process of structural change. The present chapter focuses on the variations in the relative size of the three main sectors – agriculture, industry and services – in terms of changes in output, employment and productivity to analyse the pattern of structural change in Sub-Saharan Africa since the 1980s. Although each country's specific path of structural change will differ due to factors such as differences in economic policies and international specialisation among others, in this chapter, we try to provide an overview of the pattern of structural transformation which abstracts form these differences.

Structural change is a complex and intertwined phenomenon which affects the growth processes. Since the seminal contributions of Lewis (1954) an important strand of the development literature has sought to model the development process in terms of a structural transformation from agricultural to industrial activities. Structural issues were once at the core of thinking among the development economists of the 'old school' and they have understood the key role that structural transformation played in the course of development (Rodrik, 2007). Most neoclassical economists, however, regard structural change as a secondary issue, rather than a necessary condition for economic growth.

In most countries in SSA at present, the majority of the population are engaged in agriculture, with economies in the very early stages of structural transformation. Aggregate economic performance in the region during the past two and half decades has remained unsatisfactory in contrast to robust performance of developing countries elsewhere. This is mainly due to the reason that output growth is also a function of the stage of development because of sectoral differences in productivity growth rates between agriculture, industry and services. And economic growth which is accompanied by structural transformation generates new activities. As evidenced by the experience of developed countries, growth and structural transformation are inter-related. The recent growth experience of East and South East Asian countries also reinforce this fact.

4.1 STRUCTURAL CHANGE IN THE LITERATURE

The conceptual foundation of structural change analysis dates back at least to Adam Smith, even though he had not used the term 'structure' explicitly. Smith (1776) understood the relationship between the structural features of an economy and its level of economic development. Each stage of development is associated with a particular composition of product, and a change in this composition can be considered as a major requirement to reach higher stages of development (Silva & Teixeira, 2008). For Smith the main force that allows an economy to switch from one structure to another comes from the division of labour.

However, modern sectoral analyses and the idea of decomposing an economy into primary, secondary and tertiary sectors originated with Fisher (1939) and Clark (1940). Both dealt with sectoral shifts in the composition of the labour force. The logic of their arguments being that patterns of production are functions of the level of income and that resource and production shifts are an integral part of development. Though Clark's approach was mainly empirical, he related the observed shifts to differential productivity growth and Engel effects (Syrquin, 1988).

A decomposition of the economic system into broad categories such as agriculture, industry and services, was also used by Kuznets (1966). He established the stylised facts of structural transformation. For Kuznets, growth and structural change are strongly interrelated and the latter is an essential element in accounting for the rate and patterns of growth. He analysed the process and patterns of structural change over long period of time in the advanced countries and came to the conclusion that it is an integral part of 'modern economic growth'. He used the term 'modern economic growth' to describe the economic epoch of the last 250 years. The characteristics observed in today's developed countries were: a sustained increase in per capita product and rise in factor productivity accompanied by an increase in population and a high rate of structural changes. The characteristics noted above are interrelated and mutually reinforcing. The three main causes of structural change as pointed out by Kuznets (1973) are varying income elasticity of demand for various consumer goods, the differential impact of technological progress and changes in comparative advantage.

One of the pioneers who studied the conditions for economic progress was Paul Rosenstein-Rodan. Rosenstein-Rodan (1943) saw the agricultural sector as being over populated and the only feasible way to create productive employment for this 'excess population' is to industrialise. He emphasized the importance of complementarity between different industries and argued for a 'big push'[1] of simultaneous industrial investments which could launch a chain reaction of virtuous circles. A minimum quantum of investment is seen as a necessary condition for successful development. The complementarity among different industries is the main argument in favour of large-scale planned industrialisation. However, to achieve an 'optimum size' for industrial enterprises, the area of industrialisation must be sufficiently large. The essence of the argument for a big push is about finding a market for the products. Thus, Rosenstein-Rodan argued that a simultaneous expansion of several industries would create demand for each other through the expansion of income and employment in different industries. Nurkse (1953), like Rosenstein-Rodan, also argued in favour of a coordinated increase in the amount of capital utilized in a wide range of industries and emphasised the need for 'balanced growth'. However, unlike Rosenstein-Rodan and Nurkse, Hirschman (1958) argued for a strategy of unbalanced growth. He pointed out that developing countries are short of decision making skills and therefore it is essential to promote key industries with forward and backward linkages that would create disequilibrium and then induce decisions in other sectors to rectify the disequilibrium.

The most influential early theoretical model on structural change was formulated by Arthur Lewis. Lewis (1954) model of structural change focuses on the sequential process through which the economic structure of an underdeveloped country is transformed. The model starts with the assumption of a dual economy with a traditional

[1] The term itself is not mentioned in the article, but has been used by the author in subsequent studies.

subsistence sector and a modern capitalist sector. The traditional subsistence sector is characterised by zero marginal labour productivity while the modern capitalist sector is characterised by high productivity. Lewis assumed the existence of 'surplus labour' in the traditional sector implying that labour supply to the modern sector can be taken for all practical purposes as being infinitely elastic at some subsistence wage. His model of dualistic development envisaged gradual replacement of traditional by modern sector fuelled by capital accumulation in the modern sector. According to Lewis, the shift of resources to modern capitalist sector alters the distribution of incomes in favour of the saving class thereby raising the rate of investment. The conclusion of the model is that the speed at which surplus labour is absorbed into the modern capitalist sector depends on the size of the capitalist sector and the share of profits in national income.

Another economist who emphasised the role different sectors play in economic growth was Nicholas Kaldor. Kaldor (1966; 1967) argued that it is not possible to understand the growth process without taking a sectoral approach, distinguishing between increasing and decreasing returns activities. He regarded manufacturing activities as an 'engine of growth'. The reason for this is that manufacturing as opposed to land-based activities allows for extensive division of labour as market grows and this has spill-over effects on the rest of the economy. He also pointed out the role agriculture plays in the process of industrialisation, not so much by providing the supply of essential wage goods emphasised by Lewis, but by creating demand for industrial goods (Bhaduri, 2003). Kaldor emphasised the importance of establishing an equilibrium terms of trade between the agricultural and industrial sectors, so that industrial growth is neither supply nor demand constrained (Kaldor, 1976). Though the complementarity between the two sectors was discussed informally in Kaldor (1975b) and other subsequent papers, formal model along this line was developed later by Thirlwall (1986).

Among the historical approach which emphasised structural transformation was Rostow's linear stages theory. Rostow (1960) argued that the economy passes through various stages of development. He distinguishes five such stages: traditional, transitional (or preconditions for take-off), take-off, maturity and high mass consumption. The necessary condition emphasised for any take-off is the mobilisation of saving in order to generate sufficient investment. This is a descriptive economic study trying to provide a sweeping overview of the development process. Though this approach had considerable impact on the contemporary theories of development, it was later severely criticised, particularly by Gershenkron (1962). The major criticisms were focused on the notion of a unique path of development, on the absence of endogenous mechanisms of transition between stages and on the concept of necessary prerequisites for the take-off (Syrquin, 1988).

Though Kuznets was credited with establishing the stylised facts of structural transformation, he did not use formal statistical techniques in his analysis. This task was taken up by Chenery (1960) and subsequently by Chenery and Taylor (1968) and Chenery and Syrquin (1975). Chenery was the first to test for the existence of stylised facts using formal statistical techniques for a large cross country data. In his 1960 paper, Chenery attempted to determine the pattern of transformation in the structure of production as income grows and began with a general model before estimating reduced-form equations. In this study only income and size of country measured by its population were considered as explanatory variables. Subsequent studies by Chenery and Taylor

(1968) and Chenery and Syrquin (1975) are extensions along the line of the earlier study. Chenery and Taylor (1968) included three more explanatory variables: investment ratio, share of primary exports in GNP and share of manufactured exports in GNP. They also subdivided the sample into three distinct clusters of economies i.e. large, small primary-oriented and small industry-oriented and analysed each of the groups independently. Chenery and Syrquin (1975) extended the search for regularities by increasing the number of structural variables and sample size. These empirical studies of countries at different levels of per capita income led to the identification of some important regularities of the development process. These regularities include the fall in the share of agriculture in GDP and employment and the shift towards industrial production as per capita income rises, the steady accumulation of physical and human capital, changes in the composition of consumer demand and international trade as well as changes in socioeconomic factors. A common feature of these studies is the application of rigorous statistical techniques to search for regularities and identify general patterns of economic development.

Among the formal approaches to the issue of structural change, the seminal contributions are that of Leontief's input-output model, Baumol's unbalanced growth model and Pasinetti's model of economic growth and structural change. Leontief (1941) explored the idea of interdependence between different branches of national economy through a detailed quantitative study of the economic system. His input-output model, which is presented in the form of a matrix, shows how the output of one industry is an input to another industry.

Baumol (1967) developed a model of a two-sector economy: a technologically progressive sector in which innovations, capital accumulations and economies of scale lead to a continuous rise in productivity; and a non-progressive sector which permit only sporadic increases in productivity. The former resembles manufacturing while the latter is more akin to services. Therefore, a major emphasis is placed on the unevenness of the technological impact on the two sectors, which explains the unbalanced nature of economic growth. Baumol's work does not explicitly take into account the demand side and it is only the technological side which shapes the process of structural change.

For Pasinetti (1981), structural change represents the very essence of economic growth. Pasinetti carried out his analysis in terms of vertically integrated sectors whereby all value can be traced back to labour. He considered technical progress as the major engine of economic change. Technical progress, according to Pasinetti, also generates changes in the composition of demand, which are incorporated in the analysis by means of a generalisation of Engel's law. Thus, Pasinetti's attempt was to present a general conception of the dynamics of growth and structural change that explicitly took into account the uneven impact of technological and demand changes among sectors (Silva & Teixeira, 2008).

The recent increase in the study of growth regressions has failed to take into account the long-run evolution of sectoral structure. However, there are a few works which tried to study the implications of structural change for growth models. These include Temple and Wößmann (2006), Echevarria (1997), Dowrick and Gemmell (1991), Laitner (2000) and Poirson (2000). In the last two decades, neo-Schumpeterian economists have also shown renewed interest in technological innovation, its diffusion and its impact on growth.

4.2 PATTERNS OF STRUCTURAL CHANGE IN SUB-SAHARAN AFRICA

Historically, rapid economic growth is associated with the expansion of the industrial sector. As development proceeds, both the share of agriculture in GDP and the share of agriculture in the labour force decline. However, the share of labour engaged in agriculture is usually larger than the share of agriculture in GDP, signalling lower labour productivity in agriculture than the average for the economy.

The role of industrialisation is neglected in most of the studies which deal with the development strategies for SSA. This section investigates the extent of structural transformation in SSA by taking as its starting point some of the stylised facts presented by Rodrik (2007) on the patterns of economic growth that has been highlighted by recent empirical research. These are:

(i) Growth accelerations are associated with structural changes in the direction of manufacturing.

(ii) Rapidly growing countries are those with large manufacturing sectors.

(iii) Economic development requires diversification, not specialisation.

(iv) Countries that promote exports of more "sophisticated" goods grow faster.

These regularities highlight the importance of the manufacturing sector. This has been well known since the works of classical development economists. Nicholas Kaldor, in particular, regarded manufacturing sector as an 'engine of growth' (Kaldor's hypothesis is discussed in detail in the next chapter).

4.2.1 Changes in Output and Export Structure

Table 4.1 shows sectoral shares of GDP. In most of the countries, the share of manufacturing sector has either declined or remained stagnant over the past two and half decades. The sector has shown sizeable increase only in Cameroon, Côte d'Ivoire, Lesotho, Mauritius and Mozambique. There is slight increase in Namibia, Togo and Uganda. The size of the sector has also remained small in most of the countries. In 1980 the sector's share in GDP ranged from 4 per cent in Uganda to 21 per cent in Zimbabwe whereas in 2005 it ranged from 3 per cent in Mali to 19 per cent in Côte d'Ivoire. The sector in the region is dominated by South Africa, Côte d'Ivoire, Nigeria, Kenya, Zimbabwe, Sudan, Cameroon and Mauritius. These eight countries together account for almost 80 per cent of the total manufacturing value added of the region. Among these countries South Africa accounts the lion's share of 57 per cent.

For the region as a whole excluding South Africa, the share of the sector in GDP has stagnated between 1980 and 1990, while it has declined continuously since then and hovers around 8 per cent as of 2005. This can also be seen from Figure 4.1 which shows the trends in the share of manufacturing in GDP in six different regions since 1980. Compared to all other regions, the size of the manufacturing sector in SSA excluding South Africa is the smallest. In the period 1980-2000, the share of SSA's manufacturing in world manufacturing output remained nearly constant at around 0.8 per cent. On the other hand, the share of manufacturing in total industrial output was also declining since 1990; and in 2005, it stood at 32 per cent for SSA and 19 per cent for SSA excluding South Africa (Figure 4.2).

Table 4.1 Sectoral Shares, 1980-2005 (percentage of GDP)

Country	Agriculture				Industry				Manufacturing				Services			
	1980	1990	2000	2005	1980	1990	2000	2005	1980	1990	2000	2005	1980	1990	2000	2005
Benin	35.4	36.1	36.5	32.2	12.3	13.2	13.9	13.4	8.0	7.8	8.8	7.5	52.3	50.7	49.6	54.4
Botswana	12.7	4.5	2.3	1.8	43.9	56.9	55.1	49.3	4.4	4.8	4.1	3.4	29.9	31.8	36.1	40.5
Burkina Faso	28.4	28.0	27.5	33.0	19.8	20.4	23.1	21.9	14.7	14.7	15.3	14.1	48.5	48.8	44.1	41.8
Cameroon	28.7	24.0	20.5	19.0	23.5	28.8	33.3	29.6	8.8	14.2	19.3	17.3	39.6	44.9	38.7	48.8
Côte d'Ivoire	25.9	32.5	24.2	22.8	19.7	23.2	24.9	25.9	12.8	20.9	21.7	19.3	54.4	44.3	50.9	51.3
Ethiopia	57.1	51.7	46.6	43.0	9.9	10.6	11.5	11.9	4.6	4.5	5.2	4.4	27.1	32.8	35.3	37.1
Gabon	6.8	7.3	6.2	4.9	60.4	43.0	56.3	61.4	4.6	5.6	3.7	4.1	32.8	49.7	37.5	33.8
Gambia	27.0	24.3	31.5	28.3	13.0	11.0	11.5	11.7	4.9	5.5	4.8	4.4	47.6	48.6	45.0	48.0
Ghana	57.9	44.8	35.3	37.5	11.9	16.8	25.4	25.1	7.8	9.8	9.0	8.7	30.2	38.4	39.3	37.4
Guinea	-	24.7	19.0	19.0	-	34.6	30.6	33.1	-	4.7	3.7	3.6	-	44.5	44.4	41.8
Guinea-Bissau	42.2	56.9	52.1	50.0	18.7	17.4	12.0	13.0	12.6	7.9	9.7	10.7	34.4	19.3	28.2	28.1
Kenya	27.8	25.3	28.7	24.2	17.8	16.3	15.0	17.0	10.9	10.1	10.3	10.5	39.7	44.1	45.0	47.8
Lesotho	22.4	20.9	11.0	7.2	24.2	28.8	26.8	28.8	7.7	12.2	11.5	16.9	44.5	40.4	56.4	54.5
Malawi	39.2	38.5	35.7	29.3	20.2	24.7	16.2	18.2	12.3	16.6	11.6	12.3	30.3	22.3	38.4	41.4
Mali	43.6	44.1	38.7	33.7	11.9	15.4	19.1	22.3	5.9	8.3	3.5	2.9	34.7	37.4	35.3	36.2
Mauritius	14.0	11.0	5.2	5.3	22.3	27.7	27.0	24.5	13.3	20.6	20.5	17.6	48.5	45.0	54.4	57.2
Mozambique	33.9	34.1	20.9	24.5	31.5	16.9	21.3	23.0	-	9.3	10.6	14.0	26.0	40.9	44.8	43.3
Namibia	10.5	10.6	10.8	10.4	52.7	34.3	25.5	26.7	8.6	12.4	11.7	12.4	31.2	45.3	54.8	54.5

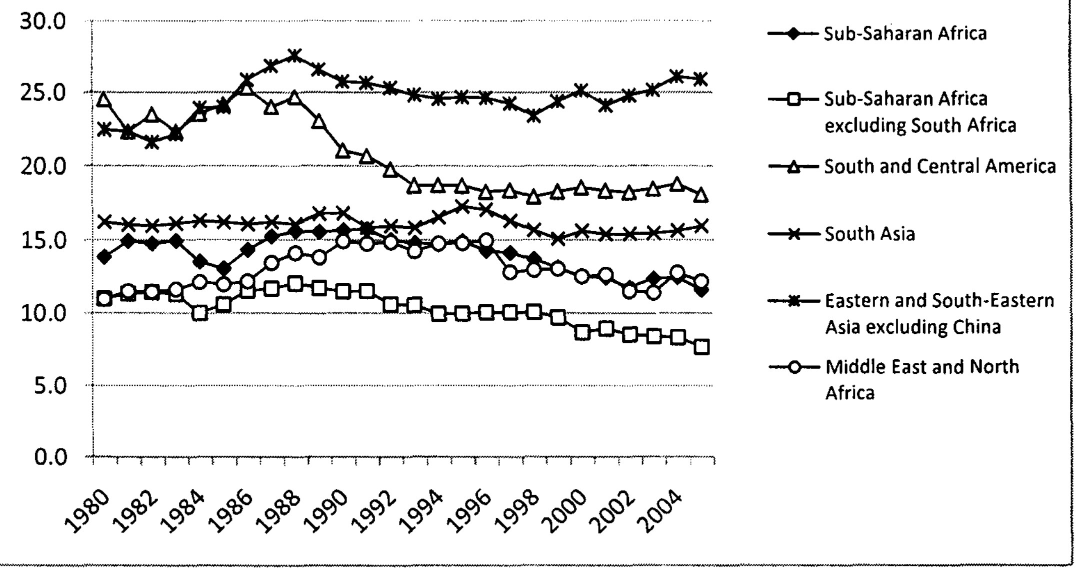
(continued)

Table 4.1 (continued)

Country	Agriculture				Industry				Manufacturing				Services			
	1980	**1990**	**2000**	**2005**	**1980**	**1990**	**2000**	**2005**	**1980**	**1990**	**2000**	**2005**	**1980**	**1990**	**2000**	**2005**
Nigeria	23.4	28.3	26.0	32.7	49.9	49.8	52.2	43.5	18.9	13.3	3.6	2.8	26.7	21.8	21.7	23.5
Senegal	17.9	17.9	16.9	14.5	17.9	19.9	20.5	20.7	12.0	13.7	12.9	13.2	53.3	52.0	50.8	51.7
Sudan	29.9	39.0	40.1	30.2	12.9	14.7	20.7	26.7	6.8	8.3	8.2	6.5	48.3	42.5	35.4	37.4
Tanzania	-	42.0	41.6	37.7	-	16.1	14.5	13.8	-	8.5	6.9	5.6	-	33.3	36.2	30.3
Togo	27.5	33.8	34.2	43.7	24.8	22.5	17.8	24.0	7.8	9.9	8.4	10.1	47.7	43.7	47.9	32.4
Uganda	71.8	53.3	27.5	25.1	4.5	10.4	21.3	23.4	4.3	5.3	7.2	7.1	23.4	30.5	44.1	44.8
Zambia	14.0	18.2	19.9	21.0	39.1	45.3	22.5	28.5	16.9	31.9	10.2	10.7	39.7	24.8	46.7	45.8
Zimbabwe	15.1	14.8	15.9	13.4	27.9	29.8	21.4	16.8	20.7	20.5	13.6	9.5	53.1	45.4	48.5	40.0
Sub-Saharan Africa	22.9	21.0	18.1	18.2	38.1	32.9	32.9	34.1	13.9	15.7	12.5	11.6	39.3	46.2	49.0	47.7
SSA excluding South Africa	29.0	29.6	26.9	27.2	34.3	29.1	33.5	35.8	11.0	11.5	8.7	7.7	37.1	41.5	39.5	37.1

Sources: World Bank's African Development Indicators online database and UNCTADstat online database.

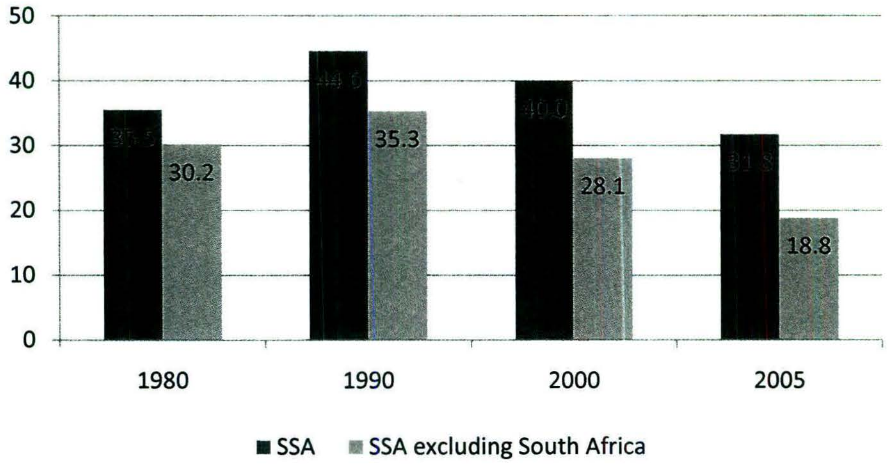
Figure 4.1 Manufacturing value added as percentage of GDP



Source: UNCTADstat online database

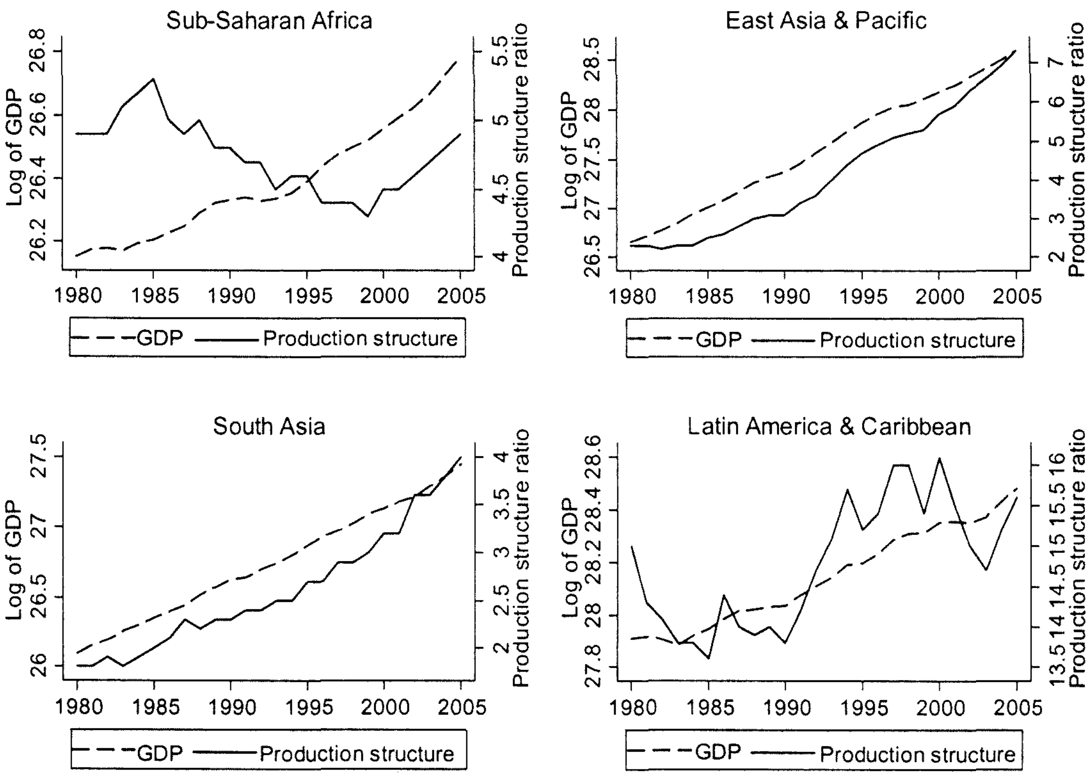
The share of agriculture in GDP for the region excluding South Africa has declined only by 2 per cent between 1980 and 2005. And the share of services has remained stagnant. In the case of the individual countries, the share of agriculture has shown a decline in many of them. As far as service is concerned, many of the countries in the sample have shown a rise in the share of the sector. On the other hand, the share of industry for the whole region has declined slightly between 1980 and 2005. However, if South Africa is excluded then the sector shows a marginal increase over the same period. Some of the individual countries have also shown an increase in the share of industry. In 2005, industry's share of GDP ranged from 61 to 12 per cent among the countries in the sample. The weighted average for the region excluding South Africa was about 36 per cent. The increase in the share of industry in GDP can be attributed mainly to a rise in the share of mining and its ancillary activities in total industrial output. Between 1980 and 2004, the share of mining in total industrial output in the region rose from 53 to 62 per cent (World Bank, 2006).

Figure 4.2 Share of manufacturing in total industrial output (%)



Sustained economic growth in successful regions was associated with changes in economic structure. Figure 4.3 presents the evolution of production structure ratio and GDP of four developing regions during the period 1980-2005 which shows the dynamic interaction between the changes in the structure of production and GDP. The production structure ratio is computed as the ratio of non-agricultural output to agricultural output. As can be seen from the figure, during the last two and half decades, growth in East Asia and Pacific and South Asia was associated with the expansion of the non-agricultural sector. However, this was not the case in SSA. Output growth in SSA for larger part of the period was not accompanied with changes in structure of production. In fact the ratio has declined continuously since the mid 1980s and the trend has been reversed only after 1999.

Figure 4.3 Production structure and GDP



During the transformation phase, the contribution of manufacturing sector to growth also rises as that of the agricultural sector falls. Each sectors contribution to aggregate growth can be calculated as:

$$\left(g_i/g\right)\theta_i \qquad (4.1)$$

where g_i and g are sectoral and GDP growth rates respectively, and $?_i$ is sectoral output shares. Sectoral contribution to growth can be regarded as the dynamic version of sectoral shares in value added.

Table 4.2 Sectoral shares and contributions to growth in SSA excluding South Africa (per cent)

	GDP	Agriculture	Industry excluding Manufacturing	Manufacturing	Services
Shares in value added					
1980-1989		25	22	10	40
1990-1999		25	21	9	38
2000-2005		25	22	9	37
Growth rates					
1980-1989	2.2	2.1	0.5	4.1	2.7
1990-1999	2.6	3.5	2.2	2.7	2.2
2000-2005	4.8	3.9	6.8	3.2	4.1
Sectoral contributions to growth					
1980-1989		24	5	19	49
1990-1999		34	18	9	32
2000-2005		20	31	6	32

Notes: (a) Growth rates have been calculated by the least-squares method.
(b) The breakdown in shares of GDP might not add-up to 100 per cent due to statistical discrepancies.

Source: World Bank's African Development Indicators online database

Table 4.2 summarises results regarding sectoral shares in GDP, growth rates and sectoral contributions to growth. Agricultural contribution to growth increased from 24 to 34 per cent between 1980-89 and 1990-99 before it settled at 20 per cent during 2000-2005. However, manufacturing contributions to growth has declined continuously during all the three periods, whereas services contribution declined from 49 to 32 per cent between 1980-89 and 1990-99 and stagnated since then. On the other hand, the contribution of industrial sector excluding manufacturing has increased significantly from 5 percent during the 1980s to 31 per cent during the period 2000-2005. Though the industrial share in value added remained almost the same in all the three periods, the significant rise in the contribution of the industrial sector to growth is due to the high rate of growth of the sector. And the growth of the sector in turn is mainly driven by the growth of mining and its ancillary activities. Thus, a conclusion which emerges from the above analysis with regard to the structure of output is that over the past two and half decades, no significant structural change has taken place in terms of shifts in the structure of production towards the manufacturing sector in most of the countries in SSA and the region as a whole.

One of the indicators of manufacturing strength is the ratio of manufacturing exports to total merchandise exports. In 2003, SSA's exports of manufactured goods account for less than 20 per cent of total exports. This figure is significantly less than other regions of the developing world (Table 4.3). The share of SSA's manufacturing exports in world exports remained roughly constant at around 0.8 per cent in the period 1980-2000 (Lawrence, 2005).

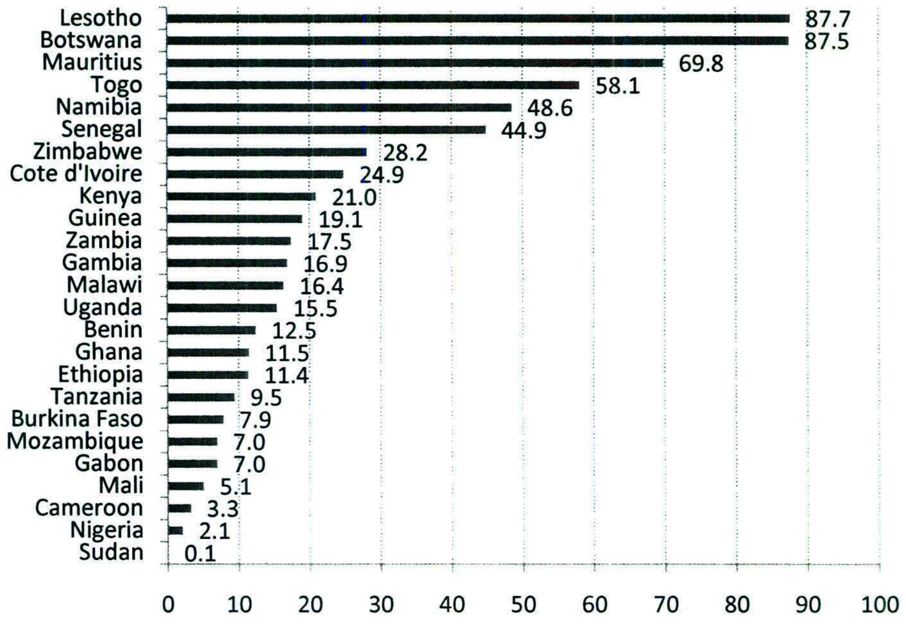
At the country level, there are only four in the sample – Lesotho, Botswana, Mauritius and Togo – for which manufactured goods constitute more than 50 per cent of total merchandise exports in 2005 (Figure 4.4). For most countries, the figure was below 20 per cent. The composition of most of these exports, however, is still dominated by products associated with early industrialisation (Lawrence, 2005). Only Côte d'Ivoire, Gambia, Mauritius and Senegal had a machinery and transport equipment sector which accounted for more than 10 per cent of total manufacturing exports.

Table 4.3 Manufactured exports as percentage of merchandise exports, 1985-2005

	1985	1995	2005
SSA excluding South Africa	7	9	18*
South Asia	57	76	74
East Asia & Pacific	26	74	80
Latin America & Caribbean	25	55	55

Note: *Data is for 2003
Sources: World Development Indicators and African Development Indicators, online databases.

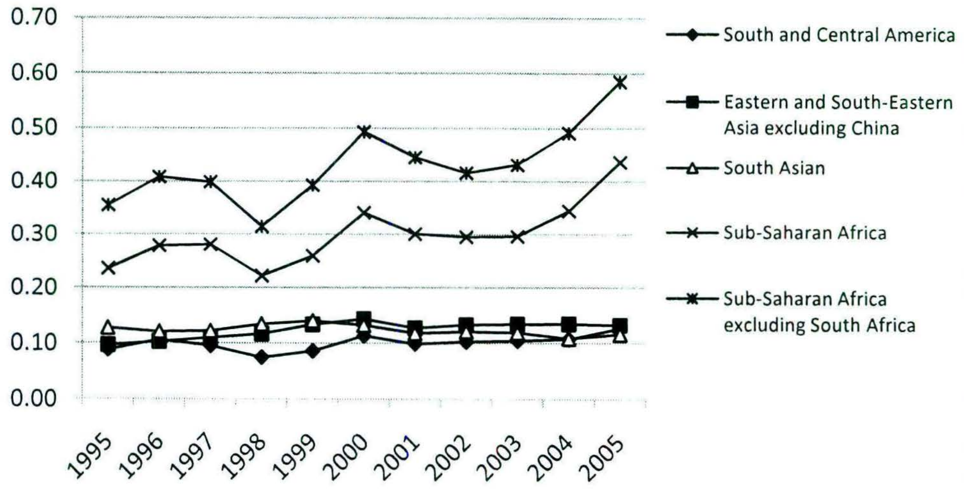
Figure 4.4 Manufactured exports as percentage of merchandise exports in 2005



Source: UNCTAD Handbook of Statistics, 2007

Diversification matters because the mix of products that a country produces and exports affects its economic growth. Diversification of export structure decreases the volatility of export income which is associated with an excessive dependence on commodity exports. Poor countries specialise in a relatively narrow range of products, while richer countries tend to be highly diversified. Moreover, the goods which poor countries produce are subject to diminishing returns, whereas richer countries are engaged in increasing returns activities. In other words, the poor countries specialise in being poor, while the rich countries specialise in being rich (Reinert, 2008). This simple fact runs counter to one of the fundamental mainstream theories of trade – the comparative advantage. According to the theory of comparative advantage, the gains from trade arise from specialisation. However, Imbs and Wacziarg (2003), after examining the pattern of sectoral concentration in a large cross section of countries and within countries over time, concluded that as the level of per capita income increases, economies tend to be less concentrated and more diversified. However, there will be a point of inflection beyond which high income countries once again become more specialised. This point of inflection occurs at a relatively late stage in development. Thus, the pattern of sectoral concentration follows a U-shape in relation to per capita income.

Figure 4.5 Concentration index of merchandise exports



Source: UNCTADstat online database

Figure 4.5 shows concentration index of merchandise exports of four regions. The index, also known as Herfindahl-Hirschman index[2], shows whether exports of a country or group of countries are concentrated on few products or diversified among a series of products. It takes a value between 0 and 1. Higher values indicate that exports are concentrated in fewer sectors. The index is quite high in SSA compared to all other regions. If South Africa is excluded, the concentration increases even further. It can also be seen that there is an upward trend in the index, showing around 20 per cent rise between 1995 and 2005. In most of the individual countries, the trend has either remained stagnant or increased over time. Among the sample countries, those which have comparatively lower concentration index are Kenya, Senegal, Togo and Zimbabwe (see Table A4.1 in the appendix).

The success of SSA countries depends on increasing gradually the volume and range of their industrial exports because the elasticity of demand for primary commodities export is limited. However, we should not underestimate the obstacle faced generally by developing countries today in protecting their industries under the current WTO trade regime in which developing countries are increasingly asked to specialise in diminishing returns activities.

[2] The index is given by the following formula: $H_j = \frac{\sqrt{\sum_{i=1}^{n}\left(\frac{x_i}{X}\right)^2} - \sqrt{1/n}}{1-\sqrt{1/n}}$, where H_j is country or group of country index, x_i is value of exports of product i, X is $\sum_{i=1}^{n} x_i$ and n is number of products.

4.2.2 Employment, Productivity and Structural Change

This section examines how the employment and productivity situation have evolved in SSA over the past twenty-five years. Chenery and Syrquin (1975) pointed out that as the share of labour in agriculture falls continuously over time, that of services increases, while the share of labour in manufacturing increases in the early stages of development and decreases in the later stages following an inverted U-shaped pattern.

SSA has the largest share of labour force employed in the agricultural sector compared to any other regions. Between 1996 and 2005, the share of employment in agriculture in the region fell from 68 to 63 per cent. However, the share of employment in industry remained almost stagnant at around 9 per cent during the same period, while employment in services increased from around 23 to 28 percent (ILO, 2007). As far as the share of employment in manufacturing is concerned, there is a marginal decline from 6.2 per cent in 1980 to 5.5 per cent in 2000 (UNCTAD, 2003).

The low share of employment in industry in the region, compared to the sector's share in total value added which was about 35 per cent in 2005, indicates high level of labour productivity in the sector. However, if we divide the industrial sector into manufacturing industry and non-manufacturing industry then we can see that the high level of labour productivity in the sector is due to the non-manufacturing industry. The productivity level in the manufacturing industry does not seem to be as high as in the non-manufacturing industry. In 2000, the share of employment in manufacturing was 5.5 per cent while its share in total value added was 8.7 per cent.

Therefore, the high level of labour productivity in the industrial sector seems to be driven by the mining industry which accounts for 62 per cent of the total industrial output in the region. Twerefou (2009) pointed out that the contribution of mining to employment generation in the region is mostly marginal due mainly to the capital-intensive nature of mining operations.

At the country level, it can be seen that only Mali, Mauritius and Senegal have registered significant rise in the share of labour in industry. The share has also increased slightly in Ethiopia, Ghana and Uganda. In the remaining countries, however, the share of labour in the sector has either declined or stagnated (Table 4.4). Thus, the gradual shift in the workforce from agriculture is more towards services than industry.

Note that most of the countries in the sample during the 1980s and 1990s have had virtually no growth in GDP per capita and it is only during the period 2000-2005 that this trend has been reversed somewhat in many of the countries. The same is also true for the region as a whole. On the other hand, however, the share of labour force in agriculture has dropped in many of these countries though not significantly (barring a few which had more than 10 per cent reduction over the period). What this means is that the agricultural sector lost its labour force not due to rising incomes in the urban economy, but by lack of income opportunities in agriculture (de Janvry & Sadoulet, 2010).

Not only has the pattern of structural change in terms of output and employment been weak in SSA countries but the data also indicate that productivity growth has been either slow or declined over the period 1985-2005. Growth of labour productivity can be achieved through technological progress and/or through shifting resources from low to higher productivity sectors. The latter approach tends to be more important for the developing economies (UN, 2006). Though the available data do not allow a detailed sectoral analysis, based on UNCTAD estimates of agricultural and non-agricultural labour force it is possible to analyse labour productivity in these two broad sectors.

Table 4.4 Sectoral labour force composition (percentage of total employment)

	Agriculture			Industry			Services		
Country	1980-1985*	1990-1995*	1999-2005*	1980-1985*	1990-1995*	1999-2005*	1980-1985*	1990-1995*	1999-2005*
Benin	67.3	63.5	-	7.1	8.1	-	25.5	28.4	-
Botswana		15.6	19.7		25.6	20.9		58.6	58.1
Burkina Faso	92.2	88.8	-	2.8	3.3	-	5	7.5	-
Cameroon	76.9	-	60.6	6.8	-	9.1	14	-	23.1
Côte d'Ivoire	64.8	60	-	8.4	9.6	-	26.8	30.5	-
Ethiopia	88.6	89.3	80.2	2	2.3	6.6	9.5	8.5	13.2
Gabon	65.5	41.6	-	12.2	11.5	-	22.4	46.2	-
Gambia	84.2	64.7	-	6.7	6.1	-	9.1	27.8	-
Ghana	61.1	62.2	55	12.8	10.1	14	26.1	27.9	31.1
Guinea	90.9	87.2	-	1.3	1.9	-	7.8	10.9	-
Guinea-Bissau	87.4	85.3	-	1.5	1.9	-	11.1	12.8	-
Kenya	23	19.1	18.6	21.6	20.4	19.5	55.4	60.5	61.9
Mali	89	85.8	41.5	1.6	2	16.5	9.4	12.2	41.9
Mauritius	29.4	15.9	12.1	24.5	44.3	38.8	42.9	38	49
Mozambique	84.3	82.7	-	7.5	8	-	8.2	9.2	-
Namibia	-	48.2	31.1	-	15	12.2	-	36.4	56
Senegal	80.7	76.7	33.7	6.2	7.5	14.8	13.1	15.8	35.9
Sudan	72.2	69.5	-	8	8.5	-	19.9	22.1	-
Tanzania	83	84.2	82.1	6	4.1	2.6	11	11.7	15.3
Togo	68.8	65.5	-	9.6	10.1	-	21.6	24.4	-
Uganda	-	80.1	68.7	-	3.2	7.8	-	16.2	23.5
Zambia	-	74.7	71.6	-	7	5.8	-	18.3	22.6
Zimbabwe	32.4	24.3	-	27.2	27.9	-	40.4	47.7	-

Note: *Data are for different years during the period specified

Sources: ILO KILM 6th edition and World Bank's African Development Indicators 2006.

Aggregate labour productivity growth can be decomposed into two parts: within-sector productivity growth and reallocation gains. Sectoral reallocation effects arise from reallocating labour from a low productivity to a high productivity sector. Positive reallocation effect shows the increase in efficiency which results when resources move from lower to higher productivity sectors (Syrquin, 1988). Based on this simple decomposition of aggregate labour productivity, it is possible to identify the contribution of at least the two broad sectors to overall productivity growth. The approach follows Syrquin (1986) and Rada and Taylor (2006). Thus, the decomposition technique used is:

$$\xi_L = \sum_i \left[\theta_0^i \left(x^i - l^i \right) + \left(\theta_0^i - \varepsilon_0^i \right) l^i \right] \tag{4.2}$$

where ξ_L represents economy-wide productivity growth, x^i and l^i are output and employment growth in sector *i* respectively and θ_0^i and ε_0^i are output and employment share of sector *i* in period zero respectively. The first term on the right hand side of the equation represents within-sector productivity growth and the second term captures the reallocation effects. If $\theta_0^i > \varepsilon_0^i$, which implies that the sector has relatively high average productivity, then positive employment growth in that sector (or a negative l^i in a sector with $\theta_0^i < \varepsilon_0^i$) will increase overall productivity (Rada and Taylor, 2006).

Economy-wide labour productivity growth has declined in almost half of the sample countries; and the rest of the countries except – Botswana, Mali, Mauritius, Mozambique, Sudan and Uganda – had very slow growth. While Botswana Mauritius, Mozambique and Sudan have registered overall productivity growth of more than 3 per cent, in Mali and Uganda productivity has increased by more than 2 per cent over the period 1985-2005 (Figure 4.6 and Table A4.2 in appendix). However, the overall productivity gains in these six countries were mainly due to the productivity increase within-sectors rather than to the movement of labour from low to high productivity sectors. The six countries which had a relatively higher productivity growth over the period 1985-2005 were also the fast growing countries in the region in terms of output over the same period. Real GDP in Botswana, Mozambique and Uganda has registered more than 6 per cent growth making them the highest growing economies in the region over the period analysed. Mauritius and Sudan had GDP growth rates of more than 5 per cent whereas in Mali the growth rate has been more than 4 per cent over the period (Table A4.2 in appendix). Overall labour productivity growth for the region as a whole decline by 0.3 per cent. Due to lack of considerable labour movement from agricultural to non-agricultural sectors most of the countries in the sample could not gain significant overall productivity growth.

Figure 4.6 Overall labour productivity growth, 1985-2005 (percentage)

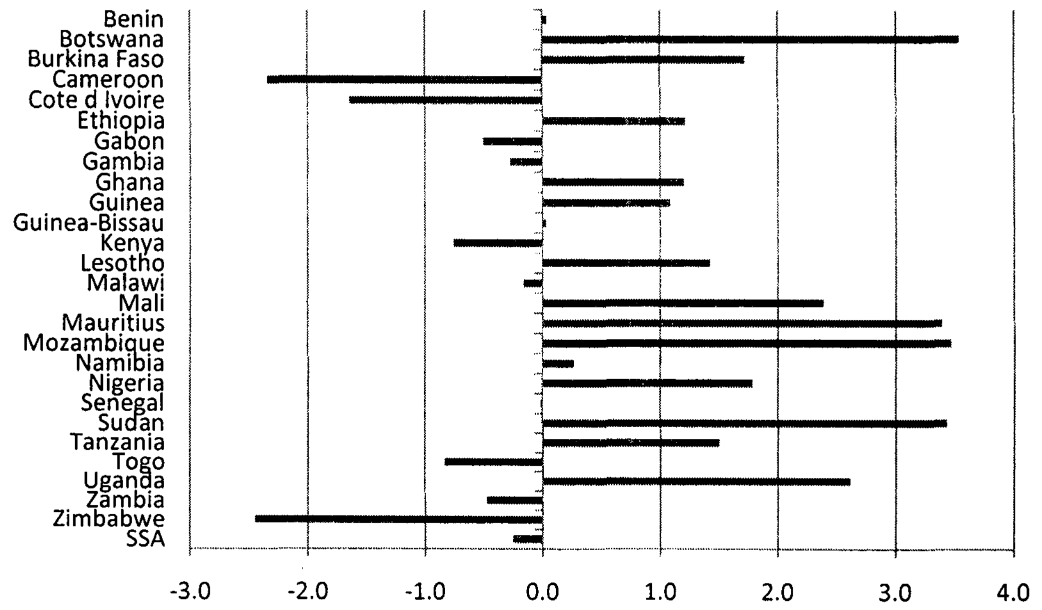


Figure 4.7 Contribution of agricultural sector to productivity growth, 1985-2005 (percentage)

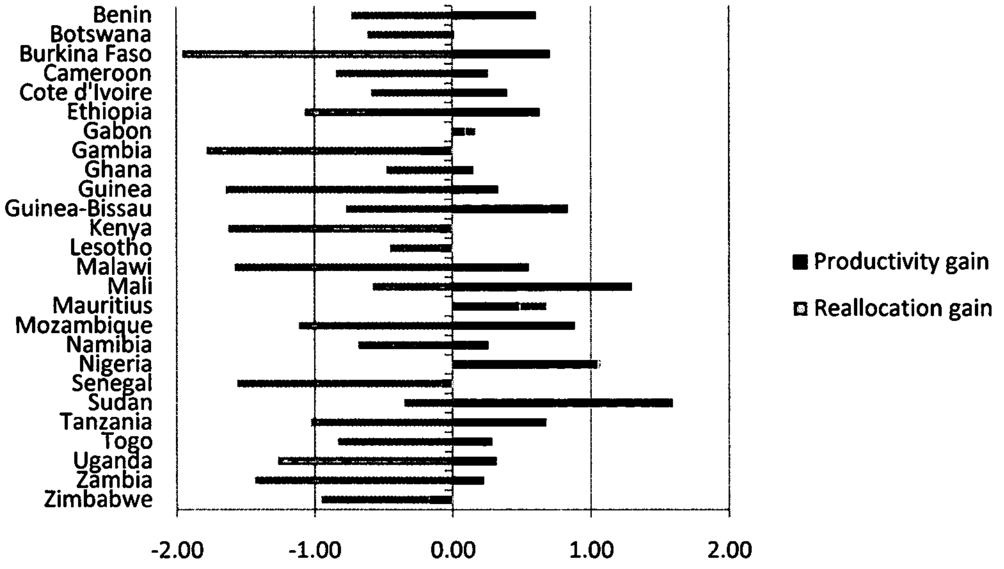


Figure 4.8 Contribution of non-agricultural sector to productivity growth, 1985-2005 (percentage)

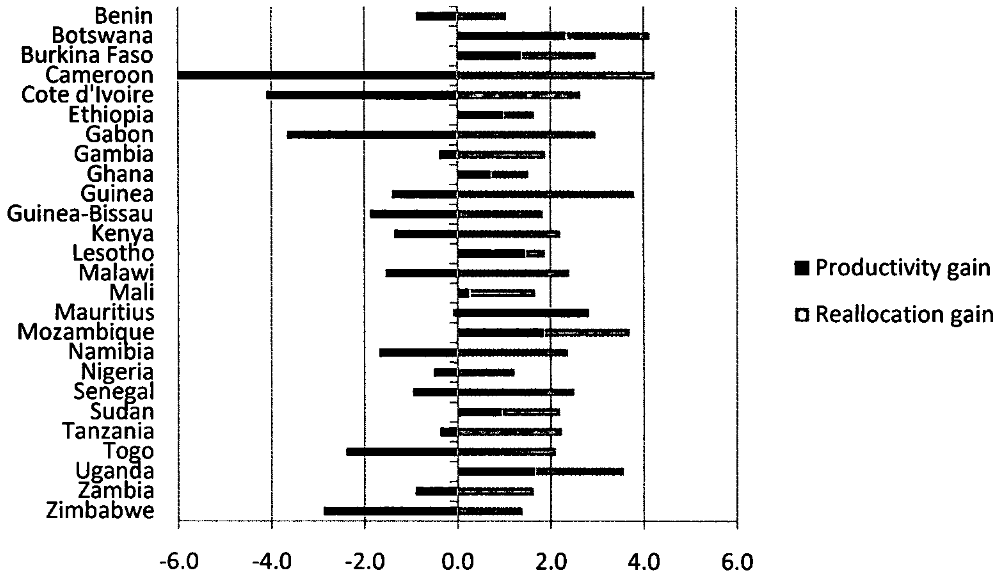


Figure 4.7 and 4.8 summarise direct (i.e. within-sector productivity gain) and reallocation contributions of agricultural and non-agricultural sectors to overall productivity growth. Due to lack of data only the two broad classifications is possible. The non-agricultural sector comprises both industry and services. Hence, the main limitation of this analysis is that productivity growth which has taken place in industry and services sectors can not be accounted for separately.

Agriculture's contribution (i.e. direct plus reallocation gains) to overall productivity growth was either negative or negligible in all countries (Table A4.2 in appendix). In almost all of the countries, reallocation effects of agricultural sector were negative (Figure 4.7). This means that the sector had positive employment growth, though may not be productive one. This is not surprising since labour share in agriculture continues to be significant in the region. The low level of agricultural productivity reflects the fact that a large share of the working population in most of the countries is engaged in agriculture in addition to the lack of technical progress in the sector. Therefore, in line with theories of dualism, the shift of the labour force out of the sector towards high productivity sector, provided that there is enough employment generation outside the agricultural sector, will help in raising overall productivity by easing population pressure on the available land. It also helps in reducing further land fragmentation.

Labour productivity growth (i.e. direct plus reallocation gains) in non-agricultural sector has been positive in most of the countries – albeit still low – barring few countries in which it has declined over the period 1985-2005 (Table A4.2 in appendix). Dividing the productivity growth of the sector into direct and reallocation effect, it can be seen that there is positive reallocation gain in most of the countries. Those which had strongest reallocation gain were Cameroon, Gabon and Guinea. However, within-sector (or direct) productivity gain has declined in more than half of the countries in the sample (Figure 4.8). Botswana had the highest labour productivity growth (direct plus reallocation) in the sector of more than 4 per cent. Those economies which have registered more than 2 per cent labour productivity growth in the sector are: Burkina Faso, Guinea, Mauritius, Mozambique, Sudan and Uganda (see Table A4.2 in appendix).

In many fast growing countries, growth is accompanied by significant positive reallocation of labour from agricultural to non-agricultural sector. This was particularly true of fast growing economies of East and South East Asia and China which were characterized by faster productivity growth by far exceeding the developed countries norm of 2 per cent per year together with significant reallocation effects. Young (1994) in his study on East Asia found that most TFP gains in East Asia derived from inter-sectoral reallocations of labour during the successful take-off period from the 1960s to the early 1990s. Therefore, for sustained economic growth in SSA, it is necessary to promote activities which can generate gainful employment and helps in raising the level of labour productivity. For this to happen the expansion of industrial sector, particularly manufacturing, is a prerequisite.

The following simple regression shows significant relationship between employment structure ratio and production structure ratio. Employment structure ratio is computed as the ratio of non-agricultural employment to agricultural employment while production structure ratio as already defined is the ratio of non-agricultural output to agricultural output. The relationship between the two ratios is shown in Figure 4.9, while the linear regression between the two variables is presented in Table 4.5. The result shows a statistically significant relationship between the two variables with a relatively high R^2 value. The regression implies that a percentage point increase in production structure ratio results in 0.7 point increase in employment structure ratio. The equation also satisfies the diagnostic tests. Thus, the regression in general indicates that the expansion of the non-agricultural sector has a positive and significant effect on employment. Though due to lack of data separate analysis of industrial and services sectors are not possible, it can still be argued that compared to the other two sectors – non-manufacturing industries and services – the expansion of manufacturing sector will have a greater impact on the economy as a whole due to the fact that this sector possesses strong backward and forward linkages.

Figure 4.9 Employment structure ratio versus production structure ratio, 1985-2005

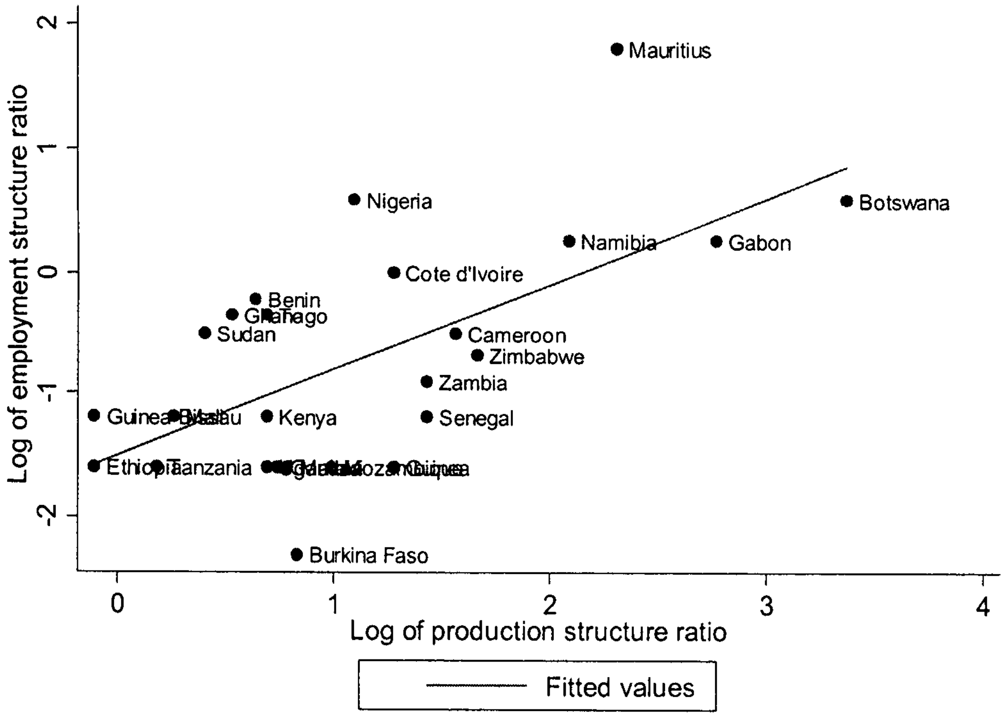


Table 4.5 Regression of employment structure ratio on production structure ratio, 1985-2005

Dependent variable: Log of employment structure ratio		
Log of production structure ratio		0.703 (0.180)***
Constant		-1.513 (0.250)***
R^2		0.40
Number of observations		25
Diagnostic tests		
Normality $\chi^2(2)$	$= 1.06$	$Prob > \chi^2 = 0.58$
Heteroscedasticity $F(1, 23)$	$= 0.40$	$Prob > F = 0.53$

Notes: The figures in parentheses are standard errors.
*** indicates significance at 1 per cent level.

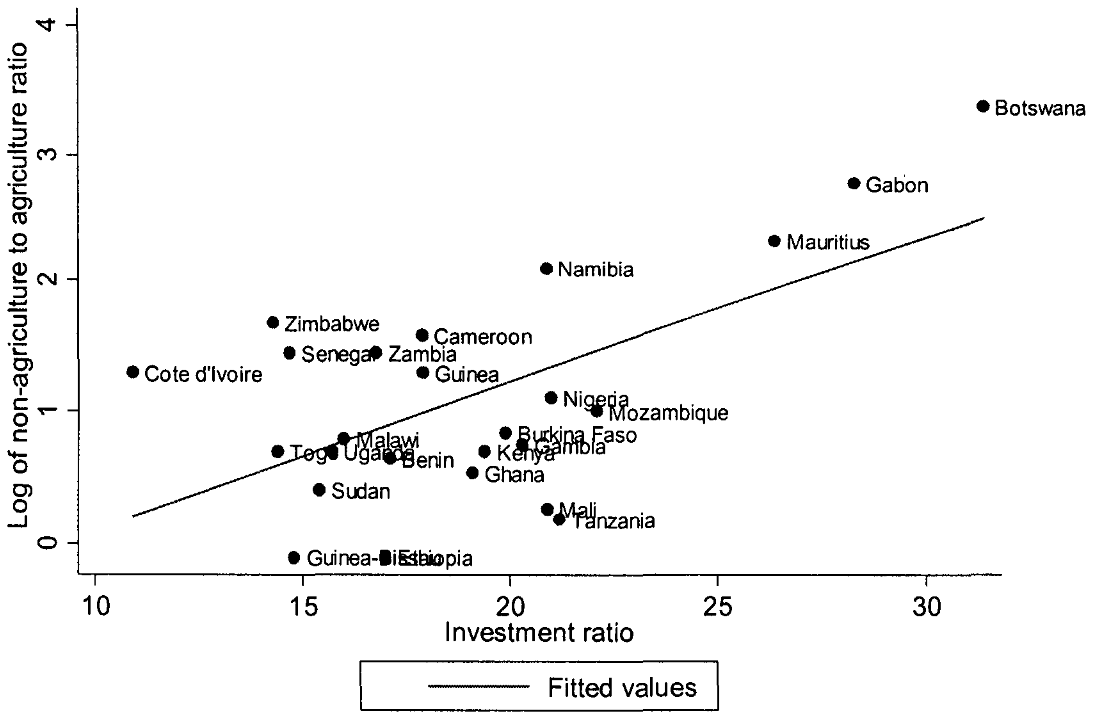
However, industrial development in SSA is constrained both by external and domestic factors. As already discussed, since most of the countries are dependent on primary commodities for their export earnings, the decline in the commodity prices puts constrains on the import of raw materials, spare parts and new machineries for investment. Moreover, the volatility of export earnings also affects the industrial sector. On the domestic front, the low purchasing power of agricultural population reduces the performance of the industrial sector by curtailing domestic demand. This latter point was emphasised by Kaldor (1967) as the main determinant of the growth of the industrial sector during the early stages of industrialisation. Therefore, improving the purchasing power of the peasantry is crucial to the industrialisation drive.

4.2.3 Investment and Structural Change

Capital formation is essential to economic growth, as it is a major carrier of technological change and productivity increases. This fact has been confirmed by the regression analysis of the 26 SSA countries which is reported in Chapter 3. The countries that experienced high level of structural transformation such as East and South East

Asian countries and China, have recorded the largest increases in investment ratio. In contrast, in SSA investment ratio has remained virtually stagnant since mid 1980s. As discussed in Chapter 2, SSA has the lowest ratio of gross capital formation to GDP among all other developing regions. In fact, the region was not able to recover to the level of investment rate it had during the 1970s.

Figure 4.10 Non-agricultural to agricultural output ratio versus investment ratio, 1985-2005



Capital accumulation is also a catalyst of structural change. Figure 4.10 shows that the ratio of non-agricultural to agricultural output is closely associated with investment ratio. The ratio of non-agriculture to agriculture is used as a proxy of structural change indicator. The same fact is also confirmed by a simple linear regression between non-agriculture to agriculture ratio and investment ratio which is reported in Table 4.6. The result shows a positive and statistically significant relationship between the two variables with a relatively high R^2 value. The equation also satisfies the diagnostic tests. The regression implies that a percentage point increase in investment ratio results in 0.11 point increase in the ratio of non-agricultural output to agricultural output. However, at this point the familiar question regarding causality might arise. But without going into detail discussion, it suffice to say that there is mutually reinforcing linkages between capital accumulation and structural change which constitute the basis for sustained economic growth.

Table 4.6 Regression of non-agriculture to agriculture output ratio on investment ratio, 1985-2005

Dependent variable: Log of non-agriculture to agriculture output ratio	
Investment ratio	0.112 (0.030)***
Constant	-1.017 (0.595)
R^2	0.37
Number of observations	25
Diagnostic tests	
Normality χ^2 *(2) = 3.26*	*Prob >* χ^2 *= 0.19*
Heteroscedasticity F(1, 23) = 0.02	*Prob > F = 0.89*

Notes: The figures in parentheses are standard errors.
*** indicates significance at 1 per cent level.

4.3 SUMMARY

One of the characteristics of SSA's economic performance is the lack of structural transformation. In this chapter we have analysed the extent of structural change in terms of output and employment. The main findings which emerge from the analysis is that with regard to the structure of output, no significant structural change has taken place in terms of shifts in the structure of production towards the manufacturing sector in most of the countries during 1980-2005. One of the factors which hampers the structural transformation of the region is the low level of investment. A simple regression analysis shows that there is a positive and statistically significant relationship between the ratio of non-agricultural to agricultural output (used as a proxy of structural change indicator) and investment ratio.

The structure of exports has also remained largely the same, still highly dependent on primary commodities. In fact, over the years the range of products exported by some of the SSA countries has reduced thereby making exports concentrated on even fewer products.

As far as the structure of employment is concerned, traditional agriculture still continues to absorb the majority of the labour force in most of the countries. The share of labour in industry in most of the countries has either declined or stagnated. In many of the countries the gradual decline in the share of employment in agriculture is absorbed by services sector rather than industry.

Not only has the pattern of structural change in terms of output and employment been weak in SSA countries, but productivity growth has also been either slow or declined in many of the countries. Overall labour productivity growth, in most of the countries, was entirely driven by the non-agricultural sector. We have attempted to decompose aggregate labour productivity growth into within-sector productivity growth and reallocation effect. In most of the countries, the overall productivity gains were mainly due to within-sector productivity growth rather than to the movement of labour from low to high productivity sectors.

CHAPTER 5

STRUCTURAL CHANGE IN A KALDORIAN PERSPECTIVE

In the post-World War II period much of the literature on economic development considered economic growth as intrinsically linked to changes in the structure of production. This was an essential insight of classical development economics. Similar notions are also embedded in the growth theories of Nicholas Kaldor.

Kaldor provided the theoretical rationale for regarding manufacturing as the leading sector in economic growth (Dasgupta and Singh, 2007). He argued that it is not possible to understand the growth process without taking a sectoral approach, distinguishing between increasing and decreasing returns activities (Kaldor, 1966; 1967). He associated increasing returns activities with industry whereas diminishing returns with the land-based activities. Kaldor regarded manufacturing in particular and industry in general, as an 'engine of growth' i.e. the key sector in propelling economic growth. The reason for this is that manufacturing as opposed to land-based activities allows for extensive division of labour as market grows and this has spill-over effects on the rest of the economy. In the words of Kaldor (1966):

> It is the rate of growth of manufacturing production (together with the ancillary activities of public utilities and construction) which is likely to exert a dominating influence on the overall rate of economic growth: partly on account of its influence on the rate of growth of productivity in the individual sector itself, and partly also because it will tend, indirectly, to raise the rate of productivity growth in other sectors….And of course it is

true more generally that industrialisation accelerates the rate of technological change throughout the economy.

The notion of 'engine of growth' is based on the argument that there is surplus labour or disguised unemployment outside the manufacturing sector, so that labour can be withdrawn from them without adverse effects on the output of those sectors (Kaldor, 1968). Therefore, he concluded that the rate at which this surplus labour is transferred from the low-productivity non-industrial sectors to the high productivity industrial sector partly determines the growth rate of productivity and output in the economy as a whole. In his view, the rate of growth of manufacturing sector, rather than its absolute size, was of prime importance.

He also emphasised the role agriculture plays in the process of industrialisation, not so much by providing the supply of essential wage goods emphasised by Lewis, but by creating demand for industrial goods (Bhaduri, 2003). He pointed out that if one is looking for some general cause which is common to most countries in hampering the process of industrialisation, it is the backwardness and stagnation of agriculture since the growth of the secondary and tertiary sectors is dependent on the growth of the agricultural surplus (Kaldor, 1967). Thus, Kaldor emphasised the role of agriculture as a generator of effective demand for industrial output. However, Bhaduri (2003) pointed out that agricultural surplus generates demand for industrial goods only by first being converted into monetary purchasing power. Thus, in a closed economy setting and without an agricultural support price system by the government, it is industry which provides this market (Bhaduri, 2003). Therefore, the two sectors are mutually dependent on each other as a source of supply and demand.

5.1 THE HYPOTHESIS

Formally, the 'engine of growth' hypothesis is presented in three related laws or empirical generalisations (Thirlwall, 2002). The first law states that there exists a strong positive relation between the growth of manufacturing output and the growth of GDP not simply in a definitional sense since manufacturing output is a component of GDP but in a fundamental causal sense. This is due to the fact that this sector possesses strong backward and forward linkage effects than other sectors. Moreover, capital accumulation and technical progress are strongest in the industrial sector, having important spillover effects on the rest of the economy (Felipe et al., 2009). Kaldor specified the laws as relationships between growth rates. Therefore, in a linear form, the first law is given by

$$g_{GDP} = \alpha + \beta g_m \qquad \beta > 0 \qquad (5.1a)$$

where g_{GDP} is the rate of growth of GDP and g_m the growth rate of manufacturing sector. However, equation (4.1a) could yield spurious results because manufacturing production is part of the total output. The rate of growth of GDP is by definition equal to the weighted average of the growth of manufacturing and non-manufacturing sectors, where the weights are the relative share of the corresponding sectors. In order to overcome this problem Kaldor (1966; 1967) suggested an alternative specification which regresses the rate of growth of non-manufacturing output on the growth of manufacturing output, i.e.

$$g_{nm} = \alpha + \beta g_m \qquad \beta > 0 \qquad (5.1b)$$

where g_{nm} is the rate of growth of non-manufacturing output. Similar regressions have to be estimated for agriculture, industry and services to examine their capacity as engines of growth because for manufacturing in particular, and industry in general, to be regarded as an engine of growth, it needs to be shown that there is no significant relationships between growth rate of GDP and the growth of other sectors. The mechanism through which fast growing industrial sector produces higher output growth for an economy as a whole is partly through its influence on the rate of growth of productivity in the industrial sector itself, and partly also because it will tend, indirectly, to raise the rate of productivity growth in non-industrial sector (Kaldor, 1966). Thus, this leads us to the second and third laws.

The second law states that there is a strong positive relation between the growth of labour productivity in manufacturing and the growth of manufacturing output because of both static and dynamic increasing returns to scale[1]. Following Allyn Young (1928), Kaldor conceives of increasing returns as a macroeconomic phenomenon. This law is also known as Verdoorn's law. It is specified as:

$$p_m = \alpha + \beta g_m \qquad \beta > 0 \tag{5.2a}$$

or, since $p_m = g_m - e_m$, equivalently as

$$e_m = -\alpha + (1-\beta) g_m \qquad 0 < (1\text{-}\beta) < 1 \tag{5.2b}$$

where p_m and e_m are the rate of growth of labour productivity and employment in manufacturing sector respectively. The two equations are two ways of looking at the same relationship and suggest that output growth is an important determinant of

[1] Static returns relate to size and scale of production, while dynamic returns relate to learning by doing and technical progress embodied in capital accumulation (Thirlwall, 1983).

productivity growth (Kaldor 1966). However, Kaldor (1975a) preferred Equation (5.2b) because he regarded "the existence of a significant relationship between the growth of employment and output as the main test for deciding whether the Verdoorn Law asserts something significant about reality or whether it is a simple statistical mirage". He further argued that if "e_m is zero or a constant then there must be a perfect correlation between p_m and g_m but one which does not assert anything since it is the automatic consequence of measuring the same thing twice over". Empirical estimations of a Verdoorn coefficient (β) have usually been around one-half. Kaldor interpreted the above correlations as evidence of increasing returns to scale since a one percentage point increase in output growth induces an increase of about one-half percentage point in employment growth and an equivalent increase in the growth of labour productivity. This suggests that a substantial proportion of technical change is endogenous, in the sense that it is induced by the growth of output (Fingleton & McCombie, 1998). In other words, the causality runs from the growth of output to the growth of productivity. But those who argue for the reverse causality point out that faster productivity growth causes demand to expand faster through relative price changes and therefore all productivity growth would be autonomous. However, Kaldor (1966) argued that if this were the case, how is one to explain the large differences in productivity growth in the same industry over the same period in different countries? Besides, the reverse causation argument would be a denial of the existence of increasing returns which is an important feature of manufacturing activities.

However, the Verdoorn's specification above ignores the contribution of the growth of the capital stock and therefore a more correctly specified Verdoorn law is:

$$p_m = \alpha + \beta_1 g_m + \beta_2 k \qquad (5.2c)$$

where k is the growth of capital. McCombie and de Ridder (1984) pointed out that the Verdoorn coefficient (β) from equation (5.2a) will be biased by the omission of capital stock unless g_m and k are orthogonal. We have not been able to take into account the differences in the growth of the capital stock due to the lack of data.

The third law states that labour productivity growth in the economy as a whole is positively related to the growth of output in the manufacturing or industrial sector due to the fact that the faster the rate of growth of manufacturing output, the faster the rate of labour transference from other sectors of the economy to manufacturing sector (Thirlwall, 1983). So a reduction in the amount of labour in non-manufacturing sectors will raise productivity growth in those sectors. As a consequence of this and because of the increasing returns in manufacturing, there will be a correlation of overall productivity growth with the growth of manufacturing output. Looked at differently, there is a negative relation between overall productivity growth and the rate of growth of employment outside manufacturing. Kaldor's formulation of this hypothesis is to regress GDP growth on the growth of employment in manufacturing sector (Kaldor, 1968). Thus

$$g_{GDP} = \alpha + \beta e_m \qquad \beta > 0 \qquad (5.3a)$$

The positive correlation in equation (4.3a) could only be consistent with the absence of any correlation between GDP growth and the growth of total employment (Kaldor, 1968).

The alternative specification proposed by Cripps and Tarling (1973) regresses productivity growth in the economy as a whole on the growth of non-manufacturing employment, controlling for the growth of manufacturing output in order to isolate the Verdoorn effect. The equation to be estimated is thus:

$$p_T = \alpha + \beta_1 g_m + \beta_2 e_{nm} \qquad \beta_1 > 0,\ \beta_2 < 0 \qquad (5.3b)$$

where p_T represents the growth of overall productivity and e_{nm} is the rate of growth of employment in the non-manufacturing sector.

These laws bring together the notion of 'engine of growth', 'economies of scale' and 'sectoral shifts' in a simple and informative way (Felipe et al., 2009). The implication of these stylized facts is that some sectors play a pivotal role in pulling up the rest of the economy and generating productivity gains through economies of scale.

5.2 AN EMPIRICAL EXAMINATION OF KALDOR'S LAWS

Kaldor (1966; 1967) employed cross-sectional data to estimate the relationship. Some authors have used time series data for individual countries. More recent research, however, resorted to panel data (see Felipe et al., 2009; Libanio, 2006). Panel data technique offers a number of advantages over pure cross-sectional data. It increases the sample size and thereby improving the power of statistical tests and estimators. Moreover, it allows us to exploit the presence of cointegration.

Studies testing Kaldor's law across African countries are almost non existent (at least to my knowledge) except the paper by Wells and Thirlwall (2003) which takes 45 countries in Africa (including both North Africa and SSA) over the period 1980-1996 and using simple cross-section regression technique, it shows that there is some empirical support for Kaldor's laws for the countries of Africa[2]. The present study uses both cross-section and panel cointegration method (depending on the availability of data) to test the relevance of Kaldor's model for a sample of 26 countries in SSA. Panel estimation offers several potential advantages including additional degrees of freedom resulting in more efficient estimation. It also allows controls for country-specific effects that cross-section estimates cannot address. The study also extends the time period beyond that of Wells and Thirlwall (2003) spanning from 1985 to 2005. The period after mid 1990s is particularly important as many of the countries in SSA have shown growth recovery since then. The data are obtained from World Bank's African Development Indicators for sectoral value added series, ILO for employment data, UNCTAD for agricultural labour force data and UNIDO for manufacturing employment.

First we start with the cross-section regression analysis in order to analyse the existence of the relationships between the relevant variables. This is the methodology used by authors like Wells and Thirlwall (2003), Dasgupta and Singh (2007) and by Kaldor himself. The tests for the first and third laws have been performed in terms of the relationships between growth rates of the relevant variables for the period 1985-2005 and 1991-2005 respectively. However, in the case of the second law due to lack of data on sectoral employment at regular intervals, the relationships between log levels of variables for the year 1990 and 2000 is estimated using panel estimation technique.

The second method used to analyse the relationships between the relevant variables is the panel cointegration method. Two variables are said to be cointegrated if

[2] However, Wells and Thirlwall (2003) did not test the second law for the manufacturing sector.

each is non-stationary i.e. *I(1)* but there is some linear combination of the two which is stationary i.e. *I(0)*. Therefore, the first step in our analysis is to test whether the variables are stationary or not. We consider three panel unit root tests proposed by Harris and Tzavalis (1999), Im et al. (2003) and Pesaran (2007) for testing unit root for a panel of 26 sub-Saharan African countries. The first two tests assume cross-sectional independence. The null hypothesis for the Harris and Tzavalis (HT) test is that each individual series in the panel contains a unit root against the alternative that each series is stationary. However, as Baltagi (2005) pointed out, the assumption that all cross-sections have or do not have a unit root is restrictive. On the other hand, the null hypothesis for the Im, Pesaran and Shin (IPS) test is that all series in the panel contain a unit root against the alternative that some (but not all) of the individual series have unit roots. Since the two tests of HT and IPS assume cross-sectional independence, they are not applicable if cross-sectional correlation is present. In fact, macro time series exhibit significant cross-sectional correlation among the countries in the panel (Baltagi, 2005). It is very likely that there might be cross-sectional correlation among the 26 countries in SSA due to exposure to common global shocks, such as changes in commodity prices. Therefore, to account for the existence of cross-sectional dependence we use the third test suggested by Pesaran (2007) which is robust to cross-sectional dependence. This test proposes as its null hypothesis that all cross-section units in the panel are non-stationary against the alternative that all or only a fraction of the series are stationary. All the tests are suitable for modest-sized database (for the first law, we have N=26, T=21 and in the case of the third law N=26, T=15). We have tested for the presence of unit roots both with and without a time trend.

The results are reported in Table A5.1 in the appendix. Based on the panel unit root tests proposed by HT and IPS we accept the null hypothesis that the series are non-stationary for all variables for Model 1(i.e. excluding a trend) at 5 per cent level of significance. However, once we include a linear time trend in the equation the null hypothesis can be rejected for the variables of non-industrial output and agricultural output in both the tests and for non-services output and agricultural labour under IPS test at the usual level of significance. In the case of Pesaran's test, which takes into account the existence of cross-sectional dependence in the panel, we are unable to reject the null hypothesis for all the variables in both the Models (i.e. with and without a trend) except for the variables of non-industrial output under Model 1 and agricultural labour under both the Models. Overall, we can conclude that the series contain unit roots, i.e. they are non-stationary. The variables are also integrated of order one, i.e. *I(1)*, and thus turn stationary if transformed into first differences (see Table A5.2 in the appendix).

Having found that the variables are non-stationary and $I(1)$, we proceed to examine whether the variables are cointegrated or not. For testing panel cointegration, the four error correction based tests suggested by Westerlund (2007) are employed. These tests avoid the problem of common factor restrictions unlike the residual based cointegration tests.[3] The tests have good small-sample properties and are designed to test for cointegration by testing the significance of the error correction term in a conditional error correction model. Therefore, a rejection of the null hypothesis of no error-correction

[3] The residual based tests require that the long-run cointegrating vector for the variables in levels is equal to the shot-run adjustment process for the variables in the first differences. This is referred to as the common factor restriction. A failure to satisfy the restriction can cause a significant loss of power for residual-based cointegration tests (see Westerlund, 2007).

can be viewed as a rejection of the null hypothesis of no cointegration. There are two sets of statistics – two group mean statistics (i.e. G_t and G_a) and two panel statistics (i.e. P_t and P_a). Both sets of statistics take no cointegration as the null hypothesis. The alternative hypothesis for the group mean statistics is that there is at least one cross-sectional unit that is cointegrated, while the other set of statistics test the alternative that the panel is cointegrated as a whole. We focus on the panel statistics since our interest lies in the average relationship across countries.

Based on these tests we reject the null hypothesis of no cointegration between non-industrial output and industrial output at 1% level of significance. The null of no cointegration between non-manufacturing output and manufacturing output and between non-service output and service output are rejected at 1% and 10% level of significance for P_t and P_a respectively. Therefore, this suggests a possible long run relationship between these cointegrating variables. On the other hand, there seems to be no cointegration between the series of non-agricultural output and agricultural output. The null hypothesis of no cointegration can not be rejected in the case of the third law as well, i.e. between the variables of total productivity, agricultural labour and industrial output (see Table A5.3 and A5.4 in the appendix).

The panel estimation techniques used in this analysis are the fixed effects (FE) estimator and first difference (FD) estimator depending on whether the variables are cointegrated or not. Under the FE estimator individual time-series data are pooled and only the intercepts are allowed to differ across the countries assuming slope homogeneity. The assumption of homogeneity of slope parameters is often inappropriate and if the slope coefficients are not identical, then the FE estimator can produce inconsistent estimates. However, Baltagi et al. (2000) argued that although some bias may be created, the efficiency gains from the pooling more than offset this.

To address this concern we compare the FE estimator with two competitor estimators: the mean-group (MG) estimator proposed by Pesaran and Smith (1995) and the pooled mean-group (PMG) estimator proposed by Pesaran et al. (1999). The MG estimator is obtained by estimating separate cointegrated equations for each group followed by a simple arithmetic average of the estimated coefficients. Thus, under the MG estimator the intercepts, slope coefficients and error variances are allowed to differ across cross-sectional units in the panel. The MG estimator performs reasonably well for large T relative to N. On the other hand, PMG estimator combines both pooling and averaging of coefficients. It takes an intermediate approach between MG and FE estimators by allowing the intercepts, short-run coefficients and error variances to differ across countries but pools the data and constrains the long-run coefficients to be the same across countries. The Hausman test is used to determine which of the three estimators are efficient.

Finally, FD estimator is used when the variables are found to be non-stationary but not cointegrated in order to avoid spurious results. In this case, we take the first difference of each variable to make the series stationary. Then we use pooled OLS on the differenced data.

5.2.1 Estimation Results and Analysis

The result for the first law is reported in Table 5.1 and Table 5.2 below. Table 5.1 reports the cross-section regression analysis. Equation 1–4 estimates the rate of growth of GDP on the growth of sectoral value added. The results from these regressions confirm Kaldor's hypothesis that industrial sector in general and manufacturing in particular plays the role of the 'engine of growth' for the economy as a whole due to the forward and backward linkage effects of these sectors. A 1% increase in industrial output growth corresponds to 0.6% increase in the rate of growth of GDP. The slope coefficient is statistically significant at 1% level. The coefficient which is significantly less than unity also implies that the greater the excess of the rate of growth of industrial output over the rate of growth of GDP, the faster the overall growth rate. There is also strong correlation between GDP growth rate and the growth of manufacturing output though the magnitude of the coefficient and the R^2 is lower compared to the industrial sector as a whole. All the diagnostic tests: the Jarque-Bera test for normality, Breusch-Pagan heteroscedasticity test and the Ramsey test for functional form are satisfied in both the equations.

For the industrial sector in general and manufacturing in particular to be regarded as a driving force behind GDP growth, it needs to be shown that similar results are not obtained for other sectors. As we can see from Eqn. 1, there is no correlation at all between growth of GDP and agricultural output growth, and the R^2 value is extremely low. The result for the service sector is somewhat different. There is statistically significant relationship between the growth of GDP and growth of service value added. However, it fails to pass the normality test at 1% level. In the Kaldorian analysis, the demand for service is considered to be the by product of the demand for industrial output

(Kaldor, 1968). Service activities such as transportation, retailing, banking services, etc. are largely dependent on the expansion of industrial activities. Dasgupta and Singh (2007) argued that this consideration is much less applicable to service activity such as IT. In the case of SSA, however, the IT sector is almost non existent and therefore the traditional Kaldorian argument about the service sector is more applicable.

Table 5.1 Cross-sectional regression estimates of Kaldor's first law, 1985-2005

Eqn. 1	Growth of GDP on growth of agricultural output	
	$g_{GDP} = 2.668 + 0.325g_a$ $(0.855)^{***}$ $(0..251)$	$R^2 = 0.07$ *Normality* χ^2 *(2) = 2.54* *Heteroscedasticity F(1, 24) = 4.79*** *Functional Form F(3, 21) = 0.24*
Eqn. 2	Growth of GDP on growth of industrial output	
	$g_{GDP} = 1.297 + 0.602g_i$ $(0.302)^{***}$ $(0.062)^{***}$	$R^2 = 0.79$ *Normality* χ^2 *(2) = 2.22* *Heteroscedasticity F(1, 24) = 1.25* *Functional Form F(3, 21) = 1.39*
Eqn. 3	Growth of GDP on growth of manufacturing output	
	$g_{GDP} = 1.649 + 0.505g_m$ $(0.548)^{***}$ $(0.117)^{***}$	$R^2 = 0.44$ *Normality* χ^2 *(2) = 1.28* *Heteroscedasticity F(1, 24) = 0.88* *Functional Form F(3, 21) = 0.60*
Eqn. 4	Growth of GDP on growth of service output	
	$g_{GDP} = 0.956 + 0.656g_s$ $(0.489)^{*}$ $(0.104)^{***}$	$R^2 = 0.62$ *Normality* χ^2 *(2) = 20.76**** *Heteroscedasticity F(1, 24) = 0.66* *Functional Form F(3, 21) = 1.13*
Eqn. 5	Growth of non-agricultural output on growth of agricultural output	
	$g_{na} = 3.145 + 0.165g_a$ $(1.012)^{***}$ (0.296)	$R^2 = 0.01$ *Normality* χ^2 *(2) = 0.87* *Heteroscedasticity F(1, 24) = 2.49* *Functional Form F(3, 21) = 0.24*

(continued)

Table 5.1 (continued)

Eqn. 6	Growth of non-industrial output on growth of industrial output	
	$g_{ni} = 2.255 + 0.417g_i$	$R^2 = 0.42$
	$(0.479)^{***}$ $(0.099)^{***}$	$Normality\ \chi^2(2) = 6.69^{**}$
		$Heteroscedasticity\ F(1, 24) = 0.23$
		$Functional\ Form\ F(3, 21) = 3.07^{*}$
Eqn. 7	Growth of non-manufacturing output on growth of manufacturing output	
	$g_{nm} = 1.897 + 0.448g_m$	$R^2 = 0.34$
	$(0.599)^{***}$ $(0.128)^{***}$	$Normality\ \chi^2(2) = 1.07$
		$Heteroscedasticity\ F(1, 24) = 0.79$
		$Functional\ Form\ F(3, 21) = 0.56$
Eqn. 8	Growth of non-service output on growth of service output	
	$g_{ns} = 1.679 + 0.479g_s$	$R^2 = 0.31$
	$(0.680)^{**}$ $(0.144)^{***}$	$Normality\ \chi^2(2) = 5.85^{*}$
		$Heteroscedasticity\ F(1, 24) = 0.02$
		$Functional\ Form\ F(3, 21) = 1.45$

Notes: Standard errors are shown in parentheses. Number of observations are 26.
*** indicates significance at 1 per cent level.
** indicates significance at 5 per cent level.
* indicates significance at 10 per cent level.

As discussed earlier, Equations 1–4 may produce spurious regression estimates because each sectoral output is part of the total output itself. To eliminate this spurious effect, we regress the rate of growth of non-agricultural output, non-industrial output, non-manufacturing output and non-service output on the growth of agricultural output, industrial output, manufacturing output and service output respectively. The results are given in Equations 5–8 and confirm the earlier estimates. There is no correlation between the rate of growth of non-agricultural output and the growth of agricultural output with extremely low R^2 value. As far as the industrial output is concerned, the coefficient is highly significant at 1% level, but fails to pass the normality test and Ramsey test for functional form at 5% and 10% level respectively. However, upon further investigation, Gabon appears as an outlier. When the model is re-estimated excluding Gabon, the equation becomes:

$$g_{ni} = 1.896 + 0.478 g_i \qquad R^2 = 0.52$$
$$(0.468)^{***} \ (0.095)^{***}$$

The coefficient is still significant at 1% level and its magnitude has also increased with improved R^2 value. The equation now satisfies the Ramsey test for functional form, but still fails to satisfy the normality test at the 10% level. On the other hand, there is strong correlation between the rate of growth of non-manufacturing output and the growth of manufacturing output and the diagnostics are all satisfactory. The coefficient for service output in Eqn. 8 is also significant at 1% level but do not satisfy the normality test at the 10% level.

The panel regression results are shown in Table 5.2. In the panel regression, the equations were estimated not in growth rates but in log levels using cointegration techniques whenever it is applicable. We used fixed effects (FE) estimator when there is cointegration between the variables. However, we also compare the FE estimator with the mean-group (MG) and pooled mean-group (PMG) estimators. Alternative estimates of the MG and PMG estimators are presented in Table A5.5 in the appendix. Hausman test is used to compare all the three estimators: the FE, MG and PMG. From this test we conclude that the FE estimator outperforms the other two estimators (see Table A5.6 in the appendix). On the other hand, when the variables are non-stationary but not cointegrated, we used first difference (FD) estimator in order to avoid spurious results.

The panel estimates confirm the results we obtained from the cross-section regression. The coefficients for industrial output, manufacturing output and service output are all statistically significant at 1% level. The R^2 is also high for all the three equations. However, there is no correlation between non-agricultural output and agricultural output. Our result, therefore, seems to be more robust compared to the earlier study by Wells and Thirlwall (2003).

Table 5.2 Panel regression estimates of Kaldor's first law, 1985-2005

	Dependent Variables	Explanatory Variables	Coefficient	R^2	No. Obs
Eqn. 1	Non-agricultural output	Constant	0.047 (0.006)***	0.05	520
		Agricultural output	0.056 (0.042)		
Eqn. 2	Non-industrial output	Constant	3.263 (0.495)***	0.67	546
		Industrial output	0.673 (0.075)***		
Eqn. 3	Non-manufacturing output	Constant	3.970 (0.384)***	0.68	546
		Manufacturing output	0.698 (0.067)***		
Eqn. 4	Non-service output	Constant	1.741 (0.474)***	0.72	546
		Service output	0.785 (0.065)***		

Notes: All variables are expressed in natural logarithm. The figures in parentheses are standard errors corrected for heteroscedasticity. All the estimations are carried using fixed effects estimator except Eqn.1 where first difference estimator is used.
*** indicates significance at 1 per cent level.

The similarity of the results between the cross-section and panel regression analysis for the first law indicates the robustness of the estimates. Therefore, from the above analysis we can conclude that Kaldor's hypothesis which states that the faster the rate of growth of the industrial (or manufacturing) sector, the faster will be the rate of growth of GDP appears to be valid in the case of the 26 countries of SSA analysed here. In fact, the only countries in the sample with relatively rapid manufacturing growth which did not experience fast GDP growth were Côte d'Ivoire, Gabon, Togo and Zambia.

Table 5.3 Panel regression estimates of Kaldor's second law

	Dependent Variables	Explanatory Variables	Coefficient	R^2
Eqn. 1	Log industrial employment	Constant	-8.061 (3.468)**	0.60
		Log industrial output	1.011 (0.249)***	
Eqn. 2	Log industrial productivity	Constant	8.059 (3.467)**	0.00
		Log industrial output	-0.011 (0.249)	
Eqn. 3	Log agricultural employment	Constant	9.490 (6.764)	0.01
		Log agricultural output	-0.132 (0.484)	
Eqn. 4	Log agricultural productivity	Constant	-9.488 (6.764)	0.33
		Log agricultural output	1.132 (0.484)**	
Eqn. 5	Log service employment	Constant	-6.093 (3.105)*	0.61
		Log service output	0.894 (0.212)***	
Eqn. 6	Log service productivity	Constant	6.094 (3.105)*	0.02
		Log service output	0.105 (0.212)	
	Number of observations		24	

Notes: The figures in parentheses are standard errors. All the estimations are carried using fixed effects estimator.
*** indicates significance at 1 per cent level.
** indicates significance at 5 per cent level.
* indicates significance at 10 per cent level.

Regression of Kaldor's second law (or Verdoorn's law) was estimated using logarithmic values of the levels by pooling data for a subsample of 12 countries for the year 1990 and 2000 due to lack of data on sectoral employment at regular intervals. This is the 'static' version of Verdoorn's law as opposed to the 'dynamic' version which is a relationship between rates of growth of productivity and output. The results are presented in Table 5.3. The coefficient for industrial employment is significant at 1% level but not significantly different from unity implying no effects of economies of scale on productivity. In other words, any increase in output requires a corresponding increase in employment. This fact has been ascertained by regressing industrial productivity on industrial output. The estimate shows that there is no correlation whatsoever between industrial productivity and output. The same kind of result is also obtained for services. Agriculture, however, reveals a different picture. The regression coefficient for agricultural employment is not significantly different from zero while the productivity coefficient is significant at 5% level but not significantly different from unity indicating the existence of disguised unemployment in this sector.

It was expected, a priori, that the industrial sector should exhibit increasing returns to scale. Kaldor (1966), however, emphasised that the relationship between productivity and output is a dynamic rather than a static relationship, i.e. between the rates of growth of productivity and output, rather than between the levels of productivity and output. McCombie (1982), using data for the advanced countries, in fact found that the log levels (or static) estimates of the Verdoorn coefficient obtained by regressing log of employment on log of output either do not differ significantly from unity or the estimate is small being around 0.9 compared to the typical value of 0.5 found when the dynamic Verdoorn law is estimated. The explanation for this paradox may either be purely statistical or theoretical. McCombie and de Ridder (1984) argued that the most plausible interpretation of the Verdoorn law is that it is a specification of Kaldor's linear technical progress function. However, it has been shown that Kaldor's technical progress function may be derived from a conventional Cobb-Doglas production function, so one possible underlying structure of the Verdoorn law is:

$$\ln E = \alpha + \beta \ln Y \tag{5.4}$$

where E and Y are the levels of employment and output respectively. If this is the correct underlying specification of the dynamic Verdoorn law, then both the static and dynamic functions should demonstrate the same degree of returns to scale. Since that is not the case, the implication may be that the traditional Cobb-Douglas production function may not be the correct structure underlying the Verdoorn law and so the static law will be mis-specified and will yield biased estimates of the returns to scale (McCombie and de Ridder, 1984).

However, estimation of Verdoorn's law for manufacturing sector using the same methodology gives us somewhat different picture. Data on manufacturing employment were collected for a subsample of 9 countries for which data were available over the period 1990-2005. The panel is unbalanced as data for some years for some countries are missing. Thus, pooling these data and regressing manufacturing employment and productivity on manufacturing output using fixed effects estimator, we obtain:

$$\underset{}{\ln E_m^{it} = \underset{(0.965)}{1.038} + \underset{(0.073)^{***}}{0.243} \ln Y_m^{it}} \qquad R^2 = 0.12 \quad \text{No. of obs. } 92$$

$$\ln P_m^{it} = \underset{(0.965)}{-1.038} + \underset{(0.073)^{***}}{0.756} \ln Y_m^{it} \qquad R^2 = 0.56 \quad \text{No. of obs. } 92$$

The coefficients for both employment and productivity are highly significant. They suggest that a one percentage point increase in manufacturing output induces a 0.24 percentage point increase in employment and 0.76 percentage point increase in labour productivity. From the above analysis we can see that the static version of the law gives us significant results both for manufacturing employment and productivity and the coefficients are also statistically different form unity. Thus, one can conclude that there is an evidence of increasing returns to scale in manufacturing sector, confirming Kaldor's hypothesis.

Table 5.4 Regression estimates of Kaldor's third law, 1991-2005

Dependent variable: Total productivity

	Cross-section	Panel
Constant	-0.583 (0.391)	-0.021 (0.009)**
Industrial output	0.487 (0.065)***	0.355 (0.045)***
Agricultural labour	-0.347 (0.178)*	-0.330 (0.175)*
R^2	0.71	0.47
F-statistics	28.11***	25.08***
Number of observations	26	364

Notes: For cross-sectional data the following equation is estimated:
Total productivity growth = a+β_1(growth of industrial output) +β_2(growth of agricultural labour)+ e
For the panel regression first difference estimator is used and the equation estimated is:
? log(total productivity$_{it}$) = a_0 + β_1? log(industrial output$_{it}$) + β_2? log(agricultural labour$_{it}$) + ? e_{it}
Standard errors are shown in parentheses. The cross-section equation satisfies all the diagnostic tests. Standard errors for the panel regression are corrected for heteroscedasticity.
*** indicates significance at 1 per cent level.
** indicates significance at 5 per cent level.
* indicates significance at 10 per cent level.

The regression results concerning the third law are presented in Table 5.4 for both cross-section and panel regression for the period 1991-2005. The panel equation is estimated using first difference estimator in order to avoid spurious result as the variables were non-stationary but not cointegrated. Interestingly, the first difference of the natural log of a variable has the additional advantage of being approximately equal to that variable's rate of growth (Mukherjee et al., 1998). We used agricultural labour instead of non-manufacturing employment as data for the latter variable were not available. The results are satisfactory with the expected signs and both variables are jointly significant. The model explains 71 per cent of the variation in overall labour productivity for the cross-section and 47 per cent for the panel regression. The coefficient of agricultural labour is significantly negative at 10 per cent level for both the specifications with almost same magnitude indicating that a one percentage point growth in agricultural labour above the average will result in a 0.35 percentage point growth in overall productivity below the average. In other words, the faster the rate of growth of industrial employment, the faster overall productivity grows. The remarkable similarity between both specifications indicates the robustness of the results.

The above analysis shows that growth of industrial sector stimulates the whole economy and has strong impact on overall productivity growth in SSA. Thus, actions should be taken to promote industrial activities in order to move into a higher stage of economic development. However, this cannot be left to market forces alone and governments should play a greater role in formulating industrial policies. The focus has to be on promoting industrial activities which can generate gainful employment and help in easing population pressure on land.

In order to promote industrial activities, efforts have to be made to raise agricultural production and income since agriculture plays a critical role as a supplier of essential wage goods and generator of effective demand for industrial output. However, agricultural surplus has to be realised into purchasing power in order to serve as a source of demand for industrial goods. It is industry which provides the market for agricultural surplus. This is specially so in the absence of agricultural support price system by the government. Thus, the two sectors are mutually dependent on each other.

5.3 SUMMARY

Kaldor regarded manufacturing activities as an 'engine of growth'. The reason for this is that manufacturing as opposed to land-based activities allows for extensive division of labour as market grows and this has spill-over effects on the rest of the economy. Using both cross-section and panel cointegration method, we have analysed the role of different sectors in the growth process in a Kaldorian perspective. The analysis shows that the industrial sector plays a pivotal role in pulling up the rest of the economy and has strong impact on overall productivity growth in SSA. Moreover, the similarity of the results between the cross-section and panel regression analysis for the first and third laws indicate the robustness of the estimates.

CHAPTER 6

GROWTH AND STRUCTURAL CHANGE IN ETHIOPIA

Ethiopia is the second most populous country in SSA after Nigeria. It is also one of the poorest countries in the world with a per capita annual income of about US$ 150. Over the period 1981-2005, the Ethiopian economy has been growing at an average annual rate of 2.8 per cent. However, the growth rate of GDP has not been high enough to improve the standard of living since population has also been growing by almost the same rate during the period.

Other indicators of well-being are also extremely low. In 2005, about 39 per cent of Ethiopia's population lived below the national poverty line. Ethiopia ranked 169 out of 177 countries in the human development index. The adult literacy rate for the country stood at 36 per cent while life expectancy at birth was 54 years.

The Ethiopian economy is based on rain-fed agriculture and overall economic performance is mainly determined by what happens in the agricultural sector. The sector has suffered from recurrent droughts and extreme fluctuations of output. The agricultural sector contributes about 43 per cent of GDP but accounts for around 80 per cent of employment indicating the low level of productivity in the sector. Agriculture is dominated by smallholders; more than 50 per cent of the farming households in the country cultivate less than 1 hectare and about 82 per cent cultivate less than 2 hectares (CSA, 2006a). The sector also accounts for more than 85 per cent of export earnings. The major agricultural export crop is coffee, providing about 35 per cent of Ethiopia's foreign exchange earnings, down from more than 60 per cent in 1985 because of the slump in coffee prices since the mid-1990s and increases in other exports.

6.1 THE POLITICAL ECONOMY OF GROWTH IN ETHIOPIA

Ethiopia's economic policy during the 1980s was the continuation of the policy adopted in 1975 following the revolution of 1974 which overthrew the monarchy. In the early 1970s, there was a consensus mainly among the educated strata of the Ethiopian population that the main factor behind the country's economic backwardness was the economic policies pursued by the Imperial regime which was largely based on feudal structure. The preferred policy according to this group was to redirect the Ethiopian economy along the socialist line.

Having risen to power on the crest of a popular uprising, the military regime could not ignore the demand for reform in order to stay in power. Thus, in 1975 the regime issued the first statement on economic policy entitled 'Declaration on Economic Policy of Socialist Ethiopia' in February 1975 and undertook sweeping social and economic reforms. The most important policy of the military regime was the nationalisation of land and other private properties and firms.

Land reform was one of the major questions raised by the revolutionaries in the early 1970s. The issue was so important that the survival of the regime itself was largely dependent on the position it would take on the land question (Geda and Degefe, 2005). As Patnaik (2003) pointed out, historically, the land reform issue has been tackled through two main alternative strategies: landlord-dominated redistribution and peasantdominated redistribution. The first case does not involve any radical takeover of land by peasants while in the second case the land is seized without compensation from the landlords and distributed to the landless peasants. In Ethiopia the regime opted for the latter strategy. Thus, the land reform was proclaimed in March 1975 which made all rural land the collective property of the Ethiopian people, the distribution between owner and tenant was abolished and no compensation was offered to former landowners (Markakis and Ayele, 2006). Apart from the nationalisation of land, the government also nationalised banks and insurance companies as well as manufacturing concerns involved in food, beverage, textile, leather, shoe, printing, chemical, iron and steel processing and production (Markakis and Ayele, 2006).

The land reform had freed peasants from debt and the need to pay rent to landlords. Though the focus of the development strategy of the military regime was agricultural development, nonetheless, the rural economy was heavily burdened with various levies imposed by the regime in order to ensure cheap supply of food to the towns and the army (Meredith, 2006). Therefore, peasants were forced to accept low prices for their produce set by the state marketing enterprise, the Agricultural Marketing Corporation (AMC). However, these prices were significantly lower than the open market prices. For instance, in 1984 the fixed price set by the AMC was only about one-fifth of the free market price in Addis Ababa, while during 1989 AMC farm-gate prices in the cases of major grains were less than 50 per cent of the Addis Ababa open market price (Meredith, 2006; Chole, 2004). This was not only the case with Addis Ababa market prices but it was also true of other major regional towns. The peasants were also required to deliver a specified quota of grain to the AMC. In some cases, peasants had to buy grain on the open markets and deliver it to the AMC in order to fulfil their quota requirements (Chole, 2004). There were also other impositions on the peasantry such as mandatory contributions to local development programmes and to the war effort. On the other hand, state farms are paid higher prices than the peasants. Government resources were also diverted into promoting state farms. For instance, between 1980/81 and 1984/85 state farms absorbed 43 per cent of all the financial resources allocated to agriculture, although their share of agricultural output was less than 5 per cent (Chole, 2004).

The military regime also did not have a comprehensive and consistent industrial policy and industry was not given much importance. Through the nationalisation of manufacturing firms, the regime marginalised private development initiatives which were gathering momentum. It also put Birr 500,000[1] as a ceiling on capital to be invested in private industry which relegated the private sector to small scale activities. This resulted in the decline of the rate of industrial investment (Chole, 2004).

By the second half of 1980s, policy failure, war and famine pushed the economy further back. Moreover, the political and economic events of the late 1980s facing the eastern socialist bloc that were Ethiopia's main sponsors, led the country to a serious economic crisis (Dercon, 2000). These events together triggered the economic reforms of 1990, which is referred to as the 'mixed economy declaration'. Therefore, after fifteen years of experiment with a socialist model, the regime started abandoning its earlier policies. However, the reform came too late to save the day.

[1] During 1980s, Ethiopia had a fixed exchange rate policy and US$ 1 was equal to Birr 2.07.

The new government that came to power after the collapse of the military regime introduced various economic reforms in 1992. These reforms took the form of a structural adjustment programme (SAP) sponsored by the IMF and the World Bank. Ethiopia is among the late adopters of structural adjustment programme in sub-Saharan Africa. The main focus of the reform was on transforming the economy from a centrally planned to a market-oriented one. During 1992, the Birr was devalued by 142 per cent from Birr 2.07 to Birr 5 per US$ and subsequently an auction based exchange rate system was introduced. Tariffs have been cut, licensing procedures simplified, grain delivery discontinued and privatisation of state owned enterprises started. Interest rate ceilings have also been abolished and the National Bank has begun to set only a floor rate for deposit rate, leaving all other rates to be determined by market forces (Geda and Degefe, 2005). Moreover, new investment law has been formulated in order to attract domestic and external foreign capital. In 1994, the banking and insurance sector has been opened to private investors.

The new government has also adopted the Agricultural Development Led Industrialisation (ADLI) policy as its principal guiding strategy since 1994. The strategy is not much different from that of the military regime except that now it operates in the context of a free market economy. The main argument of the strategy is that the growth in agriculture will induce overall economic growth by stimulating demand and supply. On the demand side, the objective of the strategy is to enhance agricultural productivity and income of smallholder farmers so that the industrial sector will not be constrained by lack of market for its products. On the supply side, the agricultural sector can provide food, raw material to industries and export products.

On the other hand, there is no clearly formulated industrial policy under the current regime as well. The current strategy of the government takes industrialisation as a derivative process that naturally comes with the rapid development of the agricultural sector (Nega, 2003). However, the desired industrialisation has not yet taken place and the share of industrial sector in GDP has remained stagnant.

6.2 GROWTH EPISODES AND SECTORAL STRUCTURE

As in other SSA countries, the 1980s had been a decade of crises for Ethiopia as well. As already discussed, this period corresponds to the period of military rule. It is also characterised by the civil war in the northern part of the country and the famine which resulted in the death of nearly a million people during 1984-85. During 1980s, the rate of growth of GDP averaged 2.1 per cent per annum which was less than the population growth of about 3 per cent resulting in a decline in per capita income of 1 per cent (Table 6.1). While this represents the overall picture during 1980s, the performance was highly uneven over the years. Especially, during the catastrophic drought and famine period of 1984-85, GDP declined by more than 7 per cent.

Sectoral disaggregation of GDP reveals that the low level of GDP growth during the 1980s was caused by the stagnant agricultural sector which accounted for 53 per cent of GDP during the same period. In the 1980s, the growth of agriculture was almost zero (Table 6.1). Agricultural output is subject to considerable fluctuations, following the pattern of rainfall. Thus, during the famine years of 1984-85, agricultural output fell by about 17 per cent. On the other hand, industry and service sectors have registered better performances. The industrial sector has grown by 4.7 per cent during the period, mostly on account of growth in manufacturing, which was 4 per cent, while the service growth rate averaged 3.9 per cent.

Table 6.1 Growth rates and sectoral shares, 1981-2005 (percentage)

	1981-1989	1990-1999	2000-05	1981-1992	1993-2005
Growth rates					
GDP	2.1 (3.9)	3.5 (2.0)	5.2 (1.1)	1.3 (6.1)	4.4 (1.3)
Per capita GDP	-1.0	0.6	2.6	-1.4	1.8
Agriculture	0.1 (140.1)	2.7 (2.6)	3.3 (3.1)	1.2 (9.9)	2.6 (3.4)
Industry	4.7 (0.9)	3.5 (4.5)	8.3 (0.3)	3.7* (3.1)	6.2 (1.2)
Manufacturing	4.0 (0.8)	1.3 (18.4)	4.3 (1.0)	3.4* (4.6)	4.5 (2.9)
Services	3.9 (1.0)	4.8 (2.1)	6.4 (0.5)	3.9* (2.8)	6.6 (0.6)
Shares in value added					
Agriculture	53	55	42	55	48
Industry	11	10	12	10	11
Manufacturing	5	4	5	4	5
Services	30	30	38	29	34

Notes: (a) Growth rates have been calculated by the least-squares method.
(b) The breakdown in shares of GDP might not add-up to 100 per cent due to statistical discrepancies.
(c) Figures in parentheses indicate coefficient of variation
* This is excluding the two crisis years of 1991 and 1992. If the two years are included then the growth rate for industry and manufacturing turns out to be zero while the growth rate for services would be 1.7 per cent during this period.

Source: World Bank's African Development Indicators online database

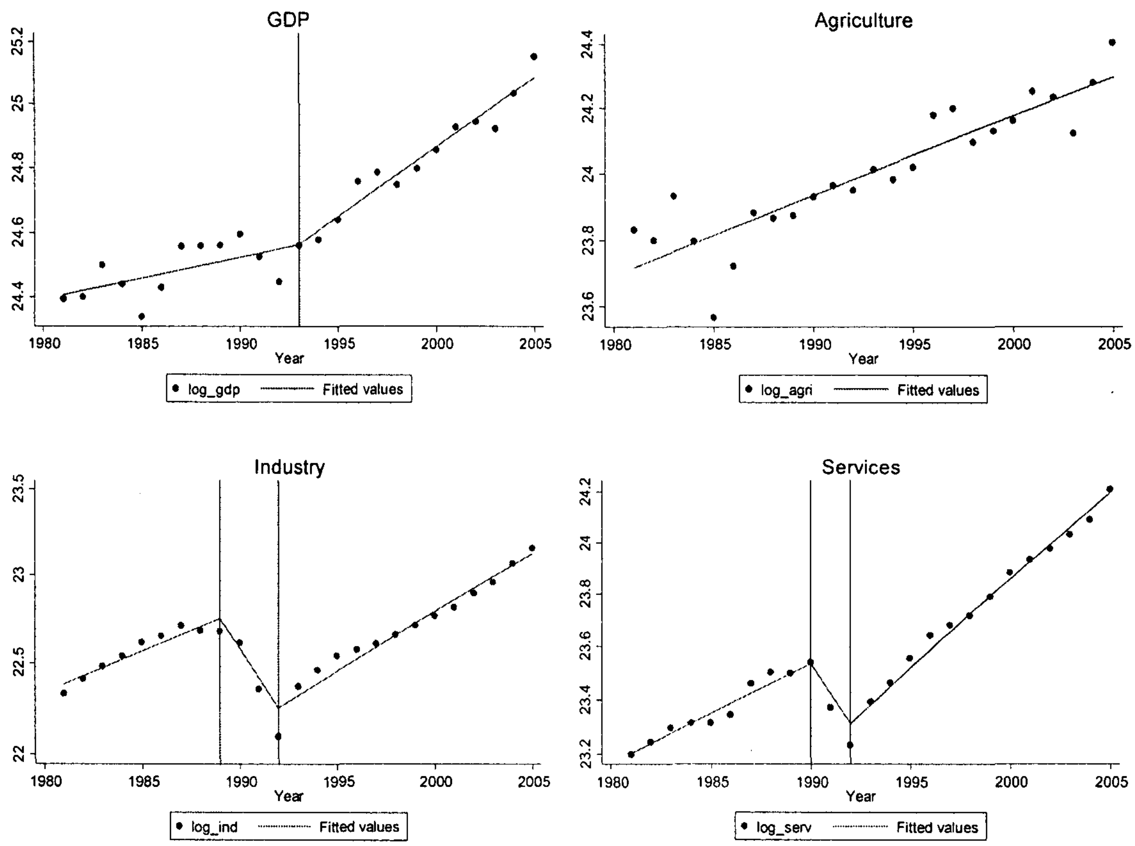
However, since the end of the civil war in 1991 the economy has recovered slowly. During the 1990s, GDP has grown by 3.5 per cent per annum which is slightly higher than the population growth rate, leading to per capita income growth of 0.6 per cent (Table 6.1). This performance was reflected in the agricultural and service sectors as well. Agriculture grew by 2.7 per cent mainly due to good harvest during mid-1990s, while service sector was the highest growing sector during this period compared to all other sectors. On the other hand, the growth of the industrial sector has been lower compared to the period of 1980s. However, this is mainly due to the inclusion of the crisis period of 1991-92, which was the period of political crisis due to the fall of the military regime, during which industrial output declined by more than 20 per cent which in turn was caused primarily by the decline of manufacturing output by more than 30 per cent. The performance of the manufacturing sector during the early period of 1990s clearly reflected the adverse impact of war.

During the first half of the 2000s, the Ethiopian economy has performed reasonably well. Except the two years of 2002 and 2003, the rest four years have registered more than 5 per cent growth rate. In 2002-03, however, the economic performance was affected due to a drought related recession. Overall, GDP during this period grew at an annual average of 5.2 per cent with sectoral growth rates of 3.3 per cent for agriculture, 8.3 for industry and 6.4 per cent for service (Table 6.1).

For a meaningful analysis, however, we need to check whether there has been any structural break in the rate of growth of GDP and its main components over the period 1981-2005 resulting in a change in the slope of the curve. Using the same methodology as described in chapter 2, we try to find out whether such a break in the data series has occurred. LOWESS smoothing technique, proposed by Cleveland (1979), indicates possible break in the GDP series at 1993. Accordingly, we have fitted piece-wise log-linear trend with a break at 1993. However, we have also checked for a break at 1992 and 1994. But the fit with a break at 1993 resulted in the least residual sum of squares indicating that a distinct break is discernible in GDP at 1993. The same exercise is also done for the main sectors. In the case of agricultural sector there was no apparent break in the growth trend. However, in the case of industrial and service sectors, there are two breaks. For the industrial sector one break occurred at 1989 and the other one at 1992. Between 1989 and 1992, industrial output has declined by about 17 per cent. On the other hand, for the services sector the break occurred at 1990 and 1992. And between 1990 and 1992, services output has declined by 14 per cent. However, since 1992 both the industrial and service sectors have shown a higher trend growth rates.

The piece-wise linear trend fits for GDP and its main sectors are shown in Figure 6.1 and the results are presented in Table 6.1. The growth recovery since the early 1990s can be ascribed to factors such as good harvests, inflows of official development aid including soft loans, remittances and a boom in construction. The period since the early 1990s also corresponds to the change in the policy stance and to the return of political stability. As Geda (2001) observed, economic performance in Ethiopia is highly correlated with the political process. During 1993-2005, the rate of growth of GDP averaged 4.4 per cent (i.e. 1.8 per cent per capita) compared to 1.3 per cent (i.e. -1.4 per cent per capita) during the period 1981-1992. However, there is much variation on a year to year basis which mainly depends on climatic conditions and external shocks. The higher rate of growth of the later period has also been shared by all the three main sectors. In all the sectors, the rate of growth in 1993-2005 is higher than the previous period of 1981-1992. The services and industrial sectors were responsible for raising aggregate growth. Service was the highest growing sector during the later period. However, agricultural growth was lower than the other two sectors during both the periods. Moreover, the growth of agricultural sector is lower than the population growth of 2.8 per cent even during the period of 1993-2005.

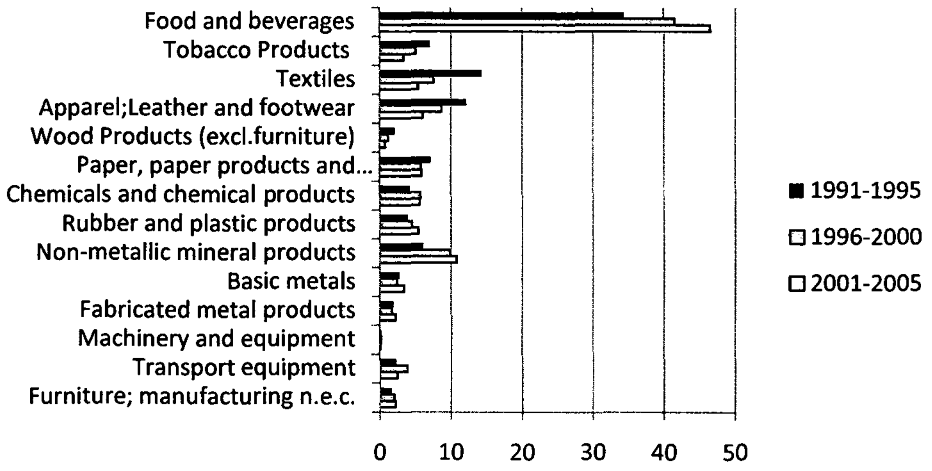
Figure 6.1 Piece-wise log-linear trend fit, 1981-2005



However, the relatively good performance during the period of 1993-2005 does not reflect significant changes in the economic structure. The share of agriculture in GDP declined by 7 per cent between the periods 1981-1992 and 1993-2005, from 55 to 48 per cent. The decreasing share of agriculture has been compensated by an increase in the share of services (Table 6.1). However, Ethiopia's economic performance is still largely determined by what happens in the agricultural sector. On the other hand, the share of industry has hardly changed and hovered around 11 per cent of GDP over the last two and half decades.

The share of manufacturing in GDP has also stagnated at around 5 per cent over the period 1981-2005. The sector accounts for about 42 per cent of the total industrial output. Manufacturing industry is largely limited to simple agro-processing activities such as sugar, grain milling, edible oil production and leather tanning as well as production of basic consumer goods such as footwear, textiles and garments and beer. However, industries like chemical, metal-processing and other engineering industries that can create dynamic inter-industry linkages are almost non-existent. Production of agricultural inputs is also insignificant. Food and beverages account for the largest part of manufacturing production and it has grown from 34 to 47 per cent between 1991-1995 and 2001-2005 (Figure 6.2). However, the value-added share of the other traditional industries such as tobacco, textiles, apparel and leather and footwear have fallen over the years and industries such as non-metallic mineral products and rubber and plastics have shown some increase in their shares. In all, however, the diversification of the economy away from traditional activities has not yet taken place to any significant extent.

Figure 6.2 Structure of manufacturing industry, 1991-2005 (percentage)



Source: CSA's Annual Survey of Large and Medium Scale Manufacturing Industries (various issues).

A significant characteristic of macroeconomic environment in Ethiopia is its high volatility. Lack of structural change largely explains the variability of growth to various shocks. The driving forces behind this instability are both internal and external factors. Besides the volatility induced by the fluctuations in coffee and other commodity prices, a key source of instability is internal. It resides in the climatic shocks the country experiences more often. However, over the period 1993-2005, variability in annual growth rates of GDP, as measured by the coefficient of variation, has decreased to 1.3 from 6.1 in the preceding period (Table 6.1). The variability has also decreased in all the main sectors in the post 1993 period. However, agricultural sector showed higher variability in both the periods compared to the other sectors. This high variability in the agricultural sector can be ascribed to the sector's extreme dependence on rainfall.

Table 6.2 Changes in consumer price index, 1980-2005 (percentage)

Periods	Inflation Rate
1980-1989	4.6
1990-1999	8.0
2000-2005	4.5
1980-1992	7.5
1993-2005	4.3

Source: World Bank's African Development Indicators online database

As far as inflation is concerned, except during periods of political instability and drought, it has been low in all the periods compared to many countries in SSA. Price movements in the country have largely been influenced by changes in agricultural output because food items account for nearly half of the basket of goods that determine the consumer price index. For instance, a bumper cereal harvest during 1996 and 2001 led to a decline in prices by 5 per cent and 8 per cent respectively. On the other hand, during the crisis year of 1991, prices have risen by 35 per cent. The other factor for price stability, especially during the period of 1993-2005, is the conservative monetary and fiscal policies. Thus, inflation has declined from 7.5 per cent during 1980-1992 to 4.3 per cent in 1993-2005 (Table 6.2).

6.3 INVESTMENT PATTERNS

The acceleration in the rate of growth of GDP during 1993-2005 occurred essentially due to a rise in investment rate. During 1993-2005, total investment equalled 20.5 per cent of GDP compared to 14.7 per cent during 1981-1992 (Table 6.3). The rise in investment rate during the period of 1993-2005 was mainly because of rise in public investment, while private investment was virtually stagnant. Due to development aid and other inflows, public investment has grown much faster than private investment. Public investment has increased substantially from 4 to 11 per cent of GDP between 1981-1992 and 1993-2005, whereas private investment has declined marginally by about 1 per cent from about 11 to 10 per cent. In fact, since the late 1990s public investment accounted for around 60 per cent of gross domestic investment and it was directed mainly towards roads, dams, education and health.

Not only higher rate of investment but also the structure of investment matters for economic growth because investment on certain assets has more growth inducing effect compared to others. Studies have shown that investment in machinery and equipment is critical for sustained growth. For instance, De Long and Summers (1991) have found a strong association between machinery and equipment investment and economic growth.

Sala-i-Martin (1997) also found a more robust correlation between equipment investment and growth than what is found between non-equipment investment and growth.

Table 6.3 Investment, savings and consumption as percentage of GDP, 1981-2005

	1981-1989	1990-1999	2000-05	1981-1992	1993-2005
Gross domestic investment	15.7	16.5	22.7	14.7	20.5
Public investment	-	6.6	13.8	4.0[1]	10.7
Private investment	-	9.9	8.9	10.6[1]	9.7
Gross domestic savings	10.5	9.7	7.9	9.7	9.4
Financing gap[2]	-5.2	-6.8	-14.8	-5.0	-11.1
Total consumption	89.5	90.3	92.1	90.3	90.6
Government	11.2	9.8	14.4	11.0	11.7
Private	78.4	80.5	77.8	79.3	78.9

Notes: [1]Data are from 1987 onward.
[2]Financing gap is gross domestic savings minus gross domestic investment.
Source: World Bank's African Development Indicators online database

Table 6.4 Structure of investment, 1996-2005 (percentage of gross domestic investment)

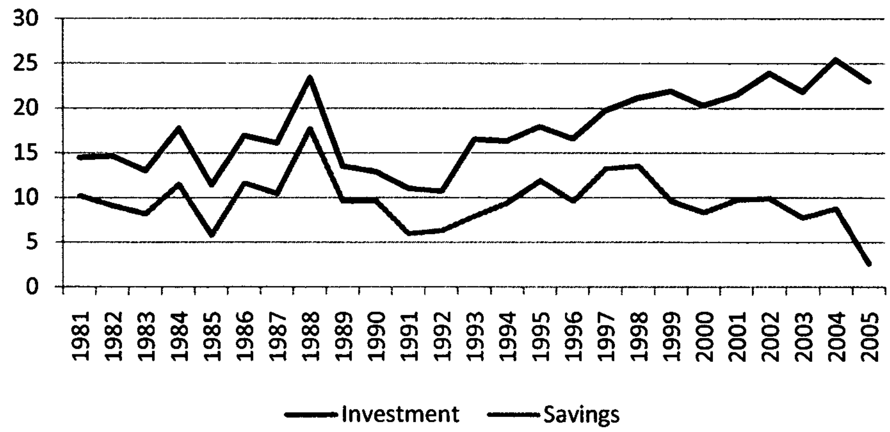
	1996-2000	2001-2005
Construction	58.9	65.5
Residential buildings	25.7	26.3
Non- residential buildings	17.5	19.8
Other construction	15.7	19.4
Transport equipment	10.5	8.9
Other machinery and equipment	24.7	22.4
Other fixed assets	2.6	2.2
Change in stock	3.2	1.0

Source: EEPRI Database, 2007

However, in Ethiopia there was a shift in the structure of investment in favour of construction away from machinery and equipments between 1996-2000 and 2001-2005. Though residential buildings carried out by households accounted for about 26 per cent of gross domestic investment, the share has remained almost the same over the years

(Table 6.4). On the other hand, both the share of non-residential buildings and other construction as percentage of gross domestic investment have risen by about 3 per cent each during 2001-2005 compared to 1996-2000 thereby resulting in the rise in the share of total construction investment from 59 to 65 per cent. The share of other machinery and equipment, however, has declined by 3 per cent from 25 to 22 per cent of gross domestic investment over the same period.

Figure 6.3 Investment and Savings as percentage of GDP, 1981-2005



As in many African economies, savings are very low in Ethiopia. Especially, since the late 1990s, the rate has exhibited a declining trend and touched 2.6 per cent in 2005 thereby leading to steadily widening financing gap (Figure 6.3). During 2000-2005, domestic savings rate has averaged 7.9 per cent compared to 10.5 and 9.7 per cent during 1981-1989 and 1990-1999 respectively. The decline during 2000-2005 is a reflection of the increase in government consumption, rising from an average of 11.2 per cent of GDP during 1981-1989 to 14.4 per cent during 2000-2005 (Table 6.3). The gap between domestic savings and investment has also risen from 5.2 per cent of GDP during 1981-

1989 to 14.8 per cent during 2000-2005. Thus, during 2000-2005, savings could finance only around one-third of total investment compared to two-third during 1980-1989.

The widening gap between savings and investment meant increasing recourse to external sources, which comes in the form of grants and loans, to finance investment. However, a country cannot finance its investment activities on a sustainable basis by external borrowing alone. Some of the main factors which exert considerable constraint on savings rate in the country are the low level of income, lack of sustained economic growth performance, expansion of public sector consumption expenditure and the hurdles to investment activities (Moges, 2005).

6.4 THE EXTERNAL SECTOR

Ethiopia's exports are dominated by a few commodities such as coffee, hides and skins and khat[2]. Coffee takes the lion's share accounting for as much as 40 per cent of total exports in 2005 down from over 60 per cent in 1985. The share of exports as percentage of GDP increased from about 7 per cent in 1981-1989 to 13 per cent in 2000-2005 (Table 6.5). However, this figure is still significantly lower than the SSA's average of 33 per cent. The increase in exports has been accompanied by equally high increase in imports from about 12 to 28 per cent over the same period. As a result the import coverage generated by exports deteriorated from 55 to 47 per cent. Ethiopia's main imports are capital goods, fuel, semi-finished goods and consumer nondurable goods which together account for at least 80 per cent of total imports.

[2] Khat is a mild stimulant grown in Eastern Africa and Yemen.

Table 6.5 Trade performance, 1981-2005

	1981-1989	1990-1999	2000-05	1981-1992	1993-2005
Growth rates					
Value of exports	3.7 (3.3)	5.9 (3.1)	15.9 (0.8)	2.0 (7.1)	12.4 (1.1)
Volume of exports	3.1 (6.2)	5.4 (6.6)	10.4 (1.1)	-5.3 (4.3)	8.3 (3.0)
Terms of trade	0.4	3.5	-5.2	2.1	-2.2
Percentage of GDP					
Exports	6.6	8.1	13.3	6.0	11.4
Imports	11.9	14.9	28.1	11.1	22.4
Trade balance	-5.3	-6.8	-14.8	-5.0	-11.1
Percentage of total export value					
Coffee	65.3[1]	57.5	40.1	59.8[1]	51.1

Notes: Figures in parentheses indicate coefficient of variation
[1]Data is from 1985 onward.
Sources: World Bank's African Development Indicators online database, UNCTADstat online database and EEPRI Database, 2007

Over the period 1993-2005, the value of exports has shown significant growth than the previous period of 1981-1992, averaging 12 per cent compared to 2 per cent of the earlier period (Table 6.5). The growth in export values was also accompanied by similar growth in export volumes. The volume of exports has grown from -5 to 8 per cent between 1981-1992 and 1993-2005. However, the large negative growth rate during the former period was due to the crisis years of 1990-1992 during which export volume declined by about 28 per cent. Thus, if we exclude the crisis years, the growth in export volumes during the 1980s was about 3 per cent. Exports exhibited high volatility in the 1980s and 1990s, mainly due to concentration in a few primary commodities. However, volatility, as measured by coefficient of variation, has declined during the first half of 2000s (see Table 6.5). On the other hand, Ethiopia's terms of trade have shown improvement in the 1990s before they deteriorated again during 2000-2005. The declining trend is attributed both to the rising import prices and falling prices of exports, especially of coffee.

Table 6.6 Structure of export, 1995-2005 (percentage of total export value)

	1995	2000	2005
All food items	72.5	66.5	62.0
Agricultural raw materials	13.4	17.6	25.9
Ores and metals	0.1	0.9	0.7
Manufactured products	11.2	9.2	11.4

Sources: UNCTAD Handbook of Statistics 2006-07

The structure of Ethiopia's foreign trade did not show any significant change over the period. All export items from Ethiopia are still virtually unprocessed or at best semi-processed. The main export products are Coffee, hides and skins, khat, oilseeds and pulses which together account for about 80 per cent of all exports. Coffee is by far the most important item. On the other hand, manufacturing accounted for about 11 per cent of total exports in 2005 which were as low as US$ 97 million (UNCTAD, 2006). The share of manufacturing export has remained unchanged since 1995 (Table 6.6). Manufacturing exports consist of semi-processed hides, canned and frozen meat, beverages, footwear and clothing.

Thus, the unreliability of export earnings coupled with the deterioration in terms of trade is one the main binding constraint on the country's economic development.

6.5 EMPLOYMENT, PRODUCTIVITY AND STRUCTURAL CHANGE

Ethiopia has the largest share of labour force employed in the agricultural sector. In 2005, agriculture accounted for 80 per cent of total employment, while the sector's share of output during the same year was 43 per cent indicating the low level of productivity in the sector. However, as indicated in Table 6.7, over the last two decades there was some change in the structure of employment. Agriculture's share of employment has declined from 89 per cent in 1984 to 80 per cent in 2005. The share of the industrial sector has increased from 2 to 7 per cent, while services' share increased from about 9 to 13 per cent. The increase in the share of industry is mainly due to the rise in the share of manufacturing employment, whereas the rise in the share of services was largely driven by a rise in the share of the wholesale and retail trade sector.

Table 6.7 Sectoral employment share (percentage)

	1984	**1994**	**2005**
Agriculture, hunting, forestry and fishing	88.6	89.3	80.2
Industry	2.0	2.3	6.6
Mining and quarrying	0.1	0.1	0.3
Manufacturing	1.6	1.8	4.9
Construction	0.3	0.3	1.4
Electricity, gas and water supply	0.1	0.1	0.1
Services	9.5	8.4	13.2
Wholesale and retail trade; and hotels and restaurants	3.8	4.2	7.7
Transport, storage and communication	0.4	0.6	0.5
Financial intermediation	0.1	0.1	0.1
Other services	5.1	3.6	4.9

Sources: Population censuses of 1984 and 1994 and labour force survey of 2005

Data on sectoral employment are not available at regular intervals. Therefore, we have relied on the information obtained from the 1984 and 1994 population censuses and the 1999 and 2005 national labour force surveys in order to compute sectoral employment growth. Growth rates have been computed for the periods of 1984-1994 and 1999-2005. However, we could not compute employment growth for the period 1994-1999 because the data may not be comparable, since data for 1994 are obtained from census report while data for 1999 are obtained from labour force survey. As presented in Table 6.8, the growth rate of employment in the agricultural sector has slowed down during 1999-2005 period compared to the period 1984-1994. There was also slow down in employment growth in utilities sector and the two services sub-sectors: wholesale and retail trade and transport and communication. On the other hand, there was a large increase in employment in the mining, construction and financial intermediation.

Table 6.8 Sectoral employment growth (percentage)

	1984-1994	**1999-2005**
Agriculture, hunting, forestry and fishing	5.8	4.0
Mining and quarrying	4.3	27.6
Construction	7.6	11.1
Electricity, gas and water supply	7.5	2.7
Wholesale and retail trade; and hotels and restaurants	6.6	0.5
Transport, storage and communication	8.4	2.9
Financial intermediation	-2.8	10.9
Other services	2.3	4.7

Note: Growth rates are computed using the equation $r = ln(P_t/P_{t-1})/n$ where P_t and P_{t-1} are the last and first observations in the period respectively and n is the number of years in the period.
Sources: Population censuses of 1984 and 1994 and labour force surveys of 1999 and 2005.

Since the data for the manufacturing sector are readily available, the growth rate for the sector is computed separately using the time series data obtained from the annual large and medium scale manufacturing industries survey. It can be seen from the result presented in Table 6.9 that employment growth in the manufacturing sector has accelerated during 1995-2005 compared to the declining trend of 1985-1994. However, employment expansion during 1995-2005 was still weak in creating sufficient employment opportunities for the fast growing population.

Table 6.9 Employment growth in the manufacturing sector (percentage)

1985-1994	-0.7
1995-2005	1.8

Sources: computed using time series data from CSA's Annual Survey of Large and Medium Scale Manufacturing Industries (various issues).

Economic growth can be ascribed either to increased employment or to productivity growth. The available data suggest that the growth recovery in the post 1993 period was mainly achieved due to increase in productivity growth since employment growth during 1981-1992 and 1993-2005 remained largely unchanged (Table 6.10). In other words, the poor growth performance during 1981-1992 was due to the collapse of productivity growth. Thus, during 1993-2005, GDP growth was shared more equally between employment growth and labour productivity growth.

Table 6.10 Decomposition of GDP growth, 1981-2005 (percentage)

	1981-1992	**1993-2005**
GDP growth	1.3	4.4
Employment growth	3.1	3.3
Labour productivity growth	-1.7	1.3

Note: Growth rates have been calculated using the least-squares method.
Sources: The Conference Board Total Economy Database (January 2011) for the employment data and World Bank's African development Indicators online database for the output data.

Using the decomposition technique discussed in Chapter 4, attempt has been made to decompose labour productivity growth into agricultural and non-agricultural sectors[3] in order to identify the contribution of these two broad sectors to overall productivity growth. According to the result presented in Table 6.11, labour productivity growth during 1993-2005 was driven solely by productivity growth in the non-

[3] Due to lack of data on sectoral employment, it is only possible to compute labour productivity growth in these two broad sectors.

agricultural sector. Productivity growth in the non-agricultural sector was caused in turn largely due to within-sector productivity gain rather than reallocation effect.

Table 6.11 Productivity decomposition, 1981-2005 (percentage)

	1981-1992	1993-2005
Agricultural sector	-2.4	-1.2
Within-sector productivity gain	-1.3	-0.4
Reallocation gain	-1.1	-0.8
Non-agricultural sector	0.9	2.3
Within-sector productivity gain	0.3	1.4
Reallocation gain	0.6	0.9
Overall productivity growth	-1.5	1.1

Sources: Computed based on data from UNCTADstat online database and World Bank's African Development Indicators online database

6.6 ADLI AND STRUCTURAL CHANGE

In Ethiopia, since the mid-1970s two different ideologies have been pursued in formulating economic policies. From 1974-1991, policies were guided by socialist principles, whereas the current government since 1991 is following market-oriented policies. However, in practice, development strategies of both governments were not very different from each other. Both emphasised development strategies that start with agriculture and then expand to other sectors.

The current government came up with a development strategy known as Agricultural Development Led Industrialisation (ADLI) in 1994. The strategy's stated aims are to enhance agricultural productivity and income of smallholder farmers through increased application of technical inputs such as fertilizers and improved seeds. This in turn, through income effect, could induce demand for manufactured goods (EEA, 2005).

Thus, industrialisation is assumed to occur as a natural outcome of the strategy, hence the lack of clearly formulated industrial policy to guide the process.

So far, the strategy has produced poor results. Over the last one decade since the implementation of the strategy there has been no rise in the levels of agricultural labour productivity and per capita income of the agricultural population. Moreover, cereal yield levels have stagnated. The government has focused entirely on the expansion of green revolution inputs without addressing the underlying issues such as irrigation facilities which are necessary for the successful implementation of the strategy. In 1998, only about 5 per cent of agricultural land was irrigated and the country is solely dependent on rain-fed agriculture (MWR, 2002). The issue of rain-fed agriculture has not been given due consideration. Therefore, the strategy could not even fulfil the primary objective of increasing agricultural income let alone bring about industrialisation.

However, the main problem of the strategy is that even if the underlying issues are addressed and there is substantial increase in crop production, then the main question which will arise is how much of this agricultural output can find a market. As already discussed in Chapter 5, in a closed economy and without an agricultural support price system by the government[4], it is industry which provides this market (Bhaduri, 2003). For instance, in 1996 and 2001 there was bumper harvests in the country and agricultural output grew by 17 and 9 per cent respectively mainly because of good climatic condition. However, this was accompanied by sharp declines in the prices of cereal crops. Figure 6.4 depicts the percentage change in prices of five main cereal crops – barely, sorghum,

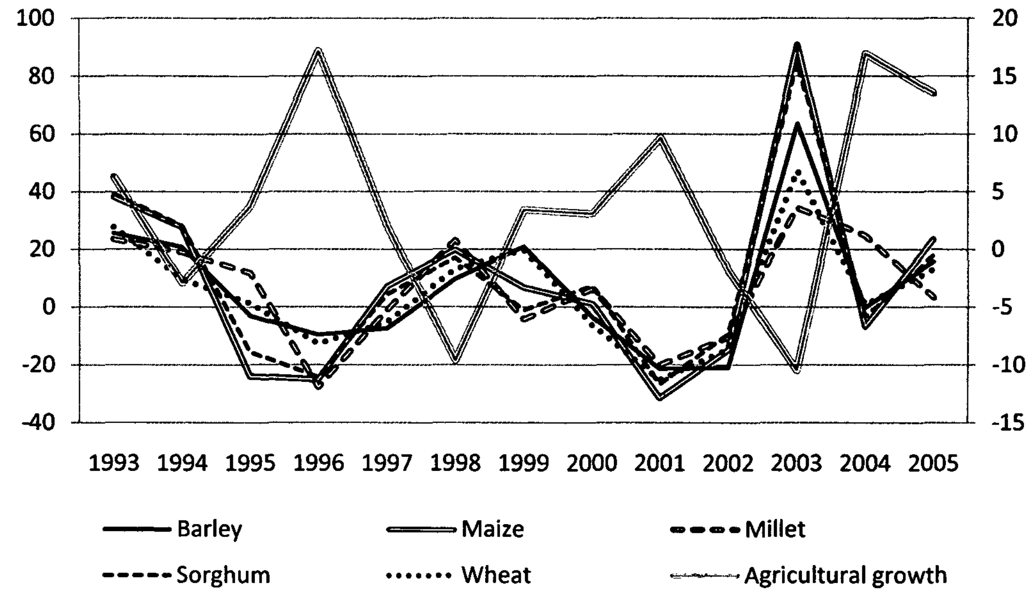
[4] Price support system has been taken out of policy consideration due to the country's structural adjustment commitments (Nega, 2003).

maize, wheat and millet – and the growth of agricultural value added. The figure clearly shows that large growth in agricultural value added was usually accompanied by sharp declines in the prices of cereal crops. A simple correlation coefficient shows that during 1993-2005 the relationship between the rate of growth of agricultural value added and the percentage change in prices of the various cereal crops is between -0.5 and -0.6. Therefore, in the absence of any minimum price support and lack of market for the agricultural products, farmers face a fall in income. This shows that demand side problems are significant for the agricultural sector. However, the strategy is entirely focused in tackling supply side problems. Thus, it is necessary for agricultural development to be accompanied by industrial development and strengthening of the urban economy.

The development of the industrial sector is also necessary because one of the channel through which labour productivity in agriculture can rise, thereby leading to a rise in income, is through the transference of labour from the agricultural to the non-agricultural sector. However, the ADLI strategy gives less emphasis to the issue of labour productivity. Population pressure on the available land has resulted in the fragmentation and decline of the average smallholders' farm size and the current national average farm size of the smallholders is about one hectare compared to about two hectares three decades ago. Thus, the agricultural sector is serving as a refugee sector with negative productivity growth and high employment share. This makes the task of generating employment outside the agricultural sector absolutely necessary. For this the primary objective of the industrialisation policy has to be on generating gainful employment.

Especially, the development of small and medium enterprises is critically important to generate off-farm employment opportunity.

Figure 6.4 Percentage change in prices of cereal crops (left axis) and growth of agricultural value added (right axis), 1993-2005



Source: World Bank's African Development Indicators online database.

Lack of clearly formulated industrial policy in Ethiopia has been the major cause which hampered the development of not only the industrial but also the agricultural sector. Country experiences around the world show that there is hardly any country that has succeeded in industrialising without an industrial policy in place (see Reinert, 2008 and Shafaeddin, 1998). However, the industrialisation process cannot be left to the market forces alone. The history of industrialisation of both early industrialisers and latecomers demonstrate that a deliberate and conscious state intervention is necessary in formulating and implementing the strategy (Shafaeddin, 2008).

Therefore, the country needs a balanced growth strategy which gives due emphasis both to agriculture and industry since the two sectors are not mutually exclusive. No doubt increase in the purchasing power of the peasantry is necessary for the industrialisation effort to succeed. However, agriculture is partly constrained by the lack of industrialisation. Thus, it is necessary to understand the problems and constraints of both the sectors to formulate appropriate policy.

6.7 SUMMARY

Over the last two and half decades, Ethiopia has seen two major shifts in its economic policy formulated under two opposing ideologies. During the 1980s, the military government followed the socialist principle in managing the economic affair of the country. However, since the downfall of the military regime in 1991, the new government has adopted market-oriented policies.

The growth of the Ethiopian economy over the entire period of 1981-2005 has been quite low averaging 2.8 per cent which was slightly less than the population growth rate. However there was a clear structural break in the GDP growth trend occurring at 1993. And since then growth has accelerated to 4.4 per cent compared to 1.3 per cent during 1980-1992. The higher rate of growth of the later period has also been shared by all the three main sectors. The growth since the early 1990s has been fuelled by a series of good harvests, inflows of official development aid including soft loans, remittances and a boom in construction. The period since the early 1990s also corresponds to the change in the policy stance and to the return of political stability.

The growth recovery in the post 1993 period was achieved due to increase in productivity growth, while employment growth remained largely unchanged. The economy-wide productivity growth was in turn driven by the growth of productivity in the non-agricultural sector.

The acceleration in the rate of growth of GDP during 1993-2005 has been accompanied by significant rise in the rate of investment. This was mainly due to the rise in public investment especially in the construction sector, while private investment virtually stagnated. This suggests that market driven strategy has not achieved its objective of increasing private investment. However, the rise in the investment rate is largely financed from external sources since domestic savings rate has remained very low.

During the period of 1981-2005, the Ethiopian economy has been characterised by a marked absence of structural transformation towards the industrial sector. Ethiopia's economic performance is still largely determined by what happens in the agricultural sector. The share of the industrial sector has been stagnated at around 11 per cent of GDP since 1980s. The structure of foreign trade also did not show significant change over the period. Almost all export items from Ethiopia are still virtually unprocessed or at best semi-processed. The share of manufacturing export has remained unchanged at about 11 per cent since 1995. As far as employment is concerned, agriculture still accounts for 80 per cent of total employment while the share of industry is only 7 per cent. Thus, the sustainability of the growth performance is highly questionable given the country's over dependence on rain-fed agriculture. Therefore, promoting structural change remains a key policy challenge.

The government has adopted Agricultural Development Led Industrialisation (ADLI) since 1994 as its development strategy with the aim of enhancing agricultural productivity and income of smallholder farmers thereby, through income effect, leading to a rise in demand for manufactured goods. According to the strategy this will lead to structural transformation. However, the strategy has failed so far to bring the stated objectives. The main shortcomings of the strategy are the focus on tackling supply side problems without due consideration to the demand side problems affecting the agricultural sector and the neglect of the issue of labour productivity.

CHAPTER 7

CONCLUSIONS AND IMPLICATIONS

The main objective of this study was to analyse the growth experience of selected countries in Sub-Saharan Africa (SSA) in the context of structural change during the period 1980-2005. Specifically, the study analysed the patterns of economic growth and the extent of structural change in terms of output and employment in the selected countries. Attempt has also been made to identify, using econometric models, the main determinants of economic growth and to examine the role of different sectors in the growth process in a Kaldorian perspective.

The economic performance of Sub-Saharan African countries during 1980s was characterised by negative per capita income growth, followed by a recovery in the 1990s and early 2000s. The decade of the 1980s has come to be known as the lost decade for the region. During 1980s, average GDP growth for the region as a whole was 2.2 per cent which was less than the average population growth rate of about 3 per cent resulting in negative per capita income growth. In the 1990s GDP growth rate averaged 2.6 per cent before accelerating to 4.8 per cent in the first half of 2000s.

However, for a meaningful analysis we need to check whether there has been any structural break in the GDP growth trend over the period 1980-2005. The analysis shows that there was typically a single main break in the growth trends for most of the countries in the sample occurring at some point during 1990s, and for the region as a whole at 1994. Therefore, dividing the entire period into two equal periods of 1980-1992 and 1993-2005 seems appropriate. Comparing the two periods, it was found that there was growth acceleration during 1993-2005 compared to 1980-1992 in many of the countries. The real economy was also much more volatile during the period 1980-1992 compared to the period of 1993-2005 in many of the SSA economies.

The economic performance of SSA countries is characterised by a relatively low rate of capital accumulation, limited structural transformation and low level of labour productivity growth. The recent growth recovery in the region was driven by factors such as increased commodity demand and prices, increased utilisation of the existing capacity made possible by a relaxation of the foreign exchange constraint, increased capital flows and debt relief. However, to sustain economic growth beyond the recovery phase requires increase in investment and its efficient utilisation. This study confirms the significance of slow capital accumulation in explaining SSA's slow economic growth. A bivariate regression analysis between growth rate of output and investment ratio shows that investment ratio accounts for over 30 per cent of the cross country variations in growth rates. However, after controlling for other relevant variables such as human capital, initial per capita GDP, export growth, volatility and debt-service ratio, it was found that investment ratio along with these variables explains over 60 per cent of the cross country variations in growth rates. The result shows a remarkable stability across the specifications with causality running from investment ratio to output growth.

However, both investment and domestic savings rates in SSA remain much lower than successful emerging economies that have seen large growth acceleration and structural change. Though the ratio of investment to GDP has increased in 12 countries out of the 17 countries in the sample for which growth has accelerated during 1993-2005 compared to the earlier period, it still remains in many countries less than the 20 per cent target threshold identified for poorer economies. On the other hand, the gap between savings and investment also remains large. In fact, during 1993-2005, external finance supported more than 50 per cent of capital formation for half of the countries in the sample. This heavy reliance of investment on external financing increases the volatility of investment which in turn increases instability of output growth.

The low savings rate in the region is partly explained by the low level of per capita income. There is a non-linear relationship between savings ratio and the level of per capita income, which means that the savings ratio rises as per capita income increases but at a decreasing rate. However, this does not mean that SSA's problems will automatically disappear if only the GDP growth rate exceeded population growth rate.

A disaggregated look at the structure of production is essential to see whether economic growth is accompanied by structural change or not. The pioneering studies of the classical development economists have highlighted the importance of structural change in terms of production structure and employment during the process of economic growth. However, even as growth accelerated, no significant structural change has taken place in terms of shifts in the structure of production towards the manufacturing sector in most of the countries in the region over the past two and half decades. The share of the sector in total output was also small in many of the countries. For the larger part of the period of 1980-2005, output growth in the region as a whole was not accompanied by changes in production structure ratio which is computed as the ratio of non-agricultural output to agricultural output and used as a proxy of structural change indicator. In fact, the ratio has declined continuously since the mid 1980s and the trend has been reversed only after 1999.

One of the factors which hampers the structural transformation of the region is the low level of investment. A simple regression of production structure ratio on investment ratio shows a positive and statistically significant relationship between the two variables indicating mutually reinforcing linkages between capital accumulation and structural change.

With regard to the structure of employment, agriculture still absorbs the majority of the labour force in most countries in the region. On the other hand, the share of labour in industry in most of the countries has either declined or stagnated. Thus, in many of the countries, the gradual decline in the share of labour in agriculture is absorbed by services sector rather than industry.

As far as the performance of the external sector is concerned, there was improvement in the share of exports in GDP as well as in the growth of export values in many of the countries during 1993-2005 compared to 1980-1992. However, the structure of exports has remained largely the same. Most economies in SSA are highly dependent on primary commodities for their export earnings while manufactured goods constitute less than 20 per cent of total exports in most of the countries. Moreover, between 1995 and 2005, export concentration index for the region as a whole increased by 68 per cent, from 0.35 to 0.59, reflecting SSA's increasing dependence on a limited number of commodities for its export earnings. In most of the individual countries, the index has either remained stagnant or increased over time.

Apart from the relatively low rate of capital accumulation and lack of structural transformation, economic performance in SSA is also characterised by low productivity growth. Decomposing GDP growth into employment growth and productivity growth, it was found that growth acceleration during 1993-2005 has been associated with positive growth in labour productivity in most of the countries, though sill low compared to the fast growing economies of East and South East Asia. However, the overall labour productivity growth, in most of the countries, was entirely driven by the non-agricultural sector.

Growth of labour productivity can be achieved through technological progress and/or through shifting resources from low to higher productivity sectors. The latter approach tends to be more important for the developing economies. We have attempted to decompose aggregate labour productivity growth into within-sector productivity growth and reallocation effect. In most of the countries, the overall productivity gains were mainly due to within-sector productivity growth rather than to the movement of labour from low to high productivity sectors.

Using a Kaldorian framework, we investigated whether industry in general and manufacturing in particular serves as 'an engine of growth' in SSA countries. According to Kaldor (1966; 1967), the mechanism through which fast growing industrial sector produces higher output growth for an economy as a whole is partly through its influence on the rate of growth of productivity in the industrial sector itself (due to the existence of static and dynamic economies of scale in the sector), and partly also because it will tend, indirectly, to raise the rate of productivity growth in non-industrial sector (due to transfer of labour from low productivity sectors to the industrial sector). Our results appear to support Kaldor's view on the importance of manufacturing industry for economic growth in the context of SSA. In estimating Kaldor's growth laws, we have used both cross-section and panel specifications. The results show that growth of industrial sector stimulates the whole economy and has strong impact on overall productivity growth in SSA. The similarity of the results between the cross-section and panel regression analysis indicates the robustness of the estimates.

Finally, we have tried to analyse, in particular, Ethiopia's economic performance during the period 1980-2005. Ethiopia has seen two major shifts in its economic policy during 1980-2005. In the 1980s, the country followed socialist economic policy. However, since 1992, the new government has adopted market-oriented policies. As in other SSA countries, the 1980s had been the decade of crises for Ethiopia as well. The decade was characterised by the civil war and the famine during 1984-85. GDP growth during this period averaged 2.1 per cent and per capita income growth declined by 1 per cent. However, the economy has recovered during 1990s and early 2000s. There was a clear structural break in the GDP growth trend occurring at 1993. Thus, comparing the two periods, it can be seen that output growth has accelerated to 4.4 per cent during 1993-2005 compared to 1.3 per cent during 1980-1992. The higher rate of growth of the later period has also been shared by all the three main sectors. The growth recovery in the post 1993 period was achieved due to increase in productivity growth, while employment growth remained largely unchanged.

The acceleration in GDP growth in Ethiopia during 1993-2005 has been accompanied by a rise in investment rate. However, the rise in investment rate during this period was mainly because of rise in public investment, while private investment was virtually stagnant. This suggests that the market oriented policy has not achieved its objective of increasing private investment. On the other hand, the gap between domestic savings and investment has been widening over time. Thus, during 2000-2005, savings could finance only around one-third of total investment compared to two-third during 1980-1989.

The relatively good performance during 1993-2005, however, does not reflect any significant changes in the economic structure of the country. The share of industry in GDP has hardly changed during this period compared to the previous period and stagnated at around 11 per cent. Moreover, the country's economic performance is still largely determined by what happens in the agricultural sector. The structure of foreign trade also did not show any significant change over the period. The share of manufacturing export has remained unchanged at about 11 per cent since 1995. As far as the structure of employment is concerned, there was some change over the last two decades. Agriculture's share of employment has declined from 89 per cent in 1984 to 80 per cent in 2005. The share of employment in industry has increased from 2 to 7 per cent, while services' share increased from about 9 to 13 per cent. On the other hand, the Agricultural Development Led Industrialisation (ADLI) strategy, which was adopted in 1994 with the aim of bringing about structural change in the economy, has produced so far poor results in fulfilling its stated objectives.

Though economic performance has improved in many SSA countries since the mid-1990s, its sustainability is doubtful given the low level of investment and lack of significant structural change in these economies. Moreover, increased dependence on external finance to cover the wide gap between savings and investment leads to uncertainty in financing investment projects. Thus, the growth recovery remains fragile.

The implications that emerge from this study are that SSA countries ability to accelerate and sustain growth hinges crucially on two factors. Firstly, the countries in the region need to increase their investment rates as investment is one of the main determinants of growth in these countries. However, it is also necessary to maintain adequate level of domestic savings rate as foreign savings can be volatile.

Secondly, SSA countries can ignore the manufacturing sector at their peril. The agricultural sector in many of the countries in the region is over-crowded. Thus, to ease the population pressure on land much of the employment will need to come from manufacturing. For this the primary objective of the industrialisation policy has to be on generating gainful employment, especially the development of small and medium enterprises is critically important to generate off-farm employment opportunities.

The countries in the region need a well-coordinated industrial policy to make the sector the 'engine of growth'. Country experiences around the world show that there is hardly any country that has succeeded in industrialising without an industrial policy in place. The industrialisation process cannot be left to the market forces alone. A deliberate and conscious state intervention is necessary in formulating and implementing the strategy.

APPENDIX

Table A1.1 Population size of the selected countries in 2005

Country	Population
Nigeria	141,356,083
Ethiopia	74,660,901
Tanzania	39,007,359
Sudan	38,698,472
Kenya	35,598,952
Uganda	28,699,255
Ghana	21,915,168
Mozambique	20,532,675
Cote d'Ivoire	19,244,866
Cameroon	17,795,149
Burkina Faso	13,933,363
Malawi	13,226,091
Zimbabwe	12,475,084
Zambia	11,738,432
Mali	11,611,090
Senegal	11,281,296
Guinea	9,220,768
Benin	7,867,626
Togo	5,992,080
Namibia	2,019,677
Lesotho	1,980,831
Botswana	1,835,938
Gambia	1,526,138
Guinea-Bissau	1,472,626
Gabon	1,369,229
Mauritius	1,243,253

Source: World Bank's African Development Indicators online database

Table A2.1 Classification of Sub-Saharan African countries based on income in 2005

Upper Middle Income ($3946-12195)	Lower Middle Income ($996-3945)	Low Income ($995 or less)	
Botswana	Angola	Benin	Madagascar
Equatorial Guinea	Cape Verde	Burkina Faso	Malawi
Gabon	Congo, Rep.	Burundi	Mali
Mauritius	Djibouti	Cameroon	Mauritania
Seychelles	Namibia	Central African Republic	Mozambique
South Africa	Swaziland	Chad	Niger
		Comoros	Nigeria
		Congo, Dem. Rep.	Rwanda
		Côte d'Ivoire	Sao Tome and Principe
		Eritrea	Senegal
		Ethiopia	Sierra Leone
		Gambia, The	Somalia
		Ghana	Sudan
		Guinea	Tanzania
		Guinea-Bissau	Togo
		Kenya	Uganda
		Lesotho	Zambia
		Liberia	Zimbabwe

Source: World Development Indicators.

Figure A2.1 Trend fit, 1980-2005

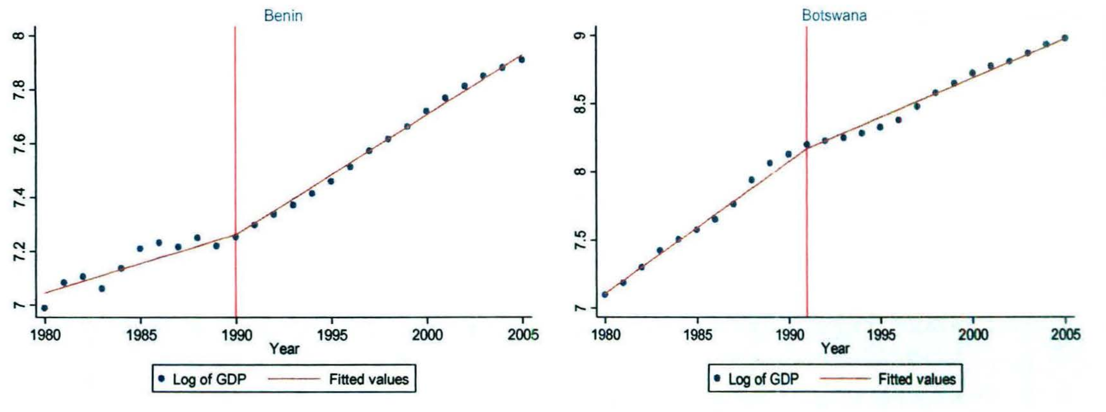
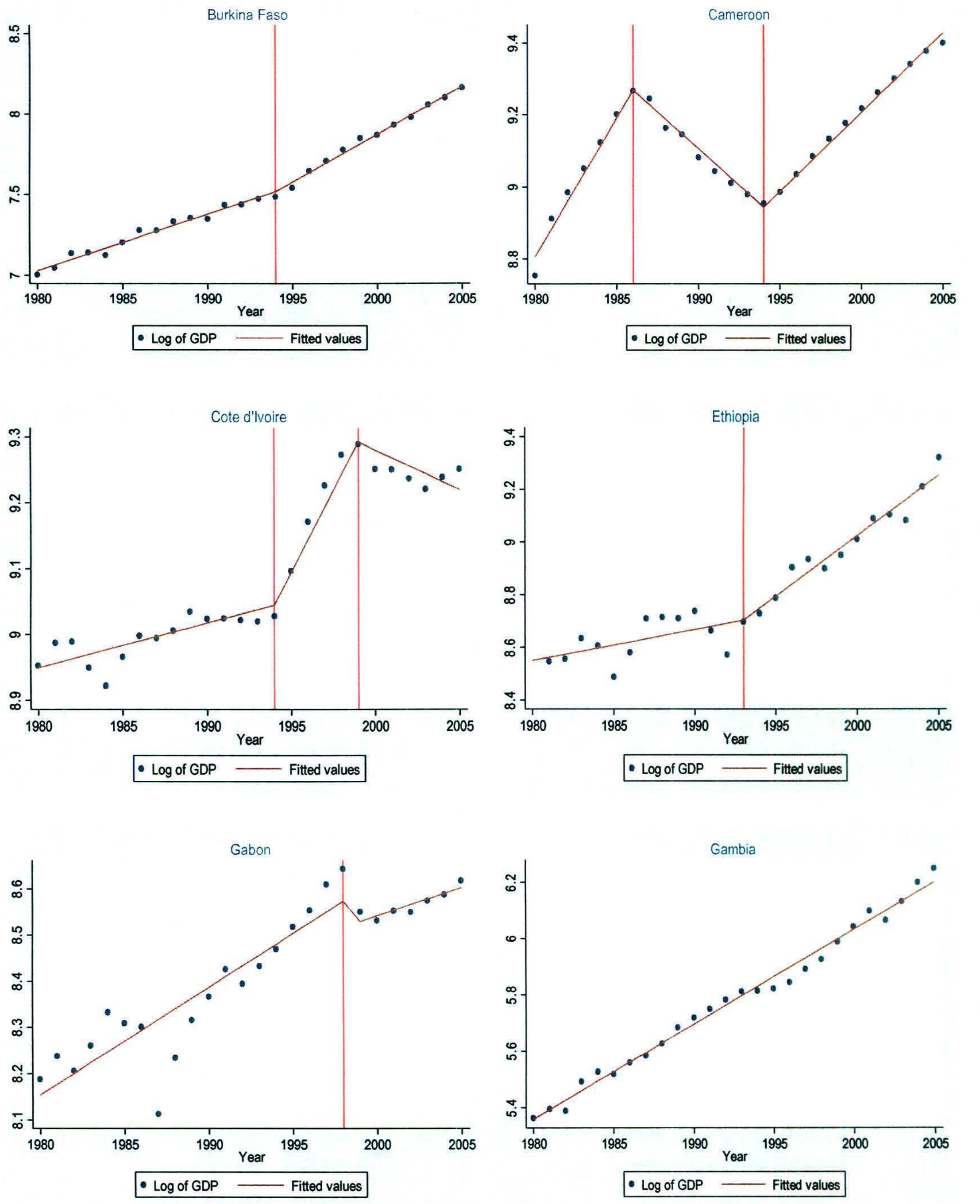


Figure A2.1 (continued)



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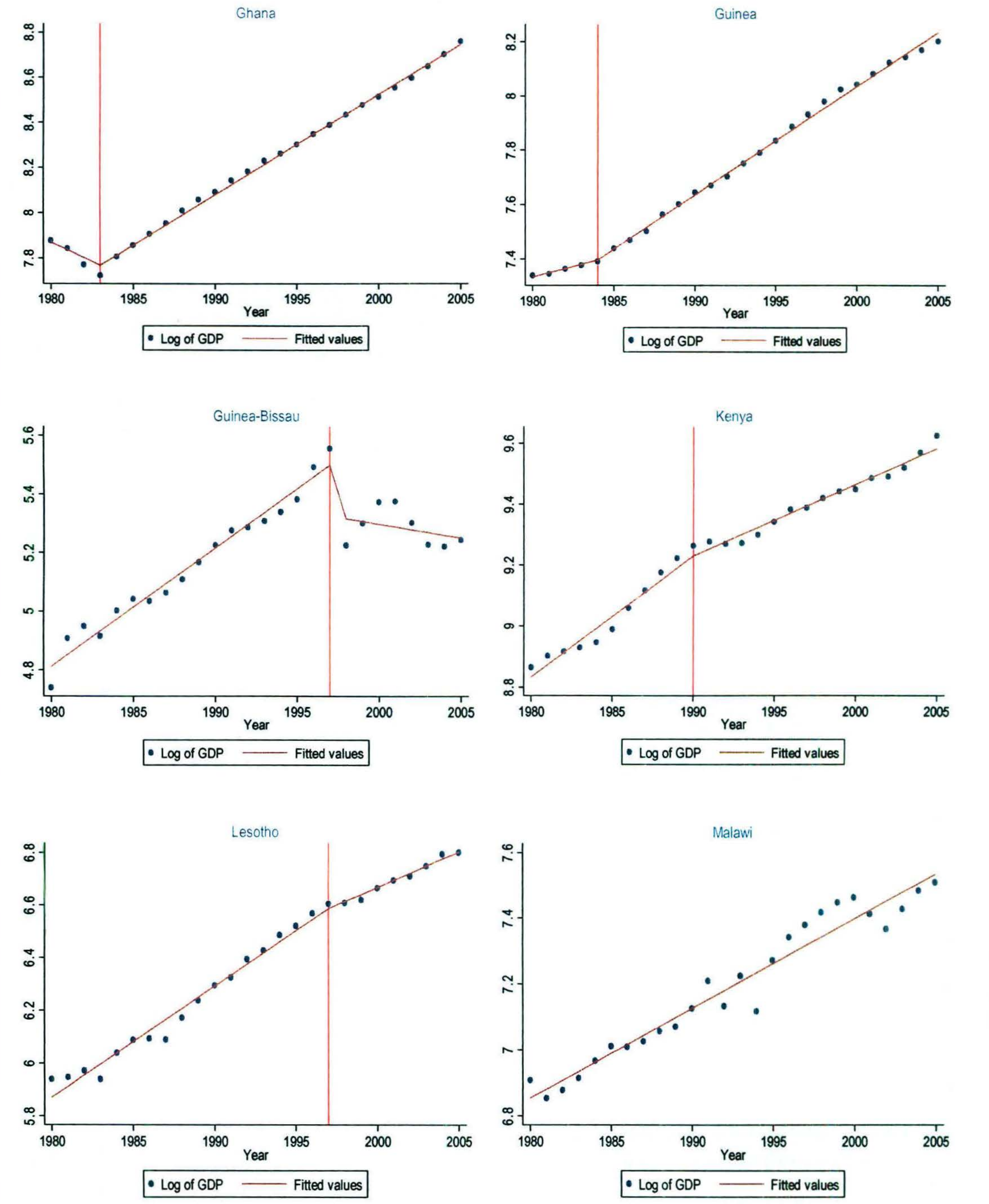

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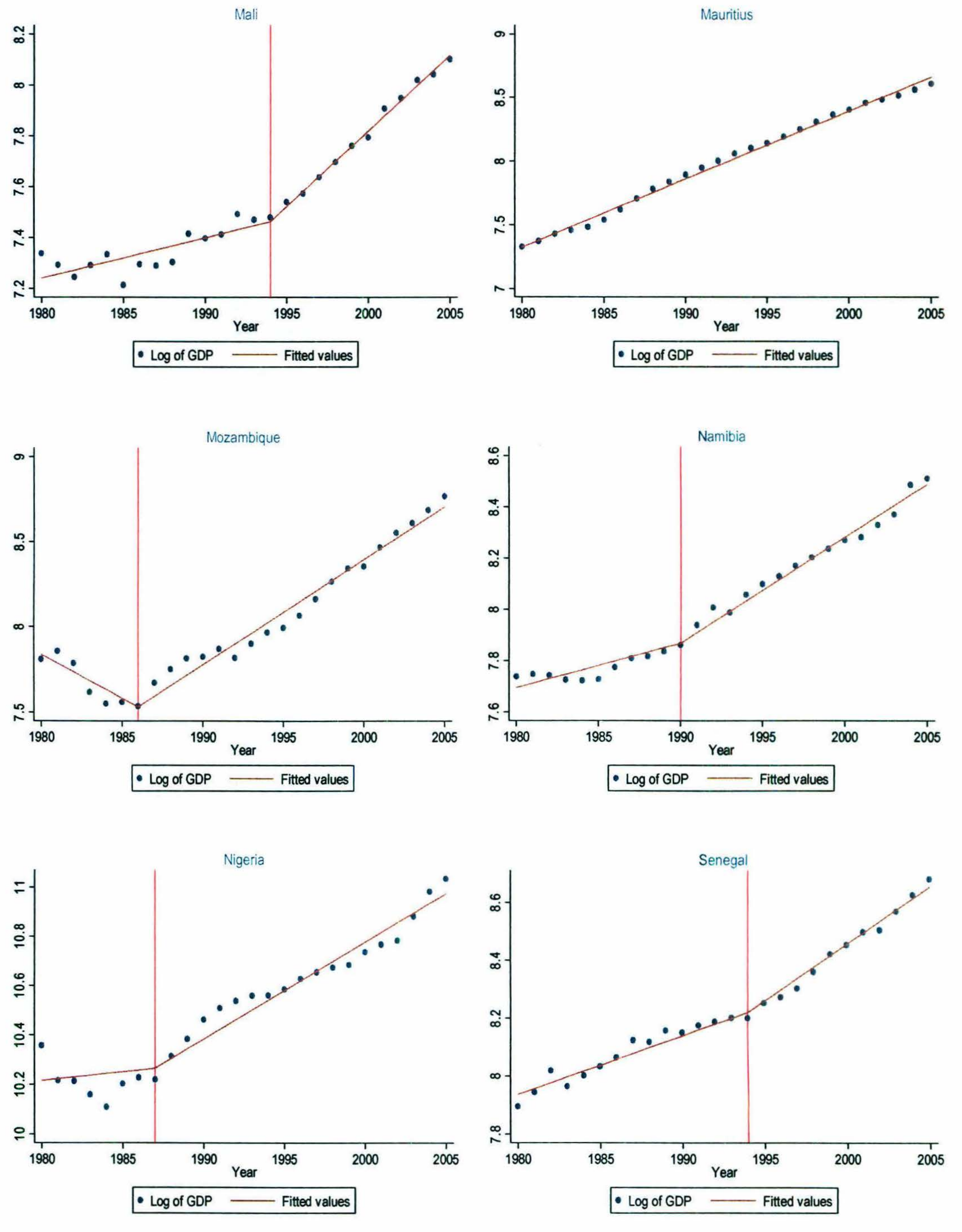

Figure A2.1 (continued)

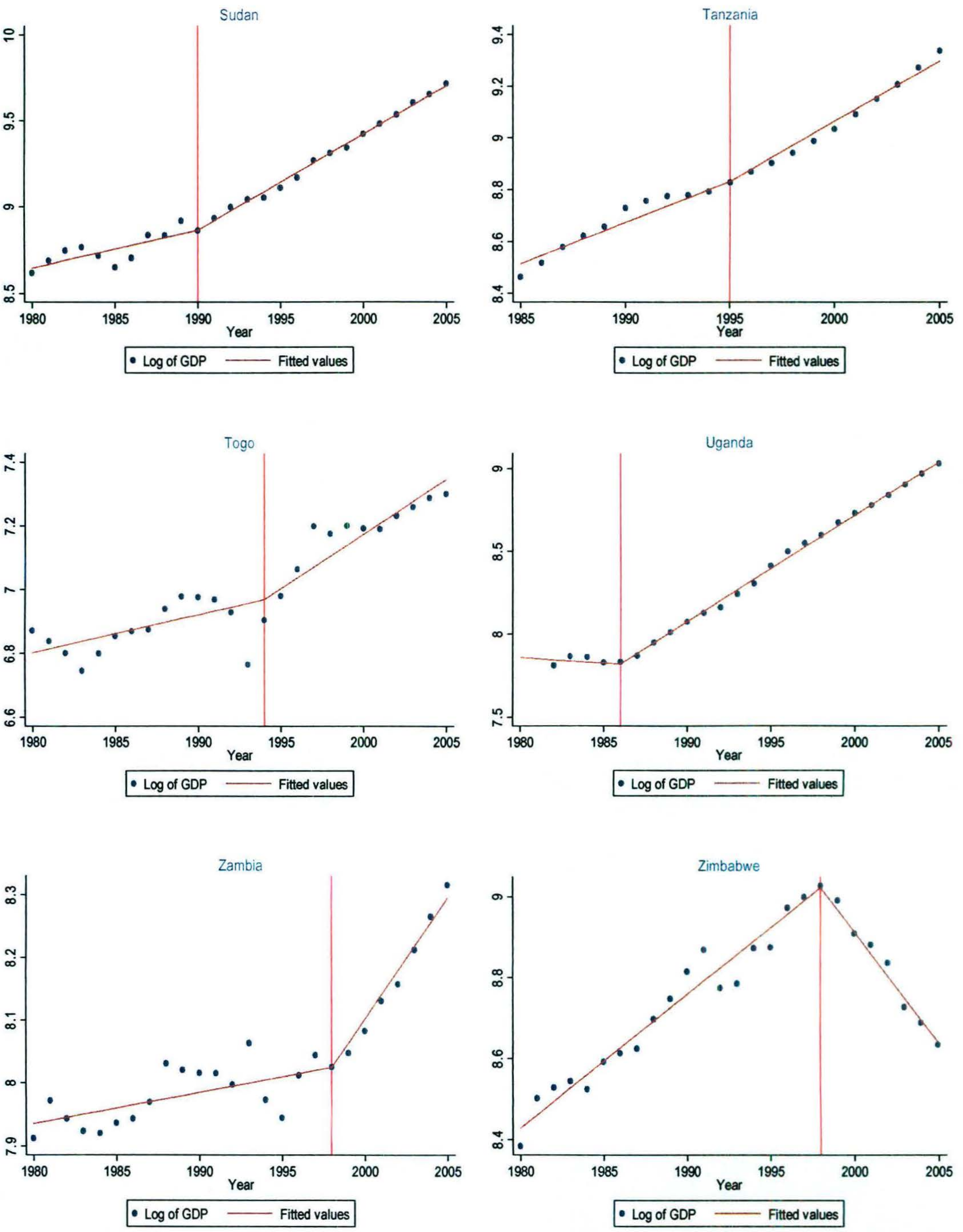

Table A2.2 Changes in consumer price index, 1980-2005 (percentage)

Country	1980-1992	1993-2005
Benin	3.3	6.7
Botswana	11.3	9.0
Burkina Faso	3.8	4.7
Cameroon	7.1	5.1
Côte d'Ivoire	5.6	5.6
Ethiopia	7.5	4.3
Gabon	4.0	4.4
Gambia	15.8	5.7
Ghana	42.2	26.0
Guinea	23.4	6.4
Guinea-Bissau	50.3	17.7
Kenya	14.1	12.2
Lesotho	14.2	8.5
Malawi	16.6	28.1
Mali	4.8	4.4
Mauritius	10.5	6.2
Mozambique	41.3	22.4
Namibia	11.6	10.2
Nigeria	21.1	25.2
Senegal	5.2	4.2
Sudan	51.4	41.8
Tanzania	29.8	13.2
Togo	4.1	6.4
Uganda	91.1	4.9
Zambia	57.8	39.9
Zimbabwe	16.2	114.8

Source: World Bank's African Development Indicators online database.

Table A4.1 Concentration index of merchandise exports, 1995-2005

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Benin	0.67	0.67	0.74	0.60	0.65	0.58	0.64	0.47	0.53	0.52	0.44
Botswana	0.50	0.54	0.25	0.29	0.41	0.81	0.83	0.79	0.77	0.74	0.74
Burkina Faso	0.57	0.61	0.60	0.64	0.65	0.56	0.58	0.60	0.71	0.74	0.73
Cameroon	0.33	0.37	0.36	0.36	0.48	0.48	0.47	0.46	0.45	0.43	0.38
Côte d'Ivoire	0.34	0.37	0.36	0.37	0.36	0.32	0.35	0.44	0.39	0.33	0.32
Ethiopia	0.65	0.62	0.62	0.67	0.60	0.54	0.39	0.41	0.41	0.40	0.40
Gabon	0.81	0.78	0.75	0.73	0.65	0.74	0.75	0.75	0.74	0.72	0.77
Gambia	0.31	0.36	0.20	0.50	0.37	0.46	0.37	0.33	0.25	0.38	0.44
Ghana	0.44	0.36	0.33	0.36	0.33	0.31	0.31	0.48	0.43	0.48	0.37
Guinea	0.63	0.67	0.61	0.56	0.56	0.57	0.59	0.52	0.55	0.64	0.65
Guinea-Bissau	0.52	0.54	0.54	0.47	0.58	0.62	0.77	0.70	0.71	0.73	0.93
Kenya	0.23	0.23	0.24	0.29	0.29	0.30	0.30	0.30	0.25	0.28	0.23
Lesotho	0.32	0.32	0.34	0.32	0.37	0.48	0.30	0.42	0.63	0.44	0.53
Malawi	0.66	0.60	0.64	0.64	0.60	0.59	0.58	0.61	0.51	0.46	0.53
Mali	0.59	0.59	0.83	0.61	0.60	0.65	0.68	0.72	0.64	0.60	0.67
Mauritius	0.35	0.37	0.36	0.35	0.35	0.34	0.33	0.32	0.33	0.32	0.28
Mozambique	0.36	0.36	0.32	0.33	0.30	0.31	0.49	0.46	0.52	0.66	0.63
Namibia	0.30	0.29	0.26	0.27	0.29	0.40	0.37	0.36	0.26	0.29	0.30
Nigeria	0.86	0.91	0.88	0.86	0.89	0.93	0.89	0.85	0.88	0.89	0.90
Senegal	0.29	0.32	0.34	0.27	0.24	0.26	0.25	0.29	0.22	0.23	0.20
Sudan	0.35	0.31	0.33	0.30	0.34	0.61	0.80	0.50	0.77	0.76	0.82
Tanzania	0.27	0.27	0.27	0.22	0.25	0.26	0.29	0.31	0.38	0.35	0.33
Togo	0.36	0.38	0.37	0.40	0.31	0.29	0.24	0.24	0.22	0.23	0.20
Uganda	0.65	0.54	0.44	0.56	0.56	0.33	0.28	0.29	0.24	0.25	0.26
Zambia	0.83	0.73	0.62	0.61	0.41	0.52	0.50	0.50	0.48	0.44	0.54
Zimbabwe	0.23	0.28	0.27	0.25	0.29	0.27	0.36	0.19	0.29	0.23	0.21
SSA excluding South Africa	0.35	0.41	0.40	0.31	0.39	0.49	0.45	0.42	0.43	0.49	0.59

Source: UNCTADstat online database

Table A4.2 Productivity decomposition and GDP growth, 1985-2005 (percentage)

Country	Agriculture			Non-agriculture			Overall Productivity	GDP Growth
	Productivity	Reallocation	Total	Productivity	Reallocation	Total		
Benin	0.6	-0.7	-0.1	-0.9	1.1	0.2	0.0	4.0
Botswana	0.0	-0.6	-0.6	2.3	1.8	4.1	3.5	6.9
Burkina Faso	0.7	-2.0	-1.3	1.4	1.6	3.0	1.7	4.9
Cameroon	0.3	-0.8	-0.6	-6.0	4.3	-1.8	-2.3	0.9
Côte d'Ivoire	0.4	-0.6	-0.2	-4.1	2.6	-1.5	-1.6	1.7
Ethiopia	0.6	-1.1	-0.4	1.0	0.7	1.7	1.2	3.4
Gabon	0.1	0.1	0.2	-3.7	3.0	-0.7	-0.5	2.0
Gambia	-0.2	-1.6	-1.8	-0.4	1.9	1.5	-0.3	3.5
Ghana	0.1	-0.5	-0.3	0.7	0.8	1.5	1.2	4.4
Guinea	0.3	-1.6	-1.3	-1.4	3.8	2.4	1.1	4.0
Guinea-Bissau	0.8	-0.8	0.1	-1.9	1.8	0.0	0.0	1.2
Kenya	-0.1	-1.5	-1.6	-1.3	2.2	0.9	-0.8	2.7
Lesotho	-0.1	-0.4	-0.5	1.5	0.4	1.9	1.4	3.9
Malawi	0.5	-1.6	-1.0	-1.5	2.4	0.9	-0.2	2.7
Mali	1.3	-0.6	0.7	0.3	1.4	1.7	2.4	4.4
Mauritius	0.5	0.2	0.7	2.8	-0.1	2.7	3.4	5.3
Mozambique	0.9	-1.1	-0.2	1.8	1.9	3.7	3.5	6.1
Namibia	0.3	-0.7	-0.4	-1.7	2.4	0.7	0.3	3.9
Nigeria	1.0	0.0	1.1	-0.5	1.2	0.7	1.8	3.8
Senegal	-0.1	-1.5	-1.6	-1.0	2.5	1.5	0.0	3.0
Sudan	1.6	-0.4	1.2	0.9	1.3	2.2	3.4	5.3
Tanzania	0.7	-1.0	-0.4	-0.4	2.2	1.9	1.5	4.0
Togo	0.3	-0.8	-0.5	-2.4	2.1	-0.3	-0.8	2.4
Uganda	0.3	-1.3	-1.0	1.6	1.9	3.6	2.6	6.6
Zambia	0.2	-1.4	-1.2	-0.9	1.6	0.7	-0.5	1.4
Zimbabwe	-0.2	-0.8	-1.0	-2.9	1.4	-1.5	-2.5	0.4
SSA	0.1	-1.2	-1.1	-1.4	2.2	0.8	-0.3	2.7

Source: Computed based on UNCTADstat online database. GDP growth rates have been calculated from World Bank's African Development Indicators online database using the least-squares method.

Table A5.1 Panel unit root tests

Variables	Harris and Tzavalis (1999)	Im et al. (2003)	Pesaran (2007)
	For the first law		
Non-agricultural output			
Model 1	0.983 [1.000]	4.849 [1.000]	-0.773 [0.220]
Model 2	0.737 [0.944]	-0.609 [0.271]	2.851 [0.998]
Non-industrial output			
Model 1	0.956 [0.999]	4.926 [1.000]	-1.916 [0.028]
Model 2	0.589 [0.017]	-2.258 [0.011]	2.002 [0.977]
Non-manufacturing output			
Model 1	0.981 [1.000]	5.299 [1.000]	-1.174 [0.120]
Model 2	0.682 [0.580]	-0.988[0.161]	2.755 [0.997]
Non-service output			
Model 1	0.971 [0.999]	6.018 [1.000]	-0.089 [0.464]
Model 2	0.651 [0.288]	-2.509 [0.006]	3.790 [1.000]
Agricultural output			
Model 1	0.897 [0.886]	2.645 [0.995]	0.015 [0.506]
Model 2	0.343 [0.000]	-3.883 [0.000]	2.538 [0.994]
Industrial output			
Model 1	0.988 [1.000]	4.578 [1.000]	0.382 [0.649]
Model 2	0.764 [0.988]	-1.562 [0.059]	3.848 [1.000]
Manufacturing output			
Model 1	0.953 [0.999]	1.286 [0.900]	1.756 [0.960]
Model 2	0.746 [0.965]	-1.444 [0.074]	4.583 [1.000]
Service output			
Model 1	0.951 [0.999]	4.342 [1.000]	0.677 [0.751]
Model 2	0.627 [0.123]	-1.031 [0.151]	3.291 [1.000]
	For the third law		
Total productivity			
Model 1	0.966 [1.000]	5.022 [1.000]	0.965 [0.833]
Model 2	0.613 [0.852]	0.918 [0.821]	2.831 [0.998]
Agricultural labour			
Model 1	0.971 [1.000]	2.499 [0.993]	-3.810 [0.000]
Model 2	0.795 [1.000]	-6.993 [0.000]	-3.448 [0.000]
Industrial output			
Model 1	0.995 [1.000]	5.688 [1.000]	-1.025 [0.153]
Model 2	0.617 [0.868]	0.371 [0.644]	2.178 [0.985]

Notes: All variables are expressed in natural logarithm. Model 1 is implemented only with a constant while Model 2 is implemented with a constant and a trend. The lags are chosen according to the Akaike criterion wherever applicable. All tests take a unit root as the null hypothesis. p-values are shown in brackets. The Pesaran (2007) test has been performed using the *pescadf* Stata routines.

Table A5.2 Panel unit root tests of variables in first difference

Variables	Im et al. (2003)	Pesaran (2007)
	For the first law	
Non-agricultural output	-8.653 [0.000]	-4.722 [0.000]
Non-industrial output	-10.258 [0.000]	-7.056 [0.000]
Non-manufacturing output	-10.622 [0.000]	-7.367 [0.000]
Non-service output	-11.231 [0.000]	-7.907 [0.000]
Agricultural output	-13.587 [0.000]	-10.311 [0.000]
Industrial output	-7.884 [0.000]	-5.815 [0.000]
Manufacturing output	-8.240 [0.000]	-5.816 [0.000]
Service output	-8.235 [0.000]	-4.663 [0.000]
	For the third law	
Total productivity	-6.531 [0.000]	-1.994 [0.023]
Agricultural labour	-4.304 [0.000]	-3.188 [0.001]
Industrial output	-9.818 [0.000]	-1.479 [0.070]

Notes: All variables are expressed in natural logarithm. The tests are computed only with a constant and the inclusion of a trend does not alter the result except in the case of agricultural labour and industrial output for the third law under the Pesaran (2007) test. All tests take a unit root as the null hypothesis. p-values are shown in brackets.

Table A5.3 Panel cointegration tests for the first law

Test	Agriculture	Industry	Manufacturing	Services
G_τ	-1.390 [0.082]	-4.853 [0.000]	-4.609 [0.000]	-6.528 [0.000]
G_α	4.649 [1.000]	3.386 [1.000]	2.884 [0.998]	2.305 [0.989]
P_τ	-1.930 [0.027]	-14.985 [0.000]	-3.168 [0.001]	-5.871 [0.000]
P_α	0.820 [0.794]	-6.883 [0.000]	-1.442 [0.075]	-1.413 [0.079]

Notes: The test regression is fitted with a constant and trend. The lags and leads in the error correction test are chosen according to the Akaike criterion. The tests take no cointegration as the null hypothesis. p-values are shown in brackets. The tests have been performed using the *xtwest* Stata routine written by Persyn & Westerlund (2008).

Table A5.4 Panel cointegration tests for the third law

G_τ	-4.659 [0.000]
G_α	7.159 [1.000]
P_τ	6.647 [1.000]
P_α	5.253 [1.000]

Notes: The test regression is fitted only with a constant since there are no enough observations to include a trend. The tests take no cointegration as the null hypothesis. *p*-values are shown in brackets. The tests have been performed using the *xtwest* Stata routine written by Persyn & Westerlund (2008).

Table A5.5 Panel regression of Kaldor's first law using MG and PMG estimators, 1985-2005

Dependent Variables	Explanatory Variables	MG	PMG
Non-industrial output	Constant	0.731 (0.181)***	0.501 (0.152)***
	Industrial output	0.901 (0.142)***	0.725 (0.022)***
Non-manufacturing output	Constant	0.677 (0.155)***	0.402 (0.090)***
	Manufacturing output	0.787 (0.133)***	0.744 (0.038)***
Non-service output	Constant	0.317 (0.280)	0.440 (0.111)***
	Service output	1.058 (0.334)***	0.760 (0.018)***

Notes: All variables are expressed in natural logarithm. The figures in parentheses are standard errors.
MG is mean group estimator.
PMG is pooled mean group estimator.
*** indicates significance at 1 per cent level.

Table A5.6 Model comparison using Hausman test for Kaldor's first law

	MG Versus PMG	MG Versus FE	PMG Versus FE
Industry	$\chi^2(1) = 1.30$	$\chi^2(1) = 0.00$	$\chi^2(1) = 0.01$
	$Prob>\chi^2 = 0.255$	$Prob>\chi^2 = 0.974$	$Prob>\chi^2 = 0.933$
Manufacturing	$\chi^2(1) = 0.09$	$\chi^2(1) = 0.00$	$\chi^2(1) = 0.00$
	$Prob>\chi^2 = 0.765$	$Prob>\chi^2 = 0.995$	$Prob>\chi^2 = 0.999$
Services	$\chi^2(1) = 0.61$	$\chi^2(1) = 0.00$	$\chi^2(1) = 0.02$
	$Prob>\chi^2 = 0.433$	$Prob>\chi^2 = 0.983$	$Prob>\chi^2 = 0.896$
	H_0: the preferred model is PMG	H_0: the preferred model is FE	H_0: the preferred model is FE

Notes:
MG is mean group estimator.
PMG is pooled mean group estimator.
FE is fixed effects estimator.

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