ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ANALYSIS OF GROWTH, POVERTY AND INEQUALITY IN SUB-SAHARAN AFRICA

BY:

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Abstract

Unlike the standard cross-country growth regressions that focus on the long run average growth and hence mask episodes of high and low growth that most of these countries experience, this paper follows the recent literature and examine growth episodes in SSA countries. This new approach applied enable us identify years of growth accelerations and episodes which were sustained over the medium and long-term. More specifically, utilizing the Penn World Data Tables (version 6.2), the study follows the diagnostic or two-pronged strategy of Rodrik (2005a and 2005b), which focuses on the particular constraints that prevent a given country from growing faster. In the latter part, we analyze the impact of growth on income poverty and inequality in selected countries drawing on available household survey data published by the World Bank in its Global Poverty Monitoring Database.

To establish correlation between growth episodes(all accelerations and sustained ones) and policy variables, institutional variables and geographic factors, we estimate alternative limited dependant variable models. The results show that variables affect these two growth episodes differently. While US interest rate(proxy of international interest rate shock), petroleum price shock, democratization, regime change, resource richness and government expenditure are important predictors of growth accelerations, positive terms-of-trade shock, growth rate of GDP deflator, economic liberalization, financial liberalization, ethnolinguistic factorization, resource endowment, and age dependency ratio determine the probability of sustained growth. The reform variables are not crucial for igniting growth. Rather, these variables are highly correlated with the timing of sustained growth.

On the other hand, by constructing a panel of income, poverty and inequality measures for selected countries, we were able to analyze the impact of growth on poverty and inequality; and of inequality on poverty. The result implies that inequality does not change significantly over time in the set of countries analyzed and that growth in these countries is generally pro-poor. It also depict that these countries should sustainably grow by about 7 percent per annum to achieve the MDG of poverty alleviation.

CHAPTER ONE

INTRODUCTION

1. 1. Background and Problem Statement

Majority of the world's poor reside in Sub-Saharan Africa(Africa here after). Countries in this region have been experiencing poor and erratic economic growth for the last several decades[1]. This trend combined with high population growth has led to very low percapita incomes and unacceptable standards of living for the large segments of the population. The economies are also often characterized by high income inequality. For a number of years, issues of growth, poverty and inequality have, therefore, been key challenges facing policymakers in this region.

Growth has been the concern of world's citizens long ago, and it has passed various thoughts in its evolution. However, the notion of long-term economic growth and the analysis of growth determinants has dates back from the classic contributions of Solow(1956) and Swan(1956) as documented in different studies such as Villa (2005), Aghion and Howitt (1998), and others. Solow(1956) and Swan(1956), in their independent prominent works, have examined economic growth in the U.S. economy and developed the "neoclassical growth theory." Growth economics has registered a rapid development since then and experienced different level of evolution to reach its current sate.

In this growth theory, the growth of output is related to the amount and quality of the basic factors of production. The amount of output growth that cannot be attributed to the change in the basic factors of production is often referred to as Solow residual, or total factor productivity or "measure

[1] Citing WDI, Africa has been growing on average by –0.7%, -0.6% and 0.7% over the 1980's, 1990's and between 2000 and 2002 (McKay, 2004).

of ignorance". The model assumes that labor force is growing at the rate of change of the population, and is augmented by exogenously growing technology. Most of the assumptions of this model have been criticized as limitations of the model and led to the invention of what is called endogenous growth models under the umbrella of new growth economics.

Endogenous growth analysis tries to overcome these shortcomings by building macroeconomic models out of microeconomic foundations. Crucial importance is usually given to the production of new technologies and human capital. Endogenous growth theory demonstrates that policy measures can have an impact on the long-run(or steady state) growth rate of an economy. 'Although endogenous growth theory is still young in comparison to the mature state of neoclassical theory, it is also inherently suitable for addressing the problem of sustainable development than is the neoclassical theory, because whether or not growth can be sustained is the central question to which endogenous growth theory is addressed' (Aghion and Howitt, 1998).

However, a new criticism on the applicability of the new growth theories to low-income and developing countries has emerged recently. These models are not providing us with clear and unambiguous results. Various reasons have been forwarded by different economists on the failure of such time-series and cross-section data based growth models. Lindauer and Pritchett(2002),for example, credited growth regressions confusion of partial correlation with (stable)parameters and confusion of empirical variables (that might be associated with policies) with feasible actions to promote growth. According to Cerra and Saxena(2007), cross-section regressions ignore the considerable variation in the data across time in these models. Policy recommendations based on such models fail to save most of the countries from poverty. Apart from these, the usual growth

models fail to differentiate between factors that ignite growth and those factors that sustain growth. However, the entire growth research has not all been about simple regression of growth on other right-hand side stuffs.

Thus, growth regressions based on "new growth economics" provide only limited lessons on the effects of various policies on growth (i.e. impact of liberalizing the trade regime, opening up the financial system, or building more schools). The policy advisors searching for generally good policies that would unquestionably "fix" the growth problems have, therefore, been left disappointed. As underscored by Rodrik (2005b), despite a voluminous literature, cross-national growth regressions ultimately do not provide much reliable and clear evidence that could be operationally useful. An alternative (diagnostic or two-pronged) approach, developed by Hausmann, Pritchett, Rodrik and others, takes a case-by-case approach and aims at explaining growth episodes experienced by different countries in the short, medium, and long-term.

This approach involves a short-run strategy of igniting growth and a medium and long-run strategy of sustaining the growth achieved. Recognizing that countries may show an upward/downward trend in growth (or both over the longer term), this approach attempts to find out which factors bring about the upward shift in growth and maintain it overt the long run in different countries. The vast existing cross-country empirical literature on growth economics cannot explain the medium term patterns. The diagnostic approach to growth does, however, look in particular for the turning points (episodes) in growth. We will adopt this approach and search for factors that accelerate and sustain growth in Africa.

In the set of African countries we have, mass poverty and high degree of inequality were recognized as socio-economic problems of their population. Moreover, it was recognized that poverty in this group of countries is multidimensional ranging from inadequate incomes to low life expectancy, high rates of mortality, high rates of illiteracy, low rates of school enrollment, and extensive malnutrition. These countries are also faced with the problem of sever inequality.

The second part of the paper would research impact of growth on inequality and poverty in the set of low-income countries.[2] Does economic growth benefit all including the conditions of the poor? Does the main impact of economic growth felt by the rich with only limited impact on the poor? The answer to this depends on how inequality is behaving overtime, as a certain percentage growth is achieved. Some studies (e.g. Adams,2003; Ravallion and Chen,1996; and Sirinivasan and Park,2000) underline that income inequality is generally stable over time and that growth benefits the poor.

However, on the other hand, some observers (McKay,2004; and Candia and Lora ,2005) argued that economic growth tends to increase income inequality, and that these higher levels of inequality ensure that economic growth benefits the rich rather than the poor. This later analysis is supported by the works of Foster and Szekely (2001) and others which show growth elasticities of significantly less than 1 suggesting a role for policies that take into account the distributional impact of growth. Note that most of the existing empirical works are based on data from large number of countries mixing developed, developing and low-income countries. Empirical studies

[2] Initially, we were interested to find out the relationship between growth, poverty and inequality based on data only from SSA countries. But as explicitly indicated in the data and methodology part, these countries have no adequate survey data and we couldn't construct enough spells. Thus we are forced to include data from other low-income countries.

based on a panel of relatively homogeneous countries(eg. low-income ones only) is not common, which this paper intends to take on(bridge).

Based on the set of low-income countries as per the World Bank country classification, panel data technique is used as countries in this group have only few surveys each. This study uses national household surveys spanning the years 1980 to date. By constructing a panel of income, poverty and inequality measures we are able to analyze the impact of growth on inequality and poverty; and inequality on poverty as well.

Given the promises of the new millennium, many of the anti-poverty initiatives sponsored by the major donor organizations of the world and strategies of individual countries have focused more on promoting economic growth rather than directly avoiding inequality in low-income countries. In order to understand how such strategy might contribute to poverty reduction, it is essential to come to an understanding to what extent a unit of economic growth reduce poverty. The other aim of this paper is, therefore, to use survey data from selected low-income countries to address the key question: *"How does economic growth affect inequality and poverty in the low-income countries of the world?*

Analyzing the correlates of growth episodes, we find that growth accelerations and sustained growth are predicted by different group of variables- while years of growth acceleration are associated with significant changes in US interest rate(proxy of international interest rate shock), petroleum price shock, democratization, regime change, resource richness and government expenditure, positive terms-of-trade shock, growth rate of Gross Domestic Product(GDP) deflator,

economic liberalization, financial liberalization, ethnolinguistic factorization, resource endowment, and age dependency ratio are significantly and robustly correlated with episodes which were sustained. Favorable US interest rate shock, regime change, resource endowment and pubic expenditure increase the probability that growth episode can occur and significant increase in petroleum price and democratization(unexpectedly) reduce this probability. Note that our reform variables are highly correlated with the timing of sustained growth, and they were not important predictors of entire growth episodes.

Based on Wodon(1999)'s methodology, we also trace the link between growth, inequality and poverty. We find a statistically significant pro-poor growth. This is mainly because inequality is not changing significantly with growth in the sample of countries. The result is robust to different choices of poverty measures as well as alternative definitions of growth between two household surveys. However, the elasticity coefficient when percapita income growth is used is less than 1. This is mainly because the gross impact of growth on poverty is less than 1 by itself.

1.2. Research Objective

The general objectives of this paper are to investigate factors that brought about the major growth accelerations among countries and what sustain economic growth; and determine the link between growth, inequality and poverty. More specifically, the study would like first, to identify the different growth episodes in selected African countries and then examine factors that brought about those episodes, second, trace out conditions or predictors of medium-term and long-term sustained growth, and identify which policy factors (if any) have led to lower growth performance in SSA than in other regions, and third, examine link between growth, inequality and poverty in selected low-income countries including Ethiopia.

1.3. Significance of the Study

Because of its welfare, social and political implications, the issue of growth in African countries has taken a significant position in the agenda of all stakeholders. It is a center in the activities and policies of national governments and international and regional development agents including IMF and World Bank. The concern on growth, poverty and inequality from pure and political economy context is emphasized currently by the urge to meet the millennium development goals in this part of the world. Therefore, the significance of this research work lies in providing relevant information on what policy measures to adopt to ignite growth and sustain the growth accelerated in this group of countries including Ethiopia. Moreover, as it will cover the distributional impact of growth, it will expose the stakeholders' relevant findings and forward policy recommendations.

Building on the available literature and organizing the data around the timing of growth episodes, this particular work is different from other similar works using more or less the same methodology in that the work: i) uses wide data coverage both in the past going to as far as 1950 to as recent as 2008 which is hoped to provide us adequately the behavior of Africa's growth experience over time; ii) is done when there pop-up a renewed interest on SSA; and iii) includes various groups of variables behind growth episodes providing us a room for identifying robust correlates. Most of the studies only try to correlate growth episodes against different covariates. They have not tried to identify what factors really can sustain growth.

Moreover, on the growth-poverty-inequality nexus, we have adopted a scientific methodology before deciding whether growth in Africa (where it was observed) is pro-poor or not and based on

the estimates, we extend our analysis to whether we are heading to the MDG of poverty alleviation. We have also organized our data around a group of homogenous countries.

1.4. Structure of the Study

The rest part of the paper is organized as follows. Chapter Two provides some background on the behavior of growth, poverty and inequality in Africa. Chapter Three of the paper reviews the progress in theoretical and empirical literature related to growth analysis, as well as the link between growth, inequality and poverty. Chapter Four describes data and methodologies used for obtaining years of growth episodes, estimating growth covariates and analyzing the relationship between growth, inequality and poverty- using data from panel of countries. While Chapter Five gives the results and its particular application to Ethiopia, Chapter Six follows with conclusion and policy implications.

CHAPTER TWO

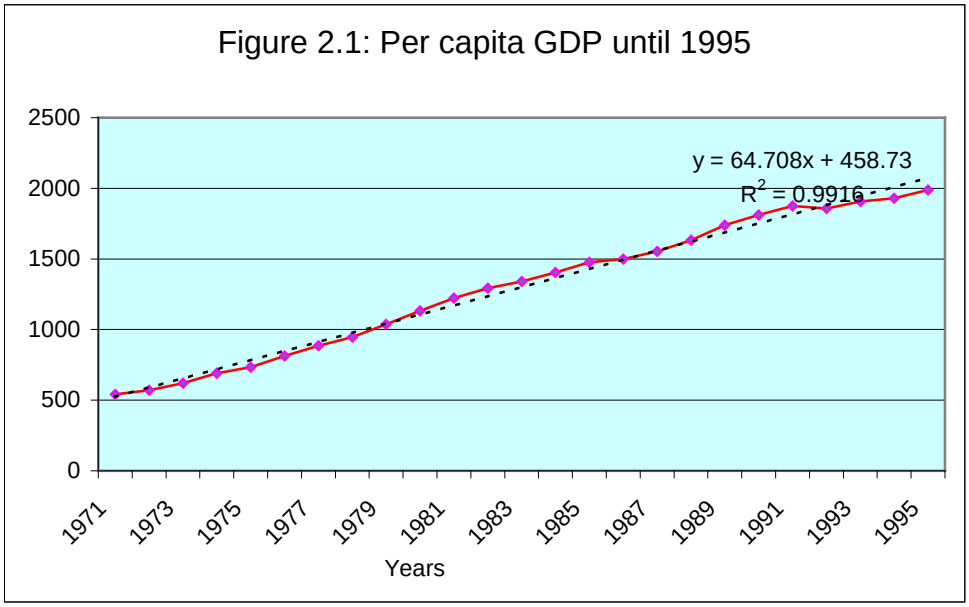
GROWTH, INEQUALITY AND POVERTY IN SUB-SAHARAN AFRICA

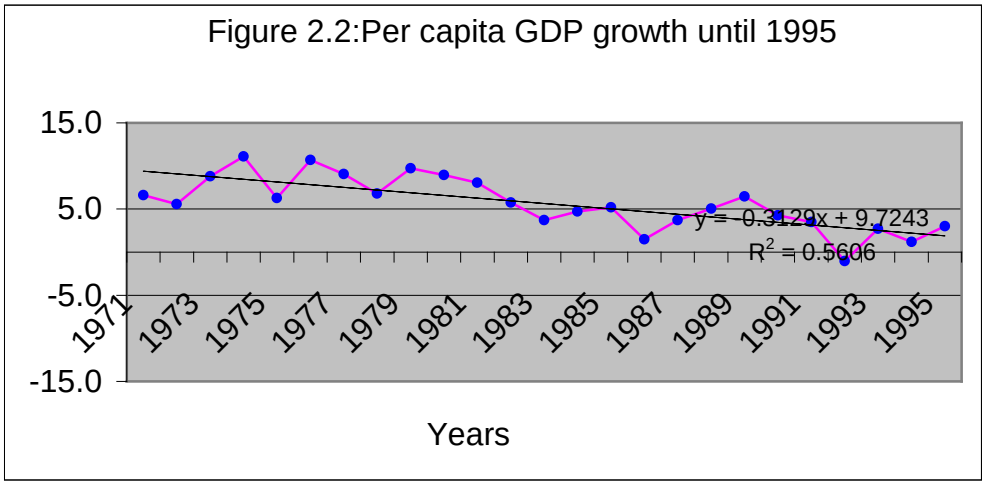
2.1. Africa's Growth Experience Until 1995

The aggregate economic performance of Sub-Saharan Africa (SSA) can be divided into three periods(Go et al, 2007): post-independence growth through the 1960s, two decades of decline and stagnation after 1975 through 1995, and a period of slow recovery from 1995 onward. Significant portion of the growth history of the continent is characterized by a steady growth leading to the existing clear divergence in the economies from the rest of the world.

During the 1960's, African countries were growing at a rate better than the 1970's. However, the percapita income based on year-on-year growth shrank between the 1970s and the mid of 1990's (see figure 2.1and 2.2[3]). More specifically, Africa was in economic collapse during a decade long period between 1975-1985. This economic collapse was turned to economic stagnation in the period 1985-95. Arbache and Page(2007) showed that Africa has the lowest coefficient of variation(CV) of GDP percapita, which is due to this long economic stagnation. Numerous factors can explain this outcome, such as higher exposure to climatic shocks, changes in the international economic environment, political economy issues, and high incidence of conflicts. Bad policies that result in instabilities of the rate of investment and the real exchange rate and lower total factor productivity are supposed to be parts of the reasons. Collier(2007) emphasized on Africa's physical and human geography as the constraints for its growth. The continent is argued to be disadvantaged in these respects.

[3] Our sample include all the 48 SSA countries we consider in the succeeding part of the study. We compute the percapita GDP and percapita income growth based on Penn World Tables extended till 2008 by actual and forecasted GDP percapita growth rate from IMF World Economic Outlook database of 2007. We used un-weighted country data in deriving the aggregate series.



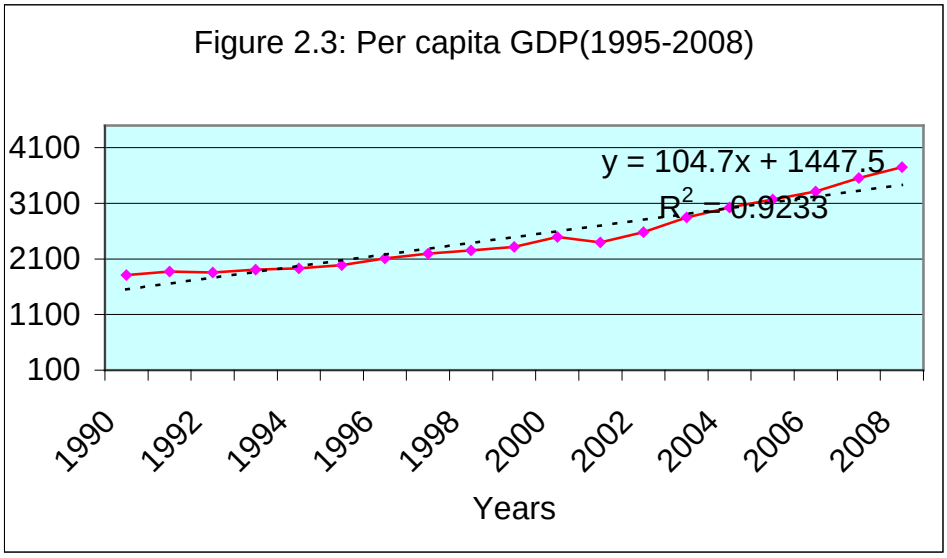


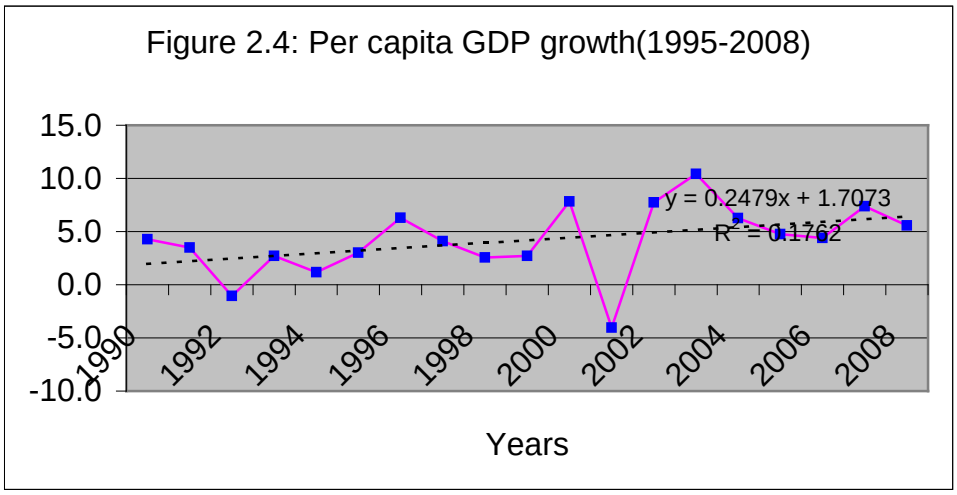
2.2. Recent Growth Experience (1995-2008)

However, the region experiences a solid economic performance in the decade 1995-2008 giving Africa's long-term growth experiences a U-shape path, with a hope for renewed growth in the economies. According to WB(2007a), year-on-year basis, Africa is registering a growth momentum of 5.2, 5.3, and 5.7 percent in the consecutive years of 2004, 2005 and 2006. As many as 28 countries recorded improvements in growth in 2006 relative to 2005. The region's average

growth rate began to approach that of other developing countries for the first time since the mid-1970s. This recent outcome is the result of both good policies and good luck.

Policies in many African countries are getting better. Inflation, budget deficits, exchange rates, and foreign debt payments are becoming more manageable. Economies are more open to trade and private enterprise. Moreover, Nudulu et al(2007) owed institutional improvement, the return of peace and security in the region, increasing political participation and competition for the recently improving economic performance of African economies. Also, African governments are increasingly taking control of their own economic destinies. It is also underpinned by good luck explained by strong global demand for key African export commodities, resulting in high export prices, especially for crude oil, metals and minerals.





2.3. Growth Experience within Africa

Though the general growth performance of the region is as indicated above, the growth experience is quite diverse within Africa, with a few countries experiencing sustained growth, a few others experiencing sustained stagnation; and the majority experiencing growth between the late 1960's and early 1970's, decline between the early 1970 and mid 1990's, and renewed growth since 1995. For example, six of the countries studied by Nudulu et al(2007) have more than tripled their percapita incomes between 1960's and 2005; nine countries have percapita incomes equal to or less than where they started in 1960; and the rest of the forty countries with full set of data for the study have seen some net improvement, but not enough to make a real decline in poverty levels.

Putting an in-depth analysis on recent growth experience of individual countries, Table 2.1 shows that countries which constitute more than 2/3 of the population and GDP of the continent are making an impressive success in the last one decade long period. On average, these countries have grown by 6.9 percent over the period 1995-2006. Equatorial Guinea has shown an outstanding growth performance.

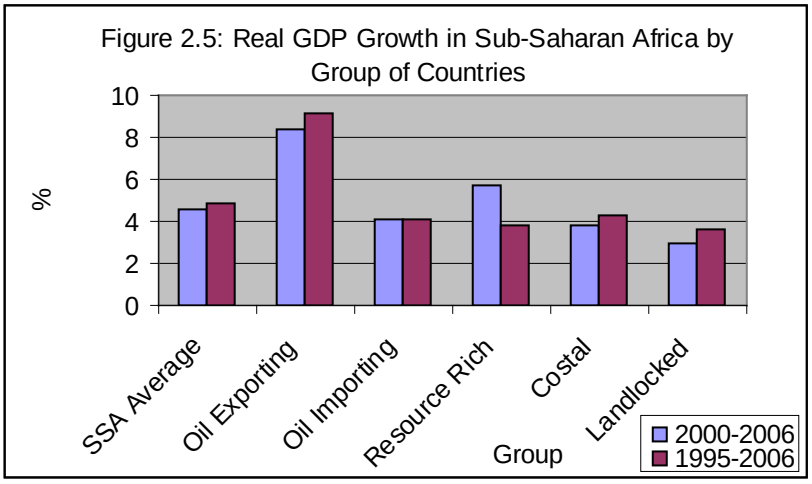
Table 2.1: GDP Growth Rates for Individual Countries(with >4%) in Sub-Saharan Africa

Countries with GDP Growth>4%(2000-2006) [70% of SSA Population and 78% of SSA GDP]			Countries with GDP Growth>4%(2000-2006) [30% of SSA Population and 22% of SSA GDP]		
Country	2000-2006	1995-2006	Country	2000-2006	1995-2006
Equatorial Guinea	23.1	36.2	Mauritius	3.9	4.4
Sierra Leone	11.6	1.7	Cameroon	3.7	4.1
Chad	10.9	7.4	Kenya	3.6	3.3
Angola	10.6	9.8	Nigeria	3.5	3.6
Liberia	8.9	12.1	Lesotho	3.4	3.2
Mozambique	7.6	7.9	Madagascar	3.2	3.2
Sudan	7.3	5.8	Guinea	2.8	3.6
Tanzania	6.3	5.2	Congo,Dem. Rep of	2.6	0.6
Ethiopia	6.2	5.7	Malawi	2.6	4.4
Burkina Faso	6.1	6.6	Comoros	2.4	2.2
Cape Verde	5.7	6.9	Swaziland	2.4	2.8
Nigeria	5.6	4.4	Burundi	2.2	0.3
Uganda	5.6	6.4	Togo	1.7	2.3
Rwanda	5.5	9.7	Eritrea	1.3	2.6
Botswana	5.3	6.3	Guinea-Bissau	1.2	0.3
Ghana	5.0	4.8	Gabon	1.1	1.4
Sao Tome & Principe	5.0	3.7	Central Africa Rep.	0.2	1.1
Mauritania	4.9	4.6	Seychelles	0.1	2.3
Gambia, The	4.9	4.6	Cote d'Ivoire	-0.3	2
Congo, Republic of	4.9	3.6	Zimbabwe	-5.5	-2.6
Mali	4.9	5.1			
Zambia	4.8	3.4			
Namibia	4.5	4.1			
Benin	4.2	4.6			
South Africa	4.1	3.5			
Senegal	4.1	4.3			
Average	6.8	6.9	Average	1.8	2.3

Source: Arbache et al(2008)

Collier (2007) stressed on physical and political geography differences across sub-regions as responsible factors for substantial variation in across country growth rates. These differences are critical because they imply equally substantial differences in opportunities and hence in the

strategies likely to be effective for growth. He identified Africa's physical and political geography in to: resource-rich, resource-scarce, costal, landlocked, large population, small population, ethnically diverse population, and country with homogeneous population. We have here emphasized on resource and geography related factors. As put in Arbache et al(2008), oil exporting countries have sustained 9.1 and 8.4 percent average growth from mid-1990's and between 2000-2006, respectively. This is comparable to top Asian performers and a little bit higher than the top seven non-oil and resource poor African countries. On the other hand, costal countries grew higher by 0.7 percentage point than landlocked countries over the period between 1995-2006[4].



Source: Data from Arbache et al(2008) and own plotting

Strengthening Collier's and Arbache et al's observations, WB(2007a) showed significant difference among different group of countries in igniting and sustaining growth. Resource-rich and oil exporting countries experience a higher frequency of growth episodes and medium and long-

[4] We are going to econometrically test whether and which of these exogenous differences have significantly affect growth probabilities in SSA.

term growth. The unconditional probability of an episode of good times was 55 percent for the resource-rich countries, 49 percent for the oil- exporting countries, and 36 percent for the non-oil-exporting countries for the period between 1995 and 2005.

All in all, African countries have undergone various years of *unsustained* upward shifts in growth trends which are comparably more frequent than sustained episodes. Likewise, there were moments in which the economies have gone for periods of slow growth. In the latter part of the paper, we will be interested in examining years of episodes hoping that it can provide evidence on how to ignite and maintain sustained growth in the region.

2.4. Poverty and Inequality in Africa

Over the last couple of decades, the challenge has been to have any growth at all. Africa has been stagnating and the economy has been diverging from the rest of the world. Recent years on the other hand have witnessed Africa with another feature. How are inequality and poverty changing in Sub-Saharan Africa over these periods? McKay(2004) noted data limitation as a challenge in assessing the progress in poverty reduction, especially in the pre-1980s. In light of this, we try to see the trend.

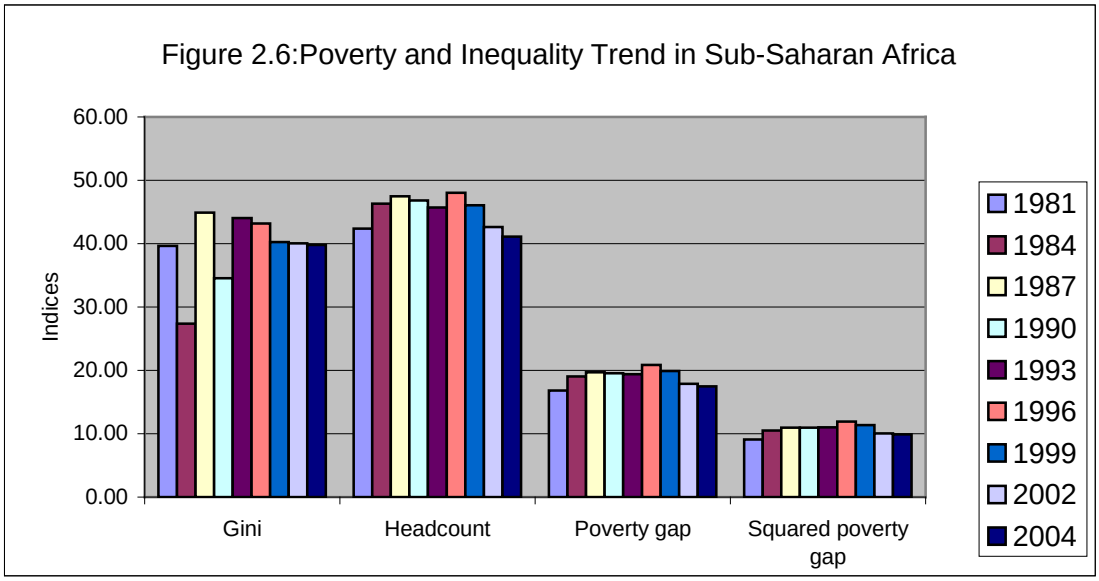
As indicated in Nudulu et al(2007), although Africa currently accounts for only 10 percent of the world's population, it now accommodates 30 percent of the world's poor. Alemayehu(2006) stressed that this poverty is more pervasive in Eastern and Southern Africa sub-regions(ESA), where about 50 percent of their population is estimated to live below the poverty line. The world as a whole has made a remarkable progress in reducing extreme poverty over the past three

decades, cutting it by nearly two-thirds. But the trend in this region has been in opposite direction; increasing both in headcounts as well as in percent especially from 1980's[5] to mid-1995. This implies that the poor economic performance of the region coupled with the high population growth has contributed to the worsening of the incidence of poverty.

Figure 2.6 shows the incidence and trend of income poverty in Africa. It also gives us the picture of income distribution in the geographic region. Over all, from 1981 to 2004, one cannot draw a representative linear trend line on our poverty and inequality indicators. However, you can see a clear declining trend in poverty and inequality after mid-1990's. These indices have been increasing and achieved their maximum in the previous survey years. These have been due to both by low average economic growth rates during the period (the previous discussion) and by the high and generally stagnant levels of income inequality in the region. The recent gradual decline in poverty is aligned with the recent change in Africa's growth trend. The regional poverty rate has fallen by about 7 percentage points between mid-1990s and 2004.

When we offer a look at the historical trend of the evolution of the region-wide aggregate Gini indices, after heating almost the highest of its level in 1993, inequality in Africa has fallen during the succeeding years. As sections 3.2 and 4.2.2 discuss in detail, knowing how the level of inequality changes when a unit of growth is registered is important to decide whether "pro-poor" [6]growth is.

[5] The oldest year for which we have poverty and inequality survey data for Africa
[6] Growth is pro-poor if rates and patterns of economic growth are associated with significant increase in the incomes of the poor.



Source: World Development Indicator PoveNet Database. Average Gini index is own computation based on simple country survey averages.

According to IMF(2007), the challenge now is to frequently accelerate and maintain fairly high growth and spread it throughout the region to achieve the income poverty goal of the MDGs. The report stresses that at present only about half a dozen countries seem to be on track to meet it. Africa still tails behind other regions in most measures of human development. The continent is continuously being overwhelmed by natural and manmade shocks including (civil) wars, climatic changes, international market crisis, and expansion of different epidemics in spite of the general improvement. To improve the situation, UNECA(2007) clearly put that African countries need to become more innovative in terms of resource mobilization and in the design of pro-growth and pro-poor policies to tackle the problems of mass unemployment, persistent poverty, and pervasive inequality.

Country evidences also suggest that the recent growth performance needs to be supported by targeted distribution policies to make inroads into poverty, and thus achieve the Millennium Development Goals(MDGs).

CHAPTER THREE

LITERATURE REVIEW

Understanding the sources of economic growth is important. It is difficult to say much about the causes of economic growth without a theory of growth. Hence, in the very immediate part of this section we will briefly discuss developments in the theory of economic growth over the past few decades together with the empirical development. In its subsequent parts, we will discuss the theoretical and empirical backbone of the methodology we are going to use for our further empirical estimation and analysis.

Motivating and sustaining growth have been among the major macroeconomic objectives of low-income countries for the last couple of decades. The relationship between growth, inequality and poverty has also received a lot of attention in the area of development economics. Growth is generally welcomed. But a further issue of interest to policy makers is how this growth is related to poverty and inequality. Establishing this relationship is important in alleviating poverty. Both theoretical and empirical researches have been carried to establish the relationships though there are still contrasting evidences coming in to front. In the latter part of this chapter, we will be having an extensive review of both empirical and theoretical literature on the link between growth, inequality and poverty.

3.1 The Two-pronged Growth Strategy for African Countries

The problem of economic growth has indeed been the ubiquitous problem of all societies at all times. This is reflected by the fight-against-nature of the early “jungle man”, the effort by ancient Greek and Roman city states to boost agricultural productivity which was regarded as source of

economic prosperity and political power, the need to create a powerful state by mercantilists through development of commerce and foreign trade, and latter the physiocrates effort giving agriculture top priority. Around the end of the eighteen-century, there was a huge agricultural-industrial revolution. In all these strategies, economic growth was in the back of their mined.

As a branch of a discipline(or economics), economic growth has deeply concerned economists ever since the days of Adam Smith . David Recardo, John Stuart Mills, Thomas Robert Mallthus, Karl Marx, Alfrade Marshal, Joseph A. Schumpter, John Manyard Keynes and others either made economic growth the central theme of their work or related their works to it (Vaish, 2002). However, after a long period of relative neglect in mainstream economics, it is only during the past four decades that economists have shown an increasing interest in developing the growth models. The notion of long-term economic growth and the analysis of growth determinants has dates back from the classic contributions of Solow(1956) and Swan(1956) as documented in different studies such as Villa (2005), Aghion and Howitt (1998), and others. Solow(1956) and Swan(1956), in their independent prominent works, have examined economic growth in the U.S. economy and developed the “neoclassical growth theory”. As Branson(1989) indicated, Edward Denison also studied the same economy, but using a more disaggregated sources of growth. Growth economics has registered a rapid development since then and experienced different level of evolution to reach its current sate.

In the evolution of growth economics, one of the strongest propositions has been that continuous technological innovation is crucial to sustain positive growth rate of output percapita. This proposition has been repeatedly tasted using the Solow-Swan growth model, or otherwise known

neoclassical growth model. The basic building blocks of this model are constant returns to scale production function and labor and capital as the basic factors of production. From these assumptions it follows that an increase in capital, provided the amount of labor employed stays the same, will result in a less than proportionate increase in output[7].

In this model, the growth of output is related to the amount and quality of the basic factors of production. The amount of output growth that cannot be attributed to the change in the basic factors of production is often referred to as Solow residual, or total factor productivity or "measure of ignorance". The model also assumes that labor force is growing at the rate of change of the population, and is augmented by exogenously growing technology. Most of the assumptions of this model have been criticized as limitations of the model and led to the invention of what is called endogenous growth models under the umbrella of new growth economics.

The "new growth economics" theories emphasize the endogenous determination of long-run (or steady state) growth rate, which is determined within the model, and therefore can be affected also by economic policies, instead of being driven exogenously. In summary, the "good news" of this approach was that permanent changes in economic parameters can alter the economic rate of growth permanently (Villa, 2005). Rao et al(2006)[8] identified the main contribution of the endogenous growth models over the standard neoclassical growth models as twofold. They identify factors that affect the rate of technical progress, which is exogenous in the neoclassical

[7] See any macroeconomics book including Obstfled and Rogof,1996; Branson, 1989; Romer, 1996; Dornbush and Fisher, 1993 and others.

[8] Quite recently Rao et al(2006) have extended the neoclassical growth model to capture the level and growth effects of the shift variables. For detailed methodological issue, refer their work "An Extension to the Neoclassical Growth Model to Estimate Growth and Level Effects, 2006".

growth model, and show that these factors have permanent growth effects. Although endogenous growth theory is still young in comparison to the mature state of neoclassical theory, it is also inherently suitable for addressing the problem of sustainable development than is the neoclassical theory, because whether or not growth can be sustained is the central question to which endogenous growth theory is addressed (Aghion and Howitt, 1998).

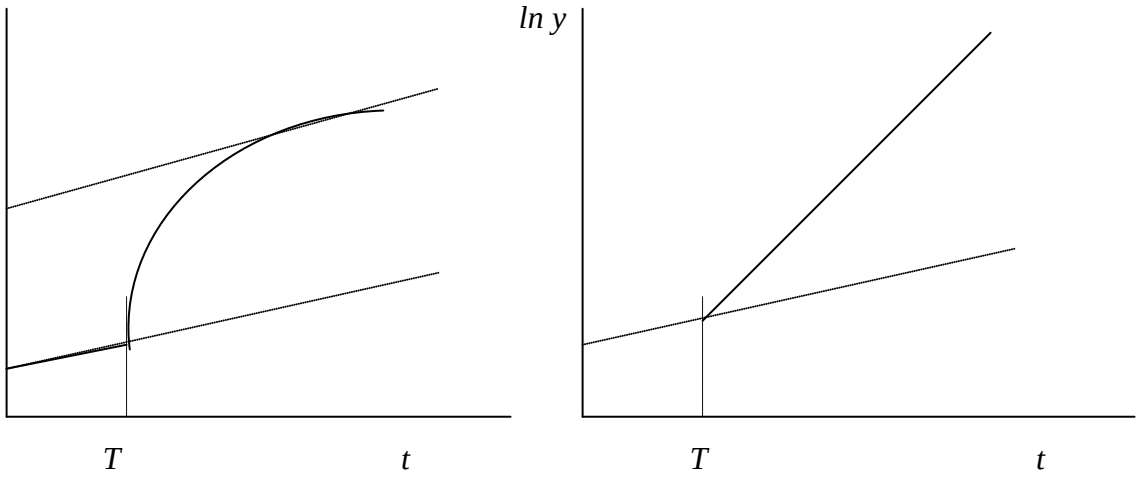


Figure 3.1: The effect of change in growth fundamentals in the neoclassical and endogenous growth models. Source: Taken from Hausmann et al(2004)

Since the inception of such formal models on economic growth, a lot of time-series and cross-section applications have been estimated, and one can observe thousands of papers that put different proxies of economic growth on the left-hand side and possible explanatory variables on the right-hand side. The impact of basic resources like physical and human capital, technological innovation, economic policies, behavior of sectors of the economy, geography, productivity and institutions have been among the variables the were put in the right-hand side and were investigated. Despite such extensive empirical works, these growth regressions have not provided

us with 'reliable and unambiguous'[9] evidences on the effect of these variables on growth. Moreover, these empirical researches have been less successful in providing reliable guidance for the questions such as how to accelerate and sustain growth in developing and low-income countries.

Different economists have forwarded various reasons on the failure of time-series and cross-section growth models. Lindauer and Pritchett(2002),for example, credited growth regressions confusion of partial correlation with (stable)parameters and confusion of empirical variables (that might be associated with policies) with feasible actions to promote growth. According to Cerra and Saxena(2007), cross-section regressions ignore the considerable variation in the data across time in such models. The inference from such regressions, thus, is questionable. Moreover, Cerra and Saxena perceive that explanatory variables that are constant or changing very little over the sample are unlikely to be the source of the shift in trend growth. For example, according to these authors, Sala-I-Martin(2000) used a million cross-country regressions to test the robustness of growth correlates. However, many policy and other variables change overtime. Ignoring these sources of variation can mask determinants of *turning points* and throw away valuable information. From these growth studies, ample of empirical findings are translated into policy recommendations(Cerra and Saxena, 2007). But many of these policy recommendations fail to save most of the countries from poverty.

Apart from these, neoclassical and endogenous growth models fail to differentiate between factors that ignite growth and those factors that sustain growth. However, the entire growth research has not all been about simple regression of growth on other right-hand side stuffs. There is now

[9] As quoted by Rodrik(2004): Growth Strategies

another variant-episodic analysis, which normally differentiates between factors that ignite and those that sustain growth and in which researchers examine episodes of more or less *discrete changes* in policy or other variables. This new growth literature seeks to explain why have different growth episodes come in the history of countries.

This latter literature is closely related to part of the growth literature that has focused on the information contained in turning points in countries growth performance[10]. This involves focusing on the correlates of accelerations in growth and variables that contribute to sustaining growth. This new method in growth analysis avoids many of the pitfalls of cross-county growth regressions that attempt to explain developing countries' average growth experience as indicated above.

Recent literatures have shown that factors that ignite growth are quite distinct from factors that can sustain growth; and that growth acceleration is a common phenomenon in developing countries than experiencing a sustained growth(Hausmann et al,2004). The basic challenge in such countries thus is less on starting growth and more on sustaining it. We have, thus, to focus on another methodology that can help us differentiate between factors that can ignite growth and other factors that can sustain growth. Such method should, according to Lindauer and Pritchett(2002), identify specific dates for the shift in growth rates and then analyze events around those dates to explain the shifts(either sustained or unsustained). An alternative approach, the one Rodrik adopted and others have used since, is aimed at explaining growth episodes and can help us bridge this gap.

[10] Similar methodologies were used by Berg et al(2006) to analyze duration of growth spells; by Dovern and Nunnenkamp(2006) to relate aid with growth accelerations in which they found that aid flows are significantly and positively related with growth acceleration even if its economic impact is small; by Jerzmanowski(2006) to evaluate the role of macroeconomic policies and policies in growth transitions; and a more or less similar methodology by Arbache and Page(2007) who have found that Africa has numerous growth acceleration episodes in the last 30 years, but also nearly a comparable number of growth collapses.

This method of analyzing growth follows what is called “Diagnostic or A Two –Pronged Growth Strategy” of Rodrik which encompasses a short-run strategy of accelerating/stimulating growth and a medium and long-run strategy of sustaining the growth achieved. This two-pronged approach to growth is aimed at examining what is happening in each country at and around the time when countries start to grow. Though we have quite enormous cross-country empirical literature on growth economics, until recently, none of these works has actually tried to uncover the fact. Unlike the classical and endogenous growth models in which growth is temporary (due to diminishing returns- exogeneity of technology) and that growth is sustainable, respectively, to see what actually cause an increase in growth the recent literature recommends to look at what special happens just when these growth accelerations happen in respective countries. The standard growth regressions indicated above do not do this. These growth models do not simply look for the turning points (episodes) in growth. Studies, for example, by Jones and Olken(2004), Jones and Olken(2007), Berg et al(2006), Rodrik(2004) and Hausmann et al(2004) show that growth accelerations are a common phenomenon in economies of the world(even in low income countries) and that there were so many growth episodes registered from 1950’s on. However, only few of these growth episodes were sustainable.

The new technique we are giving focus is a more focused variant of what are known as regime switching models of growth. Growth regimes are characterized by processes of “growth transition”, i.e. switch between periods of growth acceleration, stagnation and collapse(decelerations). Various studies are conducted to explain what causes each of the above growth processes. In addition to an explicit account given for within-country variation in the

growth process, such methodologies are also richer than standard average growth analysis since the methodologies allow for different effects of right hand side variables on the likelihood of growth acceleration, stable growth, stagnation and crisis. This kind of growth study is done by Jerzimanwski(2006). He evaluates in his paper the role of macroeconomic policies and institutions in these growth transitions.

To illustrate the idea of regime switching and have a clearer position on the regime we are interested in, note the following. Assume there are only two regimes(possible states of the world)- one in which the economy stagnates(Regime 2) and one in which the economy grows at 3 percent per year(Regime 1). Suppose that at any given moment in time, a country has a certain chance of switching from one regime to the other and a complementary probability of remaining in the initial states. Assume also that the transition probabilities depend on some country specific characteristic *X*. Higher value of *X* results in higher likelihood of the 3 percent growth regime, or otherwise.

The standard approach for growth analysis contend that countries with high level of *X* are expected to be growing fast(say, at 3 percent per year) and countries with low level of *X* are expected to be growing slowly(say, stagnates). In the regime switching approach, high *X* means more frequent episodes of growth. This is based on Jerzmanowski(2006). A stylized illustration of the regime switching process of growth with two countries of different levels of *X* is presented below: country 1 has low value of *X*, while country 2 has high *X*.

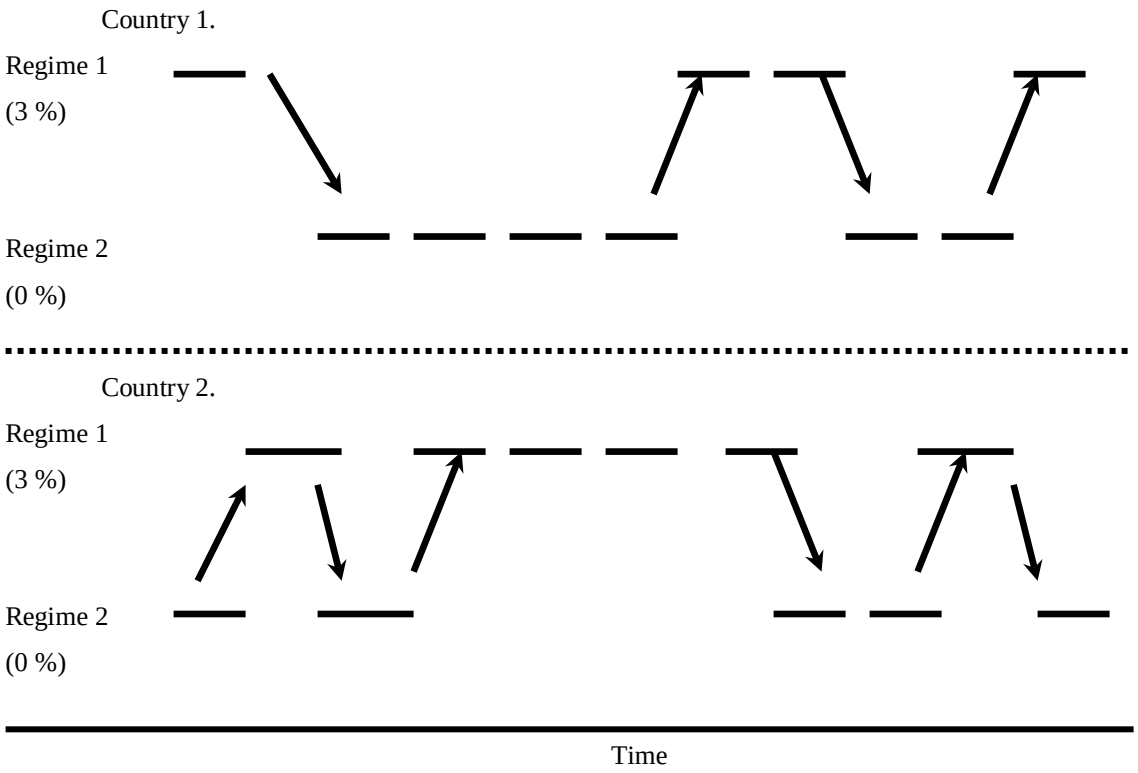


Figure 3.2: A stylized illustration of the switching process of growth.[11]

Source: Taken from Jerzmanowski(2006)

While country 1 is experiencing growth episodes only too seldom, country 2 is experiencing growth episodes quite frequently. Moreover, country 1 tends to remain in stagnation experiencing an income growth of 0 percent per annum, while country 2 is experiencing sustained period of high growth-3 percent per annum. Recent literatures tend to be dominated by the effort to explain what is correlated with growth episodes, and what are the country specific characteristics that are peculiar to country 2.

[11] Some country-specific characteristic X makes the growth regime more likely (e.g. good institutions). Country 1 has low value of X and so it spends more time in the stagnation regime. However, it is capable of periods of fast growth. Country 2 has high X and so it visits the growth regime more frequently. However it too stagnates from time to time. The growth regimes approach calls for identifying the regimes as well as the properties of transitions including the set of X's and their effect on regime changes.

3.1.1.Growth Acceleration

While many of the conclusions from the cross-country regressions held intuitive appeal-including the importance of openness to trade, macroeconomic stability, etc.-they turned out not to be robust, and thus were unable to give much real guidance on which policy levers were critical to igniting and sustaining growth in developing and low-income countries (Berg et al, 2006). The variation across countries is about as large as the variation across time. As Easterely et al(1993) first pointed out as cited in Hausmann et al(2004) and many others have confirmed since, growth performance tends to be highly unstable. Very few countries have experienced consistently high growth rates over periods of several decades. Countries long-run growth is determined by the frequency of visits to four growth regimes: stable growth, stagnation, crisis and miracle growth(Jerzimanwski, 2006). And standard growth theory, whether of the neoclassical or the endogenous variant, suggests that the best bet for uncovering the relation between growth and its fundamentals is to look for instances where trend growth experiences a clear shift (Hausmann et al, 2004).

Jones and Olken(2007) build on the literature by showing not just that period of success and failure exist, but that they are both extreme and ubiquitous. Their work shows that growth 'miracles' and 'failures' over ten years period (and longer) appear within the experience of most countries. Their finding exposes the fact that long-run growth averages within countries often mask distinct periods of success and failure and that the approach is not the right way to analyze growth.

Jones(1997), on his work on the world income distribution, investigated growth miracles and growth disasters for the 28 years prior to 1997. He identified that there were too many growth

miracles than growth disasters. A large number of growth disasters-countries that experienced decline in relative incomes-are located in sub-Saharan Africa. Chad, for example, experienced a fall in relative income from 8 percent to 3 percent, [12] implying that Africa is stagnated due to various development traps. This growth history has lead to divergence of Africa from the rest of the world and turned the continent into the poorest region. Collier(2006) stressed that Africa needs a big push to escape from its development traps. Acknowledging the fact that the low level equilibria have been sustained over some time in the continent, a marginal effort is unlikely to be successful.

Potential growth correlates are abundant, possibly much larger than the number of countries we have in our panel. However, explanatory variables that are *constant or change very little over time* are unlikely to be the sources of the shifts in trend growth(Cerra and Saxena, 2007). Studies should, thus, emphasize on the timing of shocks and policy changes to get a better chance of explaining sources of growth under panel of countries setting.

Rodrik(2005a) grouped the potential determinants of growth accelerations under three headings. One is reform; that is economic and financial liberalization in the conventional sense of opening up and stabilizing the economy and the financial sector. The second is changes in the nature of *political* regime. And the third is changes in external circumstances, which is captured by changes to the terms-of-trade. Following this grouping, Hausmann et al(2004) found that trade, exchange rate depreciation, and external shocks tend to be statistically significant predictors of growth accelerations. Collier(2007) reasoned improved prices as one of the factors that can accelerate economic growth. He confirmed that this commodity price boom could not sustain growth in the

[12] In the paper Jones considered countries income relative to the U.S. incomes, i.e. he focused on GDP per worker of countries divided by the U.S. GDP per worker.

long-run. For example, most of Africa enjoyed a commodity boom in the 1970's which was accompanied by growth acceleration. But this commodity price was followed by a decade of unparalleled economic disaster. In addition, Jerzmanowishi(2006) found that while government size appears to work mainly through lowering the probability of fast(accelerated) growth, trade is observed to increase the chance of miracle growth.

Few studies also include natural resource endowment and physical geography as particular covariates for short-term growth. Collier(2007), for example, stress that cumulative implications of these differences in growth rates for the path of GDP percapita have been dramatic. A more focused work by Collier and Goderis(2007) based on a different strategy (using panel co-integration vector autoregressive model) found strong evidence of a resource curse. Commodity booms have positive short-term effects on output, but adverse long-term effects. Alayli(2005) also found result supporting the resource curse emphasizing that the most interesting aspect of the resource curse is not that natural resource wealth on average reduces growth. Both studies also found that the resource curse is avoided by countries with sufficiently good institutions and that remedying this institutional failure requires changes of law and practice but does not require huge resource investments.

3.1.2.Sustaining Growth

The end objective of growth economics and alternative policy changes should not only be to initiate growth, but then to sustain it over the medium and long-run. Here is when the challenge comes. Though there are frequent growth accelerations in the world, we can get only few sustained growth trends. This is particularly why we have still many countries that had registered reasonably higher growth in some years (particularly in the 1960's and early 1970's) of the past decades remaining poorer.

Until recently, growth literature failed to build on turning points in growth trends and exploit the information contained in these turning points. Recent works have, however, put efforts to identify the timing of shifts in growth trends and find the feature of growth history of developing and low-income countries. Hausmann et at(2004), for example , have computed the probability of growth acceleration by decade and found an overall growth transition probability for Africa of as low as 1.91 percent with a declining trend from 6.25 percent in 1950's to 3.70, 2.51, 0.56 and 1.14 in the 1960's, 1970's, 1980's and 1990's. This shows lack of persistence in African transition and its eventual stagnation in the 1980's in particular. This observation is not peculiar to the developing world only. Very recent World Bank report on its official site disclosed that only 13 countries of the entire world averaged 7% growth for 25 years or more after World War II.

Moreover, Berg et al(2008) found that the mean length of growth spells is always much shorter-by up to a half-for Latin America and Africa compared to the industrial countries and emerging Asia. They establish that 70-80 percent of spells in the high income and emerging Asian countries lasted at least 10 years, but only 30-50 percent of spells in Latin America or Africa last that long. The

economic literature has failed to identify this fundamental property of growth in Africa and other low-income regions of the world, and consequently provided little guidance on how to embark on a successful and sustained economic growth.

Since closing the percapita income gap with rich countries will take extended periods of fast growth in the developing world, the question of how to make growth sustained appears to be of even greater policy relevance than how to get a growth episode underway. Starting growth is not a big problem as sustaining it.

Policies that will sustain growth once it is initiated are probability different from those that will initiate a miracle growth after a long period of stagnation. This idea is strengthened by Johnson et al(2007) phrase "What is associated with growth accelerations is not necessarily what keeps growth going-for example, an increase in commodity prices sparked growth in much of Africa during the 1960s, but this growth proved hard to sustain as political conflicts developed". Thus, what are the policy packages that would be most appropriate for each particular country to sustain growth? This question is perhaps the most prominent problem confronting policy makers in low-income countries including Ethiopia.

Similarly, according to Berg et al(2006), Jones and Olken (2005) stress the asymmetry between accelerations and collapses of growth: what works to get growth going is not the opposite of what seems correlated with a downbreak. For instance, growth accelerations seem to be driven largely by productivity rather than investment increases, perhaps in response to the opening of the economy to international trade. In contrasts, a collapse of investment seems to play a bigger role in

decelerations, as do increases in conflict and macroeconomic instability. This analysis suggests that the correlates of upbreaks differ from those of downbreaks. A tentative policy implication is that countries may need to do different things to get growth going from what is needed to keep it from stalling (Berg et al, 2006).

Berg et al(2006) considered the role of democratic institutions, income inequality, health and education, external competitiveness, and a number of variables related to macroeconomic stability as the major correlates of sustained growth. Collier(2007) suggested improved policies as one of the covariates. On the other hand Johnson et al(2007) have also stressed on the two possible explanations of why developing countries experience uncontained growth: inadequate education and poor health. Both are symptoms of insufficient physical capital and initial level of human capital that are “too low” to allow accumulation of further human capital.

Jones and Olken(2004) have also found a robust evidence that political institutions and movement towards democracy appear to improve growth. Using duration analysis to test what determines how long a country experience a sustained growth, Berg et al(2006) found that duration of growth spells is most robustly related to income distribution and democratization within the spell. Consistent to this, Jerzmanowski(2006) observed that institutions increase the probability of favorable outcomes-miracle growth and stable growth. On the other hand, even if he has observed that the size of government lowers the likelihood of growth acceleration, it is seen to increase the chance of sustained growth.

The challenge is that there is not yet a unified theory of sustained growth. As a result, there has not developed an acceptable and adequately tested methodology and specification into which we can plug values of explanatory variables to expose what causes growth accelerations and sustaining (Johnson et al, 2007). This is mainly owed to the fact that the methodology is only new for empirical analysis.

3.2.The Link between Growth, Inequality and Poverty

Growth has been one of the major macroeconomic goals of countries. Once countries have succeeded in igniting growth and that they make the growth achieved sustainable, the key question is to examine the impact of that growth on inequality and poverty. Deciding the link between growth, inequality and poverty is not that easy and it has been a point of debate in the arena of development economics. The need to resolve the debate and plant the possibility of drawing appropriate policy instruments should be a priority in low-income countries than anywhere else. Sub-Saharan Africa is broadly a region where there is high incidence of poverty and inequality. Finding the link is important as most countries in the region are experiencing reasonably good level of growth in the past few years. According to WB(2007a), Sub-Saharan African countries have grown by 5.7 and 5.6 percent by the years 2005 and 2006. How is this growth related to inequality and poverty?

The last decade has witnessed a booming literature on the link among growth, inequality, and poverty reduction. The existing literature is colored by contrasting views: on the one hand some theorists and findings support the view that growth(at least during its early stage) is accompanied by increased inequality; and on the other hand others (theoretically and/or empirically) support the

view that inequality does not change significantly with growth and thus that "just growth" is enough for poverty reduction. The extent of poverty reduction depends on how the distribution of income changes with growth(since the distribution of income or level of inequality determines how much of the growth trickles down to the poor). In theory at least, if income inequality increases, it is possible for a country to enjoy positive economic growth without significant benefit to its poorest segment of the population. To make this analytically traceable, think of two extreme cases: a country where oil facilities are owned by only few individuals in which case high growth would not reduce poverty at all; and another country (e.g. Nordic countries) with high rates of equality where every body benefits from a certain growth. Inequality can also affect poverty. Therefore, it is the relationship between economic growth and inequality, growth and poverty, and inequality and poverty that determine the net impact of growth on poverty reduction.

Empirical evidence on whether the benefits of economic growth are shared by the poor started to be produced systematically around the 1970s, when compilation of income distribution statistics for several countries started to become available. The first paper on the subject focused on the relationship between growth and inequality since they were mainly concerned with verifying the Kuznets hypothesis[13]. The earlier papers were also specifically concerned with the effects of growth over the standard of living of the poor (Foster and Szekely, 2001).

In the past, some theorists have argued that economic growth is not sufficient to reduce poverty in the developing world. For instance, Chenery(1974) as cited in Adams(2003) published an influential book in which he declared that it is now clear that more than a decade of rapid growth

[13] Kuznets hypothesis claims that growth and inequality are related in an inverted U-shaped curve: in the early stages of economic development, income distribution tends to worsen and does not improve until countries reach middle-income status.

in underdeveloped countries has been of little or no benefit to perhaps a third of their population. Similarly, Adelman and Morris (1973) argued that: 'Development is accompanied by an absolute as well as a relative decline in the average income of the very poor. . . . The sobering implication is that hundreds of millions of desperately poor people ... have been hurt rather than helped by economic development (Adams, 2003). This early argument on the relationship between growth and poverty was heavily influenced by the Kuznets hypothesis. The hypothesis implies that: if, in the early stages, economic growth leads to more inequality, then poverty might take many years to decline in the developing world.

Empirical works(few of which presented below) support this old proposition. The experiences of several low-income countries have shown that poverty can increase not only because of fall in output but also because of increased inequality in the distribution of income. The mechanism through which inequality hinders poverty reduction is that the higher the level of inequality, the smaller are the absolute gains of the poor as the economy grows. If the argument that growth increases inequality is true, then the best way to tackle poverty would be to reduce inequality in the poor countries of the world through installing appropriate distributional policies.

However, this intensive debate has continued until today about the extent to which economic growth has benefited poor people in the developing and low-income world. Some recent empirical researches argued that economic growth tends to increase income inequality, and that these higher levels of inequality insure that economic growth benefits the rich rather than the poor. Foster and Szekely(2001) in their extensive empirical application involving household surveys for 20 countries over a quarter century, for example, found growth elasticities for the general means that

are significantly below 1, suggesting that when the lowest incomes receive greater emphasis, then the effect of growth on the poor is not strong. Recent works by McKay(2004) on Africa and Candia and Lora(2005) on Latin American countries also support this finding. Alemayehu et al(2008) have also found a strong correlation between growth and inequality in Ethiopia implying a need for appropriative distributional policies so that poverty should not increase with growth. The mechanism that growth could increase poverty is by eroding the asset base of the poor such as loss of their free access to some resources. Besides growth resulting from shift of resources and public spending from sectors that work for the best of the poor including suspension of provision of subsidies on basic goods and services with importance to the poor towards public investment in growth promoting infrastructure would rise poverty. This is particularly true if these measures are not backed up by appropriate policies aimed at promoting better income distribution.

The most current thinking is that economic growth does not have much impact on inequality, because income distributions generally do not change much over time. However, countries that have historically experienced the greatest reduction in poverty are those that have experienced prolonged periods of sustained economic growth. It is also dominated by the consensus that progressive distributional changes are good for poverty reduction. Growth associated with progressive distributional changes will reduce poverty more than growth that leaves the distribution unchanged. There are two main reasons for this. One is that, in general, for a fixed level of income, progressive distributional change will shift resources from the richer to the poorer and thus lead to poverty reduction. The other reason is that poverty is more responsive to growth the more equal the income distribution(Perry et al, 2006).

According to Adams(2003), GDP percapita in his sample countries increased at an average rate of 2.6 percent per annum. However, the annual rate of increase in Gini coefficient was small: only 0.94 percent a year. Had we can generalize base on this study, since income inequality tend to remain stable over time, economic growth can be expected to reduce poverty. Moreover, Ravallion and Chen(1996) found no support for the view that higher growth rates in average living standards tend to come with worsening distribution. Indeed, over the whole sample of countries they considered, they found that a rising average consumption was associated with lower inequality and polarization[14].

Consistent with this proposition, using national-level data for the Latin American countries in the 1980s, Morley (1995) and Psacharopoulos et al. (1995) found that poverty and inequality have mirrored the economic cycle, rising during recession and falling during recovery(de Janvry and Sadoulet,1999). Similar result between growth and reduction in poverty is seen in several large countries with a high incidence of income poverty; such, for example, China, India and Indonesia (until the financial crisis) and also in other countries in Southeast Asia such as the Philippines (Srinivasan and Park, 2000). A few Sub-Saharan countries are part of this observation. The link between growth and non-income facets of poverty is also evident: there has been a general improvement of life expectancy, rates of mortality, education attainment, and so on.

Ravallion and Chen(1996) also found a strong association between the rate of growth in average living standards and the rate at which absolute poverty falls. They found even stronger elasticities

[14] Conventional measures of inequality may not capture well the gains and losses to the middle stratum. This calls for polarization. Polarization is the extent to which the society is divided into "haves" and "have-nots". Roughly speaking, distribution A is said to be more polarized than B if the incomes in A tend to be more bimodal, in that there are more "poor" and "rich", but fewer people in the middle. See Ravallion and Chen(1996) for detailed observation.

of poverty to change in growth for the lower poverty lines. More recent works by Adams(2003), and Iradian(2005) support the idea that economic growth reduce the proportion of people living in poverty. These findings are only less questionable under the assumption that the distribution of income remains more or less constant.

Our interest and the scope of the paper, as far as this particular part, is concerned is limited to exposing the link among our three variables and see the relative roles played by growth and inequality(income distribution) for poverty alleviation. We are not, thus, going into the laborious task of putting the existing literature on the determinants of growth and inequality in this and subsequent parts of the paper. Differentiating between growth-promoting and inequality-reducing policies may necessitate an independent work. This may also be decided once the relative importance of growth and inequality on poverty alleviation is determined and tackling inequality is justified to be an almost equally important task as igniting growth.

Furthermore, the analysis of growth-inequality link has a long tradition in economics literature(Lopez, 2004) taking a center-stage during the 1980s(Foster and Szekely,2001) though there is still no consensus through out the economics profession. The theoretical as well as the empirical literature has stressed on finding the causality between growth and inequality and whether inequality is good for growth. An extensive review on both theoretical and empirical literatures is provided by Lopez(2004). Among other important related works is one by Iradian(2005) who has assumed a one direction link and tested the impact of inequality on growth. He found a positive link. We simply assume that growth affects inequality(and inequality affects poverty alleviation) in this paper and take the causality issue beyond the domain of this work.

CHAPTER FOUR

DATA AND EMPIRICAL STRATEGY

As clearly put in the previous parts of the paper, the research project is aimed at explaining growth using a new strategy, and then to determine the relationship between growth, poverty and inequality. In this part of the paper, we have discussions related to data and methodological issues we used in the subsequent parts of the work.

4.1. Data

In investigating determinants of growth accelerations and sustained growth, we need to have reasonably long period data in order to capture adequate episodes of growth. We have, therefore, chosen Penn World Tables (PWT) version 6.2 database which is a widely used source of data for similar studies. This database provides us with internationally comparable percapita income data from 1950 to 2004. We have extended the data from 2005 to 2008 using actual figures and estimates from IMF(2007) so that we can capture the recent growth performance of African countries. The inclusion of such recent periods is one of which make the study different from other related works. Based on these data sources, our dependant variable growth "episodes" is generated using method elaborated in part 4.2.1.

Despite available voluminous research on growth, there is no consensus on what the real constraints of growth are. Following recent works, we have classified our explanatory variables under six headings: proxies of external shocks, macroeconomic stability and volatility, reform variables, democratic institutions and political conditions, geographic variables and public policies. We are more concerned with bigger changes in our explanatory variables than those that

are constant or change very little over the sample as they are unlikely to be the sources of the shifts in trend growth. We have used only some continuous variables such as those representing age dependency ratio, death rate, ethnolinguistic factorization, and growth rate of GDP deflator to control for the impact of jumps in these variables on growth episodes and take care of our categorical variables.

External Shocks

Favorable external conditions tend to initiate growth accelerations and bad external environment tend to reduce the probability that countries can experience growth. We focus on the three basic external shocks: changes in terms-of-trade measured as export plus import divided by GDP; movement in world interest rate to reflect international interest rate shocks; and world petroleum price to take care of world price shocks. To capture the impact of terms-of-trade shocks, we construct a dummy variable, *ToT_Thresh90*, which takes the value 1 whenever the year-on-year change in the terms-of-trade is in the upper 90% of the entire sample. This variable is meant to capture exceptionally favorable external circumstances. US interest rate(*Usintrate)* is a dummy taking the value of 1 during the years where there is decline in international interest rate(as peroxide by the US interest rate) implying favorable external condition. We do not need to find the change(it is a change by itself). On the other hand, change in world petroleum price is also a dummy variable*(PoP_Thresh90)* which takes the value 1 whenever the change in the petroleum price is in the upper 90% of the entire sample. While *Usintrate* and *PoP_Thresh90* are based on International Financial Statistics (IFS), *ToT_Thresh90* is constructed based on PWT.

Macroeconomic Stability

Macroeconomic volatility tends to affect growth through producing different levels of risk on the actions and decisions of economic agents. Here we have chosen three traditional indicators of macroeconomic volatility: growth rate of GDP deflator, inflation, and nominal exchange rate depreciation. Hence we code *GGDPDef* a continuous variable representing growth rate of GDP deflator to proxy changes in prices of goods and services included in the GDP. The GDP deflator is a more broadly based and, many economists argue, a better measure of inflation than the consumer price index or the producer price index. We have derived the data from the United Nations Statistics Division. *Infla* is a dummy variable taking 1 for five years following the year in which inflation is in the lower 20% of the entire sample. This variable is meant to capture exceptionally favorable(stable) macroeconomic condition. The original data is from IFS. We code nominal exchange rate depreciation as *NERDep*, representing a dummy with 1 for five years when there is at least 50% depreciation on year-on-year basis based on the series from PWT.

Reform Variables

Major reforms that are conducive to better economic growth have been assumed to be highly correlated with breaks in trend(of percapita income growth). To represent economic reforms, we use two different binary indicators. The first indicator builds on "the well-known measure of trade openness first developed by Sachs and Warner (1995) and later updated by Welch and Wacziarg (2003). The Sachs-Warner index was meant to capture changes in an economy's openness to trade, but as argued in Rodriguez and Rodrik (2001), the coding incorporated a number of structural features (e.g. presence of marketing boards, socialist economic regimes) and the macroeconomic environment (e.g. presence of a large black-market premium for foreign currency), in addition to

tariff and non-tariff barriers to trade" (Hausmann et at, 2004). Thus, we code *Econ_lib* as a binary variable that takes the value of 1 during the first five years of a transition towards trade openness.

In addition, we use a measure of financial liberalization, *Finan_lib,* which is a dummy for the first five years of a financial liberalization episode. The timing of financial liberalization is calculated from growth rate of private sector credit from IFS. *Finan_lib* is assumed when there is a more than 100% increase in private sector credit. For countries with official years of financial liberalization from Bekaert et al(2001), we take the data into account.

Democratic Institutions and Political Conditions

The Polity variables are the main ones we use to represent democratic and political conditions. *War_end* is a dummy for the five-year period beginning with the cessation of an armed conflict from the Correlates of War International War Database by Singer and Small(2003). *Civil_war_end* is a dummy for the five-year period beginning with the ending of an armed civil war. *Conflictend* is another dummy for the five-year period starting with a cession of all sorts of armed conflicts, be it internationalized or just civil war.

Breaks in growth trend can also be brought by significant changes in political and institutional structures such as changes in political regime and the structure of democratic institutions. We consider democracy, change in regime and ethnolinguistic heterogeneity to proxy these factors. Accordingly, we use *Regchnage* to measure political regime change. *Regchange* takes a value of 1 in the five-year period beginning with a regime change as recorded in the Polity IV dataset. In Polity IV, *Regchnage* is represented by EYEAR (Polity End Year which is a four-digit number

denoting the ending year of the previous polity). *Democ* is 1 during the first five-year period if the Polity2 score changes from negative to positive denoting a movement from autocracy to democracy. We have also used ethnolingustic factorization(*Ethnoling*) as a measure of ethnic heterogeneity. Ethnolingustic factorization measures the probability that two randomly selected individuals from a country are from different ethnolinguistic groups. The hypothesis is that Africa's ethnic diversity tends to slow economic growth and reduce the likelihood that good growth policies will be adopted. This latter variable comes from Philip G. Roeder(2001): "Ethnolinguistic Fractionalization(ELF) Indices".

Geographic Variables

Collapse and slow recovery of Sub-Saharan African countries have been thought to be associated with policy mistakes. We need to test the relevance of geographic variables in the economic success of SSA countries. Geography provides countries with opportunities and constraints. *Coastal* and *ResourceRich* represent our geography variables. According to Colliar(2007), a large overland transportation distances and remoteness from ports tend to reduce the probability of growth phenomenon. Natural resources have also impact on growth. We have extracted our data on resource richness[15] from Arbache and Page(2007). We have used our own observation to generate *Coastal*. While *Coastal* is a binary variable taking 1 if a country has coast, *ResourceRich* is a dummy taking 1 if a country is rich in resources.

[15] Countries are resource rich if they are abundantly endowed with strategic resources such as oil and other metallic minerals.

Public Policy Variables

GovExp is a dummy variable taking a value of 1 for five-years period if change in government expenditure as share of GDP is in the upper 90% of the entire sample. This variable is also extracted from the Pen World data table version 6.2. It represents favorable public policy that may positively affect the quality of human resource. *PrivInvs* is another binary generated from the same source signifying a significant change in private investment as share of GDP. *PrivInvs* takes 1 for five consecutive years if private investment change is in the upper 90% based on the entire sample. The other variable in this category is a measure of death rate. *DeathRate* is a continuous variable representing unfavorable health policy. *AgeDep* is also another variable we used; measuring the ratio of dependants to working age population which represent inefficient public health policy. This indicator gives insight into the amount of people of non-working age compared to the number of those of working age. A high ratio means those of working age - and the overall economy - face a greater burden in supporting the under-age and aging population. The evolution of the variable is a function of mortality, fertility rates and of net migration. The latter three variables are taken from WDIs database.

The other major objective of the paper is to investigate whether growth, where it has been achieved in the panel of selected countries, has been a key factor behind poverty reduction once briefly reviewing some of the factors likely to be important to ignite and sustain growth in Africa using our episodic analysis. The poverty alleviation impact heavily depends on how inequality is behaving overtime. Previous works on countries of different income groups and other regions have shown contrasting results on the relationship between these variables. To test these relationships on SSA countries, and to more accurately pinpoint the impact of economic growth on

poverty and inequality in the region, it is necessary to obtain an appropriate data set. This data set, according to Adams (2003), should do three things: first, it should focus on the low-income countries of the world; second, it should utilize the results of household surveys, since these surveys represent the best source of poverty information in most developing countries, and third, it should include complete growth, poverty and inequality data for as many countries and time periods as possible. Such data can be obtained from World Bank World Global Poverty Monitoring Database. We will employ simple panel data econometrics to obtain statistical coefficients representing elasticities that would refute the theoretical expectation.

We wanted to include all the 48 SSA countries in our study. However some of these countries have no survey data at all[16], or had only one survey data and not included for final analysis. We were able to get only 21 countries with total of 60 surveys. Thus, we were forced to include countries in the rest of the world classified as low-income in World Bank list of countries(as of July 2007)[17] for which we can find at least two household surveys . This increased the countries to 34 and the surveys to 103. This paper, thus, use low-income countries(including those from SSA) having at least two nationally representative household surveys since 1980. Following Adams(2003), we use the year 1980 as a cutoff point, because in this set of low-income countries, many of the pre-1980 household surveys if they exist are perceived to be of low quality. For that matter, we have found no surveys before 1980's for these economies.

[16]India is the only low-income country which has a fairly long(3 decades) time-series household survey data. See Srinivasan and Park(2000) and Wodon's work titled Growth, Poverty, and Inequality: A Regional Panel for Bangladesh. But we have not included India as we get regional (rural and urban) data only.

[17] This table classifies all World Bank member economies, and all other economies with populations of more than 30,000. For operational and analytical purpose, economies are divided among income groups according to 2006 gross national income (GNI) percapita, calculated using the World Bank Atlas method. The groups are: lower middle income, $906–3,595; upper middle income, $3,596–11,115; and high income, $11,116 or more.

Other studies have constructed a data set to examine the relationship among growth, poverty and inequality. However, these data sets are not inclusive of all countries we want to include for this study. Moreover, we want to include new household surveys which have become available recently. Accordingly, we have constructed our own dataset. Table 4.1 presents summary of survey data on poverty, inequality and growth.

Since our aim is to see how growth affects poverty and inequality, we need at least two surveys for each country. In the data set, two surveys for a country define what we call a "spell". This enables us to calculate changes. We use the same living standard indicator-either expenditure or income per person- overtime in constructing the spells. Consumption(or expenditure) is the preferred indicator of well-being because it incorporates the life cycle hypothesis(LCH)[18], and because it can be measured precisely than income. Therefore, when there is a choice, we use consumption in preference to income.

Similar to Adams(2003), in constructing the intervals, we use relatively restrictive criteria: intervals must be two or more years in length, they must come from nationally-representative household surveys, and they must use the same "welfare indicator"- overtime as pointed above. Unfortunately, most of the countries in our data set use expenditure(consumption) per person as welfare indicator, which is more or less a more accurate measure of welfare.

Our purpose is to compute how economic growth affect poverty and inequality. We use change in the level of percapita income, in PPP units, as can be measured from countries national account

[18] The Life Cycle Hypothesis (LCH) is an economic concept analysing individual consumption patterns. LCH assumes that individuals consume a constant percentage of the present value of their life income.

data. It was established that percapita income significantly affects poverty and inequality. As a test for robustness of our estimates, we also use changes in survey mean income in place of change in percapita income between two surveys. The data on percapita income come from Penn World Tables version 6.2 extended till 2008. The survey mean income come from the World Bank Global Poverty Monitoring Database.

In measuring the changes in poverty, we use three different poverty measures: poverty headcount, poverty-gap and squared-poverty-gap indices. Poverty headcount index[19] measures the incidence of poverty, which is simply the percentage of the population living in households with a percapita consumption below the poverty line. The poverty line is set at $1 per person per day based on the World Bank definition of poverty. However, this index ignores the amounts by which the expenditures(incomes) of the poor fall short of the poverty line. Thus, we also use the poverty gap index which measures in percentage terms how far the average expenditure(income) of the poor fall short of the poverty line. The third measure-the squared poverty gap index- indicates the severity of poverty. This measure possesses useful analytical properties, because it is sensitive to changes in distribution among the poor. While the transfer of expenditures from a poor person to a poorer person will not change the headcount index or the poverty gap index, it will decrease the squared poverty gap index.

To measure change in inequality, economists use different indicators. We preferred to use Gini Index[20] as it remains to be the most widely used indicator(Agenor, 2000; and Iradian, 2005) and for ease of comparability of results. But as aggregate measure, it can mask some differences (i.

[19] The definitions are from Wodon(1999).
[20] Like other indicators of inequality including computation of deciles and quintiles, Gini index is also derived from the Lorenz curve(Agenor, 2000).

relative income positions of certain groups can change, but Gini index remains the same). It is always good to supplement by other measures (that focus more on specific groups). Hopefully, that will be my assignment for future research.

The same household surveys that we use to measure poverty are used as source for inequality data. It is a summary measure of the extent to which the actual distribution of income, consumption expenditure, or a related variable, differs from a hypothetical distribution in which each person receives an identical share. This indicator is particularly relevant to the equity component of sustainable development. The index scaled to vary from a minimum of zero to a maximum of hundred; zero representing no inequality and hundred representing the maximum possible degree of inequality. Similar to survey mean income data, poverty and inequality data also come from the World Bank Global Poverty Monitoring Database. The data set as a whole allows us to construct 70 spells using 103 surveys.

4.2. Empirical Strategy

4.2.1. Identifying the Episodes in Growth

Inspired by recent works on economic growth strategies, we will use Hausmann et al(2004) approach with some adjustments to identify different episodes in which growth in percapita income undergoes significant change and then correlate these episodes with the timing of economic and political reforms and other covariates. Using this approach, we hope to find a more robust relationship between the covariates and episodes of growth in percapita income, as compared to most typical cross-country regressions which were looking at the determinants of long-run average growth rates.

We use this method we have the details below to search for points of accelerations in the growth rate of GDP percapita. Following Hausmann et al(2004), we define the growth rate g_t at time t over horizon n to be the least squares growth rate of GDP percapita (y) from t to $t+n(\hat{g}_{t,t+n})$ defined implicitly by the following:

$$\ln(y_{t+i}) = a + \hat{g}_{t,t+n} * t, \qquad i = 0.....n\,,\ a \text{ is the inersept term} \ldots\ldots\ldots\ldots\ldots\ldots[1]$$

The change in the growth rate at time t is simply the change in the growth over horizon n across that period:

$$\Delta g_t = g_{t,t+n} - g_{t-n,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots[2]$$

We identify growth accelerations by looking for rapid growth episodes that satisfy the following conditions. The cut-offs are from Hausmann et al(2004).

1. $g_{t,t+n} \geq 3.5$ *ppa, that growth is rapid*
2. $\Delta g_t \geq 2.0$ *ppa, that growth accelerates*
3. $y_{t+n} \geq \max\{y_i\}, \quad i \leq t$, *that post growth output exceeds pre-episode output*

We apply this method to the GDP percapita data for all SSA countries for which we have data points. Unlike Hausmann et al(2004), we take the relevant time horizon to be six years (i.e., *n* = 5). This is to address the plainly high volatility of overall rate of African growth.

We must decide on the minimum "interstitiary period": the minimum number of years that we require between growth accelerations. Imposing a long interstitiary period means that we could be missing true breaks that are less than *h* periods away from each other. On the other hand, going for short interstitiary period may not provide us with true output breaks. Studies (Hausmann et al, 2004; and Berg et al,2006 among others) allow that countries can have more than one instance of growth accelerations as long as the dates are more than *h*=5 years apart. Taking an example from Hausmann et al(2004), a country could accelerate from 0% to 3.5% in 1967 and then accelerate from 3.5% to 6.0% in 1972 as two distinct episodes.

We have strictly followed this filter and consistent to previous works, it provides us large number of growth accelerations equal to 58 episodes in 37 of the 48 countries for the years between 1955 and 2003. This gives us unconditional probability of 2.46 percent for growth accelerations. We then identified sustained growth episodes if the growth rate remained above 2 percent in years *[t+5, t+15]* and unsustained episodes those episodes for which the growth rate fell below the 2 percent threshold. Identifying sustained episodes requires 29 years data (between 1965 – 1993). In this part, we have to work with a smaller sample size. This technique gives us 28 sustained episodes with unconditional probability of 2.01 percent. Consistent to Berg et al(2006), only half of growth accelerations are sustained over the medium and long-run. The intensity of these growth episodes differs notoriously across countries; some countries experiencing no episodes given our definition but some having as many as four (Equatorial Guinea, for example) over the years considered.

Table 3.1 provides a summary of these episodes together with the standard country abbreviations obtained from the source data. The episodes are then going to be analyzed. Unlike other works,

this method provides us with up-breaks only, which is our interest as well. In addition, we have tried to consider recent periods of African's growth history. Following Hausmann et al(2004), we also allow this variable to include a window around the time of each episode*[t-1,t and t+1]*. The reason to allow such a window around t is that there is somehow uncertainty that is attached to the identification of a specific year of growth episodes given the relatively low quality of macro data in SSA. We, thus, create a variable "episodes" that take a value of 1 around years of accelerations (i.e, *[t-1,t and t+1]*) , and 0 otherwise. To study these discreet growth episodes and correlate them with our variables of interest discussed in part 4.1, we need to use a limited dependant variable model.

Related methodologies were used by Jones and Olken(2004), Berg et al(2008), Arbach and Page(2007), Pattillo et al(2005) and Jermanowki(2007). Jones and Olken(2004) allow arbitrarily large number of breaks and does not constrain the breaks to be spaced by any given number of years. In contrast to our special interest on growth rates of substantial magnitude, the authors examine any possible breaks in trend. Pattillo et al(2005) and Arbach and Page(2007) used similar methods with Hausmann et al(2004) to determine years of significant changes in growth though they have not specified how distant two growth episodes should be. While Berg et al(2008) tried to put a restriction in the gap between two episodes, their methodology leads to considering small up-breaks as growth episodes which are not much of interest economically . We are more interested in significant changes in growth rates identified purely using economic criteria than statistical one. Their methodologies, thus, cannot help us trace significant changes in trend only. Moreover, either technique does not help us identify the sustained growth episodes from the

unsustained ones. One of our big purposes here is to see how African countries can sustain the recent shift in their percapita income growth.

On the other hand, Jerzimanowski(2006) estimates a Markov switching model of growth with four such regimes: miracle growth, stable growth, stagnation, and crisis. In contrast, our approach identifies just the first two of the regimes using pure economic criteria and then investigates potential factors influencing the probability that growth is ignited and sustained. The rationale behind concentrating on only two of the regimes is that Africa is more concerned with igniting growth(though in recent years it has become common in most of Africa) and with a headache of sustaining it than the laborious and ambitious task of explaining all possible "regimes" . Nevertheless, the superiority of the Hausmann et al(2004) methodology over others with respect to the above points is still debating in the recent growth literature. Moreover, none of the above models considered an extensive list of variables as theoretical and empirical covariates of growth episodes.

4.2.2. Empirical Models

The first task here is to setup an empirical model to deal with the phenomenon of episodes of growth. Application of limited dependant variable model on growth analysis is not a usual task. This limits the range for comparability of our specification and the results as well. A probit regression is an ideal model to start our episodal analysis.

We use the series "episodes" (the 3-year window) around the point of growth acceleration generated through the above process (section 4.2.1.) as our dependant variable for our probit

regression. This variable is regressed on a number of covariates to examine what correlates with these growth episodes. To check the robustness of our regression, we will also undertake alternative estimation techniques. Note that our models contain year effects (year dummies) to control for external circumstances that are common to all countries. As discussed in the data part of the paper, the covariates include six groups of variables.

The baseline specification we use for analyzing the limited dependant variable in the probit regression is

$$episodes_i = \gamma + \sum_k \beta_k \chi_{kt} + V_t + \varepsilon_t, \qquad t = 1,...,t \text{ ....[3]}$$

where X_{kt} are the right hand side variables(covariates) used in the model, V_t is the year effect, β_k are coefficients and ε_t is the error term. We first estimate the above model for all growth miracles identified, and then estimate it only for the sustained episodes of growth. Doing this will help us examine those covariates that are enough just to ignite growth, and differentiate those that can sustain growth.

The motivation behind the above method is mainly threefold (Olofsgard and Zahran, 2007). First of all, the approach explicitly looks at variation across time. Furthermore, by focusing on the episodes of change, the approach also accounts for the possibility of non-linear effects of discrete changes in factors. Finally, the policy discussion is centered around the question of what can be done to generate a *sustained acceleration* in a country's growth rate, given a more or less recently established growth in most of Africa. Hence, the question is 'what is needed to initiate a sustainable change', exactly what the growth acceleration approach is focusing on.

To test for the robustness of our basic probit analysis, we also estimate alternative models making different assumptions on the probabilistic distribution of our error term as well as considering for the possible existence of unobserved heterogeneity in the sample. First, we will be estimating a simple logistic regression with similar specification but assuming a logistic distribution on the error term. We hope that our covariates included in our previous two models can explain much of what different have happened during years of significant shift in growth trends in sample countries. But there could be unmodeled(because they are unobserved) heterogeneities in the sample. This unobserved heterogeneity could be specific for each country and constant overtime; or it could be specific for each country but varying overtime. While fixed effect models can take care of unobserved heterogeneities that are constant over time, random effect models can take care of time-varying characteristics. Thus, apart from our baseline probit specification, we will also undertake random and fixed effect models.

The other part of the paper is centered on explaining the link between growth, poverty and inequality. It is widely accepted in different works that poverty is multidimensional in nature: income (monetary) poverty and non-income (non-monetary) poverty. Non-income poverty encompasses human development dimension of poverty. However, we will be focusing on income poverty mainly due to lack of complete data on non-income poverty variables corresponding to years of respective countries household surveys. We hope that any change in households' income will be transmitted to changes in human development dimensions of poverty. Thus, we will be estimating impact of growth on poverty and inequality using monetary indicators of poverty. How inequality changes with growth determines to what extent the poor are benefiting from that growth.

There are a number of approaches in investigating whether growth is pro-poor or not. One approach is to examine a growth incidence curve (GIC), which plots the growth in expenditure across each percentile in income distribution(Pauw and Mncube,2007). However, a more nuanced approach to probe how strongly growth benefits the poor, according to Pauw and Mncube(2007), is by studding the impact of both growth and change in inequality on poverty.

To obtain an estimate of the impact of growth on poverty and inequality, we follow the conventional approach based on the calculation of elasticity of poverty to change in inequality and growth. By growth, we mean growth of percapita/survey mean income. The impact of growth on poverty seems to be straight forward if income distribution remains unchanged. However, income distribution (inequality) need not remain constant. Thus, if the growth registered is associated with rise in inequality, poverty may not decline. Following Wodon(1999) we ran the following three simple panel data models on selected countries. This would enable us explicitly obtain elasticities of poverty and inequality to growth.

The relationship between growth and inequality is provided by the following regression.

$$\log G_{it} = \alpha + \beta \log W_{it} + a_i + \varepsilon_{i_t} \quad \text{……..…. ……..…..……..[4]}$$

where G_{it} is the Gini index for country *i* in period *t*, W_{it} is percapita (survey mean) income[21] for that country at that time, a_i are country fixed/random effects, and ε_{it} are error terms. The inclusion of country fixed/random effects is important as we are regressing based on cross-country

[21] We will first be estimating the relationship using percapita income and latter use survey mean income to test for the robustness of our initial result.

panel data coming from various regions. This technique removes any bias resulting from the correlation between country specific characteristics and variables we have in our model.

Given the log-log specification, the parameter β directly provides the elasticity of inequality to growth.

Next we are concerned with finding the gross and net impact of growth on poverty. The elasticity β of inequality to growth is a key component of the difference between the gross (holding inequality constant) and net (accounting for changing inequality) impacts of growth on poverty.

Denoting by γ and λ the gross and net elasticities of poverty to growth, by β the elasticity of inequality to growth, and by δ the elasticity of poverty to inequality (controlling for growth), one has:

$$\lambda = \gamma + \beta\delta \quad \text{.....[5]}$$

To find the gross elasticity of poverty to growth and the elasticity of poverty to inequality controlling for growth, we use:

$$\log P_{it} = \varpi + \gamma \log W_{it} + \delta \log G_{it} + \varpi_i + v_{it} \quad \text{.....[6]}$$

where P_{it} is poverty for country *i* in period *t*, W_{it} and G_{it} are defined as before, and ϖ_i are country fixed/random effects.

What is the net impact of growth on poverty? It can be found by using [5] once we estimate [6] or by estimating:

$$\log P_{it} = \varphi + \lambda \log W_{it} + \varphi_i + \eta_{it} \text{ ……..……[7]}$$

As usual, φ_i is country fixed/random effect.

The data we would be using corresponds to countries survey years ranging from 1980 to the latest available.

Unlike other methodologies that could be used for almost similar analysis, the one at hand is superior in that it allow us to make standard poverty decomposition, that is, to identify the *growth and distributional components* corresponding to a given level of observed poverty change. This methodology allows us to determine the net impact of growth and change in inequality (income distribution) on change in poverty.

CHAPTER FIVE

DISCUSSION OF ESTIMATION RESULTS

5.1. Growth Acceleration

As we have put the main covariates in classes/groups(of similar type) in the data part, it is instructive to proceed sequentially, examining first the impact on growth acceleration and sustained growth of each group assuming other variables are constant. We thus present a useful analysis focusing on the main covariates of all growth episodes and of only sustained growth episodes.

External Shocks

We start with selected variables representing external shocks. In all cases except the summary analysis, we start with a probit regression(Column 1). We have also undertaken a logistic regression(Column 2) to test for robustness of our baseline estimation results. Our estimation results include year effects to capture external circumstances that are common to all countries. Table 5.1 shows external shock variables including positive terms-of-trade shock, US interest rate and world petroleum price. Column 1 shows that all our external shock variables are found to be statistically significant predictors of growth accelerations. As expected, positive terms-of-trade shock seems to increase the probability of experiencing growth acceleration by 4.2 percentage points. We also find a reasonable and significant effect of a favorable shock on US interest rate on the probability of growth acceleration; a one percentage point favorable shock on US interest rate(a proxy for world interest rate)increase the probability that the set of countries under consideration experience growth acceleration by 1.6 percent. An increase (negative shock) in world petroleum price reduces this probability by 5.3 percentage point reflecting a significant influence of the shock on growth. Column 2 of the same table displays the result from our

alternative estimation (logistic regression). Reaffirming our probit results, estimates of the logistic regression are quite similar both in sign and statistical significance level.

Table 5.1 Predicting Growth Accelerations: External Shocks

Dependant Variable: Growth episodes/accelerations

	C1	C2
ToT_Theresh90	0.0421***	0.6471***
	(0.0135)	(0.1767)
	(3.4100)	(3.6600)
Usintrate	0.0159*	0.2611*
	(0.0100)	(0.1600)
	(1.6200)	(1.6300)
PoP_Thresh90	-0.0527***	-0.8312***
	(0.0107)	(0.1738)
	(-5.0700)	(-4.7800)
Observations	2352	2352
Pseudo R2	0.0493	0.0501

Note: Column 1 Estimated by probit regression. Coefficients shown are marginal probabilities evaluated at the sample means. First values in parenthesis are robust standard-errors, and the second values are t-statistics.(*) indicates significance at the 10% level, (**) indicates significance at the 5% level, and (***) indicates significance at the 1% level. Estimation include year effects(dummies).
Column 2 Estimated by logistic regression and coefficients are estimated coefficients. Others are similar to the note on column 1.

Macroeconomic Stability

Controlling for our external shock variables, we inhere examine the impact of our macroeconomic volatility/stability variables on growth accelerations as shown in Table 5.2. This table signifies that all our proxies for macroeconomic stability are insignificant predictors of growth episode. From Column 1, nominal exchange rate depreciation tends to reduce the probability that growth episodes can occur. On the other hand, while favorable domestic inflation level is positively correlated with the timing of growth episodes, growth rate in GDP deflator is with unexpected positive sign. Similarly, we have supported our probit result by a logistic regression. Estimation results from our logistic regression signify robustness of our probit result to alternative estimation method.

Table 5.2. Predicting Growth Accelerations: Macroeconomic Stability

Dependant Variable: Growth episodes/accelerations

	C1	C2
GGDPDef	1.5E-05	2.23E-04
	(2.1E-05)	(2.74E-04)
	(0.7000)	(0.8000)
Infla	0.0011	-0.0342
	(0.0137)	(0.2028)
	(-0.0800)	(-0.1700)
NERDep	-0.0249	-0.3849
	(0.0145)	(0.2650)
	(-1.5700)	(-1.4500)
Observations	1584	1584
Pseudo R2	0.0405	0.0405

Note: Column 1 Similar to Table 5.1 Column 1
Column 2 Similar to Table 5.1 Column 2

Reform Variables

Now is the time to see the effect of major policy reforms on the timing of growth acceleration independent of and controlling for other variables. Here in Table 5.3, we include economic liberalization and financial liberalization variables. Column 1 shows that our reform variables are not statistically significant predictors of years of growth accelerations when they are taken independent of other variables. The logistic regression from Column 2 of the same table more or less supports our probit. It shows that none of the variables are strong predictors.

Table 5.3. Predicting Growth Accelerations: Economic Reform

Dependant Variable: Growth episodes/accelerations

	C1	C2
Econ_lib	-.01000	-.15885
	(0.0213)	(0.3917)
	(-0.4400)	(-0.4100)
Finan_lib	0.0430	0.4972
	(1.0800)	(0.4707)
	(0.2820)	(1.0600)
Observations	2303	2303
Pseudo R2	0.0273	0.0272

Note: Column 1 Similar to Table 5.1 Column 1
Column 2 Similar to Table 5.1 Column 2

Democratic Institutions and Political Conditions

Controlling for external shocks, macroeconomic stability and reform variables, we next show the effects of democratic institutions and political condition variables on the probability of growth accelerations. This is shown in Table 5.4. Column 1 shows that *War_end* is unexpectedly signed and is slightly statistically significant. The result shows that a political regime change(*Regchnage*) increases the probability of occurrence of growth accelerations by 2.9 percentage point. However, against our expectation democratization is negatively, but significantly correlated with growth accelerations. *Civil_war_end*, *Conflicend* and *Ethnoling* pop-up with reasonable singes although are not statistically significant. A robustness test was undertaken by estimating a logistic regression. Results are identical both in sign and level of significance.

Table 5.4. Predicting Growth Accelerations: Democratic Institutional and Political Conditions

Dependant Variable: Growth episodes/accelerations

	C1	C2
War_end	-0.0513*	-1.0870*
	(0.0204)	(0.6075)
	(-1.8000)	(-1.7900)
Civil_war_end	0.0159	0.18757
	(0.0349)	(0.4859)
	(0.4900)	(0.3900)
Conflictend	0.0276	0.3824
	(0.0376)	(0.4642)
	(0.8000)	(0.8200)
Democ	-0.0722***	-2.0719***
	(0.0098)	(0.7217)
	(-3.5300)	(-2.8700)
Regchnage	0.0292**	0.4185**
	(0.0132)	(0.1872)
	(2.2600)	(2.2300)
Ethnoling	-0.0118	-0.1829
	(0.0239)	(0.3609)
	(-0.4900)	(-0.5100)
Observations	1740	1740
Pseudo R2	0.0578	0.0578

Note: Column 1 Similar to Table 5.1 Column 1
Column 2 Similar to Table 5.1 Column 2

Geographic Factors

We now examine the relationship between geographic factors and the probability of growth episodes occurring. The geographic variables we used in this study are *Costal* and *ResourceRich* representing located along the coast and endowed with strategic natural resource, respectively. We would have used tropics as another important variable that could significantly determine the likelihood of breaks in trend on countries percapita income. However, all our countries are located in tropics and we preferred to drop it. These factors have been overlooked when undertaking growth regressions. The unambiguous result is that a resource rich country tends to experience more frequent growth accelerations. Unexpectedly, being along the coast is negatively related to the probability of growth episodes occurring. However, the variable is not a significant predictor of growth. The irrelevance of being along the coast in Africa goes in line, in other ways, with Collier's(2006) statement "…Africa's costal economies have performed much worse than other low-income costal economies". See Table 5.5.for details of the result.

Table 5.5. Predicting Growth Accelerations: Geographic Factors

Dependant Variable: Growth episodes/accelerations		
	C1	C2
Coastal	-0.0171	-0.2593
	(0.0114)	(0.1681)
	(-1.5500)	(-1.5400)
ResourceRich	0.0291***	0.4052***
	(0.0122)	(0.1676)
	(2.5400)	(2.4200)
Observations	2352	2352
Pseudo R2	0.0289	0.0287

Note: Column 1 Similar to Table 5.1 Column 1
Column 2 Similar to Table 5.1 Column 2

***Public Policy Variables*:**

Finally, controlling for all our variables, let's see the impact of some public policy variables(some are outcomes of public policies by their own) on the frequency of growth episodes occurring. See results from Table 5.6. Probit analysis is presented in Column 1. According to the result, government expenditure is positively and significantly related to growth episodes - a percentage point increase in government expenditure tends to increase the probability that growth accelerations occurring by 9.4 percentage point. On the other hand, private consumption and age-dependency ratio are correctly signed but are insignificantly correlated with the timing of growth accelerations. In addition, death rate pop-up with unexpected sign.

Table 5.6. Predicting Growth Accelerations: Public Policy

Dependant Variable: Growth episodes/accelerations		
	C1	C2
GovExp	0.0939***	0.9985***
	(0.0311)	(0.3199)
	(3.5800)	(3.1200)
PrivInves	0.0366	0.4156
	(0.0286)	(0.3523)
	(1.3900)	(1.1800)
DeathRate	0.0025	0.0255
	(0.0017)	(0.0245)
	(1.4800)	(1.0400)
AgeDep	-0.0408	-0.3841
	(0.0940)	(1.4151)
	(-0.4300)	(-0.2700)
Observations	576	576
Pseudo R2	0.0711	0.0682

Note: Column 1 Similar to Table 5.1 Column 1
Column 2 Similar to Table 5.1 Column 2

Summary Analysis

Once we have seen the impact of group of variables on the probability of growth accelerations, it is instructive to see whether the effect holds up if they are jointly taken in to a model. We here choose only those variables that were important predictors of quick growth episodes when we analyze the covariates in groups of same kind. We start our econometric analysis with probit regressions, and further undertake various estimation techniques to confirm the reliability and robustness of our estimations. The first three columns of Table 5.7 present results from probit estimations. Results from this summary analysis should be taken for granted relative to our estimations based on classes of variables.

When we examine all important variables at once(Column 1), we have seen that our important variables remain significant. The basic probit estimation from the summary result reaffirms that our external shock variables –favorable US interest rate shock, and negative world petroleum price shock are the main predictors of growth accelerations in the set of SSA countries. Moreover, our public policy variable(government expenditure) is significantly correlated with frequent occurrence of growth episodes. The result from our probit reaffirms that resource rich countries tend to experience a higher probability of growth accelerations. However, similar to Hausmann et al (2004), our reform variables are not significantly related to growth episodes in these economies. This implies that igniting growth does not require such huge reforms. From our institutional and political stability variables, *Regchnage,* representing ending years of the previous polity, is significant predictor of years of growth accelerations. Also, unexpectedly, democratization is correlated negatively and significantly with growth episodes. But this is consistent with

Baro(1996)'s observation based on a panel of 100 countries. China is most often given as an example.

In the next two columns, we have also undertaken a probit analysis by choosing different groups of variables. In Column 2, we have taken out macroeconomic and some of political stability variables to see if our reform variables are still insignificant. Consistent to the baseline specification(Column 1), our reform variables remain insignificant. Column 3 drops all reform variables and other institutional and political stability variables. Vis-à-vis Column 1, our external shock variables remained to be significantly correlated to the likelihood of growth accelerations in the group of sub-Saharan Africa countries.

Similar to what we have done, to test for the robustness and reliability of the summary result based on our probit regressions, we have undertaken four other models: logistic regression(Column 4), random-effect logistic regression(Column 5), fixed-effect logistic regression(Column 6), and random-effect probit regression(Column 7) imposing different distributional assumptions[22] on the error term and the behavior of unobserved heterogeneities in the sample. The fixed and random effect models are important to take care of some unobserved and unmodeled heterogeneity in our sample which may influence our results. Our probit estimations are robust to the above types of estimation methods related to our assumptions. Variables are *almost equally* significant in all specifications with same direction in correlation with our dependant variable. This confirms that our results are robust and representative given our domain countries.

[22] The difference in the probability distributional assumption of the error term is that while logistic assumes the error term taking a logistic distribution function, probit a normal distribution function. Fixed effect regression controls for unobserved, but constant, variation across the cross-sectional units. Random effect models on the other hand assume the unobserved heterogeneity to change over time.

Table 5.7. Predicting Growth Accelerations: Summary Analysis

Dependant Variable: Growth Episodes

	C1	C2	C3	C4	C5	C6	C7
ToT_Theresh90	0.0116	0.0114	0.0149	0.1837	0.2499	0.2302	0.1175
	(0.0132)	*(0.0126)*	*(0.0138)*	*(0.2200)*	*(0.2328)*	*(0.2406)*	*(0.1228)*
	(0.9000)	*(0.9300)*	*(1.1200)*	*(0.8400)*	*(1.0700*	*(0.9600)*	*(0.9600)*
Usintrate	0.0346***	0.0320***	0.0352***	0.5473***	0.5291***	0.5020***	0.2598***
	(0.0115)	*(0.0113)*	*(0.0116)*	*(0.1836)*	*(0.1907)*	*(0.1909)*	*(0.0994)*
	(3.1300)	*(2.9500)*	*(3.1300)*	*(2.9800)*	*(2.7700)*	*(2.6300)*	*(2.6100)*
PoP_Thresh90	-0.0759***	-0.0752***	-0.0794***	-1.0821***	-1.4260***	-1.4991***	-0.7478***
	(0.0154)	*(0.0142)*	*(0.0152)*	*(0.2086)*	*(0.2331)*	*(0.2343)*	*(0.1192)*
	(-5.6600)	*(-6.0800)*	*(-5.9200)*	*(-5.1900)*	*(-6.1200)*	*(-6.4000)*	*(-6.2700)*
Infla	-0.0050		0.0020	-0.0883	-0.1377	-0.1762	-0.0732
	(0.0110)		*(0.0116)*	*(0.1992)*	*(0.2225)*	*(0.2273)*	*(0.1165)*
	(-0.4500)		*(0.1700)*	*(-0.4400)*	*(-0.6200)*	*(-0.7800)*	*(-0.6300)*
NERDep	-0.0095		-0.0017	-0.1011	0.2644	0.3637	0.1054
	(0.0147)		*(0.0161)*	*(0.2875)*	*(0.3195)*	*(0.3315)*	*(0.1699)*
	(-0.6200)		*(-0.1000)*	*(-0.3500)*	*(0.8300)*	*(1.1000)*	*(0.6200)*
Econ_lib	0.0215	0.0188		0.3023	0.5045	0.5297	0.2849
	(0.0287)	*(0.0277)*		*(0.4404)*	*(0.4360)*	*(0.4427)*	*(0.2226)*
	(0.8300)	*(0.7500)*		*(0.6900)*	*(1.1600)*	*(1.2000)*	*(1.2800)*
Finan_lib	0.0504	0.0444		0.6311	0.7161	0.7785	0.3855
	(0.0458)	*(0.0436)*		*(0.5047)*	*(0.5402)*	*(0.5490)*	*(0.2921)*
	(1.3500	*(1.2300)*		*(1.2500)*	*(1.3300)*	*(1.4200)*	*(1.3200)*
Civil_war_end	-0.0036)			-0.0278	-0.4539	-0.6303	-0.2732
	(0.0252)			*(0.5060)*	*(0.4821)*	*(0.4801)*	*(0.2508)*
	(-0.1400)			*(-0.0600)*	*(-0.9400)*	*(-1.3100)*	*(-1.0900)*
Conflictend	0.0009		-0.0025	-0.0261	0.2858	0.5187	0.1793
	(0.0212)		*(0.0156)*	*(0.4095)*	*(0.3949)*	*(0.3999)*	*(0.2002)*
	(0.0400)		*(-0.1600)*	*(-0.0600)*	*(0.7200)*	*(1.3000)*	*(0.9000)*
Democ	-0.0605***	-0.0597***		-1.9185***	-1.7646**	-1.7442**	-0.8827***
	(0.0085)	*(0.0082)*		*(0.6892)*	*(0.7600)*	*(0.7770)*	*(0.3546)*
	(-3.6600)	*(-3.7000)*		*(-2.7800)*	*(-2.3200)*	*(-2.2400)*	*(-2.4900)*
Regchnage	0.0307***	0.0339***		0.4846***	0.5385***	0.5957***	0.2701**
	(0.0122)	*(0.0121)*		*(0.1963)*	*(0.2153)*	*(0.2239)*	*(0.1128)*
	(2.6000)	*(2.9400)*		*(2.4700)*	*(2.5000)*	*(2.6600)*	*(2.3900)*
Ethnoling	-0.0186		-0.0233	-0.2894	0.1244		-0.0088
	(0.0220)		*(0.0227)*	*(0.3877)*	*(0.9138)*		*(0.5449)*
	(-0.8500)		*(-1.0300)*	*(-0.7500)*	*(0.1400)*		*(-0.0200)*
ResourceRich	0.0307**	0.0196*	0.0343***	0.3949**	0.6033*		0.2876
	(0.0140)	*(0.0122)*	*(0.0146)*	*(0.2099)*	*(0.3788)*		*(0.2203)*
	(2.3100)	*(1.7100)*	*(2.6100)*	*(1.8800)*	*(1.5900)*		*(1.3100)*
GovExp	0.0504***	0.0529***	0.0496***	0.7463***	0.72466***	0.7389***	0.3803***
	(0.0148)	*(0.0142)*	*(0.0144)*	*(0.2108)*	*(0.2166)*	*(0.2199)*	*(0.1146)*
	(3.8100)	*(4.2000)*	*(3.7800)*	*(3.5400)*	*(3.3500)*	*(3.3600)*	*(3.3200)*
PrivInves	-0.0020			-0.0461	0.1486	0.2372	0.0879
	(0.0122)			*(0.2199)*	*(0.2465)*	*(0.2582)*	*(0.1319)*
	(-0.1600)			*(-0.2100)*	*(0.6000)*	*(0.9200)*	*(0.6700)*

(cont'd) Table 5.7. Predicting Growth Accelerations: Summary Analysis

Observations	1740	1799	1828	1740	1776	1257	1776
Wald chi2(61)	150.450	145.23	140.53	141.25			
LR chi2(15)					81.53	83.9	67.60
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.116	0.1151	0.0981	0.1146			

Note: Column 1 Estimated by probit regression. Coefficients shown are marginal probabilities evaluated at the sample means. First values in parenthesis are robust standard-errors, and the second values are t-statistics.(*) indicates significance at the 10% level, (**) indicates significance at the 5% level, and (***) indicates significance at the 1% level. Estimation include year effects(dummies).

Column 2 Note similar to Column 1

Column 3 Note similar to Column 1

Column 4 Estimated by logistic regression and coefficients are estimated coefficients. Others are similar to the note on column 1.

Column 5 Random-effect logistic regression

Column 6 Fixed-effect logistic regression

Column 7 Random-effect probit regression

5.2.Sustaining Growth

We have tried to determine the main correlates of growth accelerations. Our estimation result forwarded us with some expected results. There are also interestingly unexpected results obtained. It is not clear why democratization tend to significantly reduce the probability of occurrence of growth episodes. Our reform variables are also insignificantly correlated with the timing of growth accelerations. Only our external shock and institutional and political stability variables are found to be strong predictors of the timing of growth episodes. It is useful at this point in time to concentrate on years of sustained growth and correlate the variables with the timing of sustained growth before making a final statement.

In our methodology part, we have clearly put that we have used a different filter to identify only those episodes which were sustained. To recall, we identified sustained growth episodes if the growth rate remained above 2 percent in years *[t+5, t+15]*. This technique gives us 28 sustained episodes and, in this part, we have to work with a smaller sample size(only for years from 1965 to 1993).

We have followed the same procedure as we do it above in identifying variables that significantly determine the likelihood of sustained growth. We have first correlated the years of sustained growth against different group of variables one group at once. As usual we have first estimated a probit and test the robustness of the results by comparing the results with logistic estimates. The results are summarized in Table 5.8. The result exposes that favorable terms-of-trade shock is from our external shock variables that determine the likelihood of occurrence of sustained growth. While macroeconomic volatility variables are correctly signed, they are not significantly associated with sustained growth episodes. Our preliminary analysis shows that economic and financial liberalization are crucial to sustain a growth ignited. Taking our preliminary analysis further to the impact of institutional and political conditions, the result implies that a diversified society is faced with a higher probability of ending a growth accelerated. It is still surprising that being along the coasts(our regression over geographic factors) is statistically correlated with years of sustained growth with negative sign. In addition to other institutional and political conditions, all our public policy variables are not found to be important to sustain growth.

Table 5.8. Predicting Sustained Growth: Different Group of Variables

	Dependant Variable: Sustained Growth Episodes		
		C1	C2
External Shocks	*ToT_Theresh90*	0.0167***	0.6587***
		(0.0077)	(0.2574)
		(2.6200)	(2.5600)
	Usintrate	-0.0146	-0.6167
		(0.0093)	(0.4633)
		(-1.6000)	(-1.3300)
	PoP_Thresh90	-0.0338	-1.6068
		(0.0376)	(1.5366)
		(-1.0700)	(-1.0500)
	Observations	1296	1296
	Pseudo R2	0.1064	0.1059

(cont'd) Table 5.8. Predicting Sustained Growth: Different Group of Variables

Macroeconomic Stability	*GGDPDef*	-0.0002	-0.0140
		(0.0002)	(0.0120)
		(-1.2800)	(-1.1700)
	Infla	0.0062	0.3946
		(0.0048)	(0.2943)
		(1.4100)	(1.3400)
	NERDep	0.0027	0.2849
		(0.0081)	(0.5615)
		(0.3500)	(0.5100)
	Observations	942	942
	Pseudo R2	0.1279	0.1269
Economic Reform	*Econ_lib*	0.0262*	2.9793*
		(0.0224)	(2.0313)
		(1.8200)	(1.6000)
	Finan_lib	0.0844**	8.0683**
		(0.0747)	(7.6937)
		(2.2300)	(2.1900)
	Observations	1269	1269
	Pseudo R2	0.1170	0.1164
Institutional and Political Conditions	*War_end*	-0.0149	0.2154
		(0.0053)	(0.2088)
		(-1.5400)	(-1.5800)
	Civil_war_end	0.0079	1.4081
		(0.0110)	(0.5920)
		(0.8600)	(0.8100)
	Conflictend	-0.0019	1.0088
		(0.0117)	(0.6493)
		(-0.1600)	(0.0100)
	Regchnage	0.0057	1.3028
		(0.0056)	(0.3866)
		(1.0800)	(0.8900)
	Ethnoling	-0.0171**	-0.4139*
		(0.0091)	(0.2010)
		(-1.9500)	(-1.8200)
	Observations	992	992
	Pseudo R2	0.1196	0.118
Geographic Factors	*Coastal*	-0.0139**	-0.6212***
		(0.0064)	(0.2452)
		(-2.4400)	(-2.5300)
	ResourceRich	0.0079	0.3138
		(0.0065)	(0.2588)
		(1.3400)	(1.2100)
	Observations	1296	1296
	Pseudo R2	0.1031	0.1042

(cont'd) Table 5.8. Predicting Sustained Growth: Different Group of Variables

	GovExp	0.0082	0.1084
		(0.0306)	(0.5358)
		(0.2700)	(0.2000)
	PrivInves	0.0167	0.2677
		(0.0329)	(0.5260)
		(0.5300)	(0.5100)
	DeathRate	0.0017	0.0313
		(0.0023)	(0.0439)
		(0.7600)	(0.7100)
	AgeDep	-0.1242	-1.6841
		(0.1409)	(2.5517)
Public Policy		(-0.8900)	(-0.6600)
	Observations	327	327
	Pseudo R2	0.0977	0.0966

Note: Column 1 Estimated by probit regression. Coefficients shown are marginal probabilities evaluated at the sample means. First values in parenthesis are robust standard-errors, and the second values are t-statistics. (*) indicates significance at the 10% level, (**) indicates significance at the 5% level, and (***) indicates significance at the 1% level. Estimation includes year effect(dummies).

Column 2 Estimated by logistic regression and coefficients are estimated coefficients. Others are similar to the note on column 1.

Summary Analysis

Lets now turn to the summary analysis to determine the robust covariates of sustained growth when all *important* variables are taken into a model at once. We have estimated six models starting with our basic probit regressions. The first three models are estimated using probit estimation technique. We have not taken on our fixed-effect logistic regression for the sole reason that the estimation technique has reduced our observations to only 396 due to lack of within group variation of some variables and multiple positive outcomes within a group.

The summary analysis on correlates of sustained growth on SSA countries reveals that some of our external shock, macroeconomic stability and reform variables are significantly correlated with the likelihood of experiencing sustained growth. From Column 1 of Table 5.9, we can see that favorable change in terms-of-trade and endowment in natural resources increase the odds of

experiencing a sustained growth. On the other hand, a significant increase in the growth rate of GDP deflator(a proxy for bad macroeconomic management) and a much diversified society leads to a higher probability that a growth spell will end. Unlike our result in part 5.1, here we have seen that our reform variables(both economic and financial liberalization) are significant covariates of sustained growth. On the other hand, while higher ethnoligustic factorization and age dependency ratio tend to reduce the probability that growth is sustained, a resource endowed country tend to frequently experience a sustained growth.

Unlike the finding by Hausmann et al(2004), we have found that positive terms-of-trade increases the probability of experiencing sustained growth. In line with the recent data in our analysis, this finding is consistent with IMF(2008) in its chapter on Globalization, Commodity Prices and Developing Countries. The paper suggests that the recent commodity price boom is proving more favorable to developing economies than previous booms, mainly because of general improvement in their institutional and policy environments, including greater financial development, trade liberalization, and fiscal restraint.

Table 5.9. Predicting Sustained Growth Episodes: Summary Analysis

Dependant Variable: Sustained Growth

	C1	C2	C3	C4	C5	C6
ToT_Theresh90	0.0107***	0.0081***		3.4160***	1.0879**	0.6125**
	(0.0045)	*(0.0043)*		*(1.0919)*	*(0.5505)*	*(0.2945)*
	(3.9900)	*(2.5000)*		*(3.8400)*	*(1.9800)*	*(2.0800)*
Usintrate	0.0039	0.0041		2.2169	1.4703*	0.6241
	(0.0050)	*(0.0060)*		*(2.1469)*	*(0.9088)*	*(0.4757)*
	(0.8400)	*(0.7200)*		*(0.8200)*	*(1.6200)*	*(1.3100)*
PoP_Thresh90	-0.0108	-0.0232		0.2326	-7.7010*	-2.2718
	(0.0186)	*(0.0287)*		*(0.3877)*	*(4.5900)*	*(9501.419)*
	(-0.8800)	*(-1.2800)*		*(-0.8800)*	*(-1.68)*	*(0.0000)*
GGDPDef	-0.0001**		-0.0002*	-0.9756*	-0.0142	-0.0054
	(0.0001)		*(0.0001)*	*(0.0132)*	*(0.0168)*	*(0.0087)*
	(-1.9600)		*(-1.7500)*	*(-1.8300)*	*(-0.8400)*	*(-0.6200)*

(cont'd)Table 5.9. Predicting Sustained Growth Episodes: Summary Analysis

Infla	0.0032		0.0060*	1.6300	-0.1528	-0.0865
	(0.0026)		*(0.0039)*	*(0.5977)*	*(0.4827)*	*(0.2623)*
	(1.4200)		*(1.8500)*	*(1.3300)*	*(-0.3200)*	*(-0.3300)*
eNERDep	-0.0029		-0.0012	0.5843	0.5196	-0.3701
	(0.0020)		*(0.0039)*	*(0.3283)*	*(1.0753)*	*(0.6266)*
	(-1.3200)		*(-0.2900)*	*(-0.9600)*	*(0.4800)*	*(-0.5900)*
Econ_lib	0.0230**	0.0203*	0.0167*	4.8736**	3.7273***	1.5824***
	(0.0188)	*(0.0178)*	*(0.0148)*	*(3.5072)*	*(0.9602)*	*(0.4974)*
	(2.3200)	*(1.8700)*	*(1.8300)*	*(2.2000)*	*(3.8800)*	*(3.1800)*
Finan_lib	0.1243***	0.0678**	0.1804***	20.5104***	2.7372	2.4001
	(0.1015)	*(0.0627)*	*(0.1258)*	*(21.9689)*	*(2.6535)*	*(1.6432)*
	(3.0900)	*(2.3300)*	*(3.3600)*	*(2.8200)*	*(1.0300)*	*(1.4600)*
Civil_war_end	-0.0033*	-0.0036	-0.0040	0.4266	-1.1748	-0.8992
	(0.0014)	*(0.0026)*	*(0.0022)*	*(0.2457)*	*(1.1379)*	*(0.6750)*
	(-1.8700)	*(-1.1100)*	*(-1.3600)*	*(-1.4800)*	*(-1.0300)*	*(-1.3300)*
Regchnage	0.0028	0.0018	0.0019	1.4342	1.4726***	0.9843***
	(0.0023)	*(0.0029)*	*(0.0028)*	*(0.5162)*	*(0.4660)*	*(0.2766)*
	(1.3800)	*(0.6400)*	*(0.7200)*	*(1.0000)*	*(3.1600)*	*(3.5600)*
Ethnoling	-0.0089***	-0.0131***	-0.0125***	-0.2161**	-4.7546***	-2.5664***
	(0.0042)	*(0.0053)*	*(0.0054)*	*(0.1383)*	*(1.4865)*	*(0.8585)*
	(-2.7300)	*(-2.9600)*	*(-2.7600)*	*(-2.3900*	*(-3.2000)*	*(-2.9900)*
ResourceRich	0.0101***	0.0092***	0.0139***	3.5090***	3.4991***	1.1052**
	(0.0043)	*(0.0046)*	*(0.0060)*	*(1.2778)*	*(0.9316)*	*(0.4530)*
	(3.4800)	*(2.6800)*	*(3.4600)*	*(3.4500)*	*(3.7600)*	*(2.4400)*
GovExp	0.0016	-0.0011		1.3900	0.4148	0.2187
	(0.0020)	*(0.0024)*		*(0.4418)*	*(0.4698)*	*(0.2479)*
	(0.8700)	*(-0.4500)*		*(1.0400)*	*(0.8800)*	*(0.8800)*
PrivInves	-0.0019	0.0013		0.6480	-0.0001	-0.4230
	(0.0016)	*(0.0030)*		*(0.2528)*	*(0.5123)*	*(0.2727)*
	(-1.1100)	*(0.4500)*		*(-1.1100)*	*(0.0000)*	*(-1.5500)*
AgeDep	-0.0210**	-0.0128		0.0405	-14.8566***	-5.5002***
	(0.0118)	*(0.0148)*		*(0.0904)*	*(3.1931)*	*(1.4215)*
	(-2.0300)	*(-0.8900)*		*(-1.4400)*	*(-4.6500)*	*(-3.8700)*
Observations	878	1046	878	878	984	984
Wald chi2(61)	99.81	81.84	80.13	98.40		
LR chi2(15)					118.52	109.98
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.2365	0.1662	0.1899	0.2365		

Note: Column 1 Estimated by probit regression. Coefficients shown are marginal probabilities evaluated at the sample means. First values in parenthesis are robust standard-errors, and the second values are t-statistics.(*) indicates significance at the 10% level, (**) indicates significance at the 5% level, and (***) indicates significance at the 1% level. Estimation include year effects(dummies).

Column 2 Note similar to Column 1

Column 3 Note similar to Column 1

Column 4 Estimated by logistic regression and coefficients are estimated coefficients. Others are similar to the note on column 1.

Column 5 Random-effect logistic regression

Column 6 Random-effect probit regression

Diagnostic Tests

Since there is no satisfying measure of goodness-of-fit reported with binary choice estimations, we need to grasp some alternatives available. The test for the predictive power of the models indicates that the all episodes baseline probit model successfully predict about 37 percent of episode years(episode=1) when an estimated probability of 25 percent is taken as a cut-off. On the other hand it predicts 92.7 percent of non-episodic years(episode=0) correctly. The model is with an overall correct predictive rate of 90.6 percent. To see the predictive accuracy of our models, we have also seen the Receiver Operating Characteristic(ROC) results. For our basic probit specification of the growth accelerations model, we found that about 74 percent of the area lies under the curve implying fair specification.

The diagnostic test on our model on sustained episodes also shows that the model predicts 30.5 percent of years with sustained episodes, while it is able to successfully predict 95.2 percent of years with no sustained growth episodes, with an overall correct prediction of about 90.9 percent. On the other hand, the ROC for sustained episodes probit model is as high as 85.5 percent indicating good ability of the variables included in predicting years of sustained growth.

Another measure of goodness of fit is Pearson's goodness-of-fit test. The test generates a chi-square(χ^2) with the null hypothesis that the row variable is unrelated (that is, only randomly related) to the column variable. Tests from our result justify that the null can be rejected(prob=0.94 for all episodes and prob=1.000 for sustained episodes), i.e. there is theoretical relationship between our dependant and independent variables and the models fit well. However, since the number of covariates pattern is equal to the number of observations, the Pearson test is

not appropraite for these data. Thus, we need to run Hosmer and Lemeshow test of goodness-of-fit. This requires the data to form 10 nearly equal-sized groups. The value of the Hosmer and Lemeshow chi-squere (both with 8 degrees of freedom) are 0.17 and 0.15 for all episodes and sustained episodes, respectivily, suggesting that the models fit reasonably well.

On the other hand, to test for the existence of specification error, we have run a *linktest* on both basic probit specifications of our growth accelerations and sustained growth models. We have found that the *linktest*[23] is not significant in each case implying that we have chosen meaningful predictors and that the models are properly specified.

5.3.The Link between Growth, Inequality and Poverty

This section presents panel regression results on the relationship between growth, poverty and inequality. Knowing this helps in guiding public and distribution related policies in to the right truck so that the lower segment of the population can benefit from the recently occurring growth in most of these countries. In addition, this estimation can resolve some of the ambiguities in the literature on the link between these three variables. Our observation can also bridge the gap in the literature on the same topic on SSA and other poor countries.

Tables 5.10 and 5.11 provide a summary of how economic growth affects poverty. This is reflected in the elasticities estimated using information on poverty measures based on national wide household surveys. The first table shows a panel regression estimates taking percapita income growth rate between any two household survey years as a proxy for growth. To test for the

[23] Z statistics for _hatsq for sustained episodes model is 1.31, while is –0.79 for all episodes probit model. The decision rule is that _hatsq should not be statistically significant if the model is correctly specified and if important predictors are included.

robustness of our result, we also present Table 5.11 in which we used survey mean income in place of percapita income.

To recall, γ represents the gross elasticity of poverty to growth. It measures the percentage reduction in poverty obtained for a percentage change in growth rate, holding inequality constant. On the other hand while δ measures the elasticity of poverty to inequality, i.e. the extent to which poverty increases when inequality worsen by one percent holding growth constant; β represents the level of percentage change in inequality with one percent growth(i.e. elasticity of inequality to growth). The net impact of economic growth on poverty is represented by λ which is simply the percentage change in poverty resulting from an additional percentage economic growth while allowing inequality to change.

The different elasticities are obtained using Wodon's technique presented in the latter section of the methodology part. The main findings of the panel regressions are:

- There is a negative relationship between economic growth and poverty. This is true for both measures of growth and all measures of poverty.
- Another interesting feature of the result is that growth in SSA is accompanied by a more or less stable level of inequality. Thus, growth derived inequality has not been a problem.

Turning in to the results in more detail, we have estimated both random and fixed effects models to establish the relationship. To choose the best model, we have undertaken Hausmann specification test. The test, however, does not reject the null of equality of the estimated

elasticities from both random and fixed effects models even at 10% significance level. This implies that random effects are appropriate models for our dataset. But to be sure about our choice, we ran Breush and Pagan Lagrangian Multiplier(BP-LM) test for random effects(*xttest0*) and the test confirms that random effects models are appropriate for the dataset we have. Thus, we will use the random effects estimator as an input for further analysis in part 5.5. The gross elasticity of poverty to growth is presented in the first two columns under Table 5.10. Both random and fixed effects models show that a percentage growth in percapita income reduces poverty by almost equal percent in all the three measures of poverty. Note also that gross elasticity of poverty to growth is relatively larger when poverty is measured by poverty gap index. As an alternative to percapita income, we have used survey mean income in our panel estimation. Though the direction of the elasticities is generally the same, unlike Adams(2003), the gross effect of economic growth as measured by survey mean is much stronger: γ is 1.2(random effects) and 0.8(fixed effects) when poverty is measured by squared poverty and 1.4(random effects) and 1.2(fixed effects) when measured by headcount.

The panel estimate also gave us the measure of elasticity of poverty to inequality. Whether we use percapita income or survey mean income, inequality tends to worsen poverty in SSA. A percentage change increase in the Gini index increase poverty by at least 2.0(in both random and fixed effects models) percentage points in either cases(percapita or survey mean income). Since we have seen that inequality worsens poverty, it is really high-time to see the impact of growth on inequality. If growth deteriorates equality, then it is in effect complicating the poverty alleviation objective of growth.

Considering how inequality behaves when growth comes about is the other task. The estimates from Table 5.10 reveal surprising results. Inequality tends to remain constant when growth is registered. This is statistically consistent when we estimate β using survey mean income in Table 5.11. In both cases the magnitude of change in inequality to a percentage change in growth is quite marginal which is 0.04(random effects) and 0.06(fixed effects) percentage point when percapita income is used and 0.04(random effects) and 0.07(fixed effects) percentage points when survey mean income is used, though the elasticity pop-up with different signs.

Then, what is the net impact of growth on poverty? Looking for the last two columns of each table, we can see both the random effect and fixed effect models results(similarly the Hausmann specification test was conducted and was unable to reject the null that the estimated coefficients are equivalent). The impact of growth on all measures of poverty is similar with what we obtain when we allow inequality to vary. This is mainly because given our dataset; inequality was not sensitive to growth. Allowing inequality to change, growth based on percapita income indicates that a percentage point increase in growth leads to a reduction in poverty based on headcount index by 0.68(random effects model) and 0.52(fixed effects model) percentage points. On the other hand, poverty gap and squared poverty gap indices decline by 0.73 and 0.68(random effects model) and 0.57 and 0.55(fixed effects model) percentage points for a single percentage point additional growth registered, respectively. Some portion of the elasticity of poverty to growth is lost due to the positive(but marginal) impact of growth on inequality. The net impact of growth as measured by survey mean income on poverty(Table 5.10) is much greater than the finding in Table 5.10 for the elasticity of inequality to growth is negative as well as for the higher gross elasticity of poverty to growth. Considering the headcount index of Table 5.11, the net elasticity of

growth on poverty is -1.5 (random effect) and -1.4 (fixed effect). While the poverty gap index imply a percentage point increase in growth result in a 1.5(random effect) and 1.0(fixed effect) percentage point decline in poverty, the net elasticity based on squared gap poverty index obtained using random and fixed effects models are -1.3 and -0.9, slightly higher than the gross elasticities which were -1.2 and -0.8.

Table 5.10. The Link between Growth, Inequality and Poverty: Percapita Income

	Gross elasticity of poverty to growth(γ)		Elasticity of poverty to inequality(δ)		Elasticity of inequality to growth(β)		Net elasticity of poverty to growth(λ)	
	Random effect	Fixed effect	Random effect	Fixed effect	Random effect	Fixed effect	Random effect	Fixed effect
Headcount	-0.7726***	-0.6558***	2.0404***	2.0697***	0.0453	0.0631	-0.6801***	-0.5252**
	(0.1470)	*(0.2063)*	*(0.3083)*	*(0.4581)*	*(0.0431)*	*(0.0544)*	*(0.1730)*	*(0.2323)*
	(-5.7200)	*(-2.9900)*	*(6.0600)*	*(5.0600)*	*(1.1400)*	*(0.9500)*	*(-4.4000)*	*(-2.0500)*
Gap	-0.8497***	-0.7366***	2.6520***	2.6911***	0.0453	0.0631	-0.7295***	-0.5667**
	(0.1317)	*(0.1997)*	*(0.2710)*	*(0.3880)*	*(0.0431)*	*(0.0544)*	*(0.1712)*	*(0.2489)*
	(-6.2500)	*(-3.4900)*	*(8.0000)*	*(6.8500)*	*(1.1400)*	*(0.9500)*	*(-4.3400)*	*(-2.0700)*
Squared gap	-0.8102***	-0.7310***	2.7471***	2.7966***	0.0453	0.0631	-0.6856***	-0.5544**
	(0.1271)	*(0.1821)*	*(0.2853)*	*(0.4037)*	*(0.0431)*	*(0.0544)*	*(0.1642)*	*(0.2384)*
	(-6.2300)	*(-3.7100)*	*(8.7800)*	*(7.6200)*	*(1.1400)*	*(0.9500)*	*(-4.1300)*	*(-2.0700)*

Note: A Hausmann test for the choice of random effect over the fixed effect model could not reject the null of equality of the estimates from both models even at 10% level, (**) indicates significance at the 5% level, and (***) indicates significance at the 1% level. The number of observations in all cases is 103 and chi-square probability of 0.0000 showing excellent model fit. First values in parenthesis are robust standard errors; second values are t-statistics.

Table 5.11. The Link between Growth, Inequality and Poverty: Survey Mean Income

	Gross elasticity of poverty to growth(γ)		Elasticity of poverty to inequality(δ)		Elasticity of inequality to growth(β)		Net elasticity of poverty to growth(λ)	
	Random effect	Fixed effect	Random effect	Fixed effect	Random effect	Fixed effect	Random effect	Fixed effect
Headcount	-1.4337***	-1.2136***	2.0523***	2.1588***	-0.0410	-0.0718	-1.5179***	-1.3686***
	(0.0996)	*(0.2405)*	*(0.2276)*	*(0.5486)*	*(0.0705)*	*(0.0998)*	*(0.1872)*	*(0.3577)*
	(-19.8600)	*(-9.5800)*	*(11.3300)*	*(8.4000)*	*(-0.9500)*	*(-1.2100)*	*(-12.6400)*	*(-7.6700)*
Gap	-1.4287***	-0.9372***	2.2117***	2.1464***	-0.0410	-0.0718	-1.5194***	-1.0914***
	(0.1151)	*(0.2486)*	*(0.2496)*	*(0.4519)*	*(0.0705)*	*(0.0998)*	*(0.1578)*	*(0.3174)*
	(-21.2400)	*(-6.7500)*	*(12.2700)*	*(7.6200)*	*(-0.9500)*	*(-1.2100)*	*(-10.9200)*	*(-5.8500)*
Squared gap	-1.2405***	-0.7878***	2.1517***	2.0522***	-0.0410	-0.0718	-1.3287***	-0.9351***
	(0.1613)	*(0.2556)*	*(0.3301)*	*(0.4145)*	*(0.0705)*	*(0.0998)*	*(0.1611)*	*(0.2925)*
	(-14.8600)	*(-5.4900)*	*(10.2000)*	*(7.0600)*	*(-0.9500)*	*(-1.2100)*	*(-9.4200)*	*(-5.0300)*

Note: A Hausmann test for the choice of random effect over the fixed effect model could not reject the null of equality of the estimates from both models even at 10% level, (**) indicates significance at the 5% level, and (***) indicates significance at the 1% level. The number of observations in all cases is 103 and chi-square probability of 0.0000 showing excellent model fit. First values in parenthesis are robust standard errors; second values are t-statistics.

5.4. How Sustainable the Recent Growth is in SSA: The Case of Ethiopia

In the former part of the paper, we have envisaged to identify years of growth episodes and explain what brought the growth. Our result signifies that growth episodes have been relatively common in SSA and that there are recently noticeable growth accelerations in most of the countries, though we were able to discover factors that are highly related to growth accelerations. The question is whether the recent growth performance can be sustained or not. We have clearly identified the main covariates that are correlated with sustained growth. The result from part 5.2 reveals that economic and financial liberalization, and significant improvement in terms-of-trade, growth rate in GDP deflator, age dependency ratio and ethnic diversity are crucial determinants of sustained growth. Do the main correlates of sustained growth as per our finding currently exist? In this sub-section, we will try to assess how these factors are behaving in Ethiopia and evaluate if

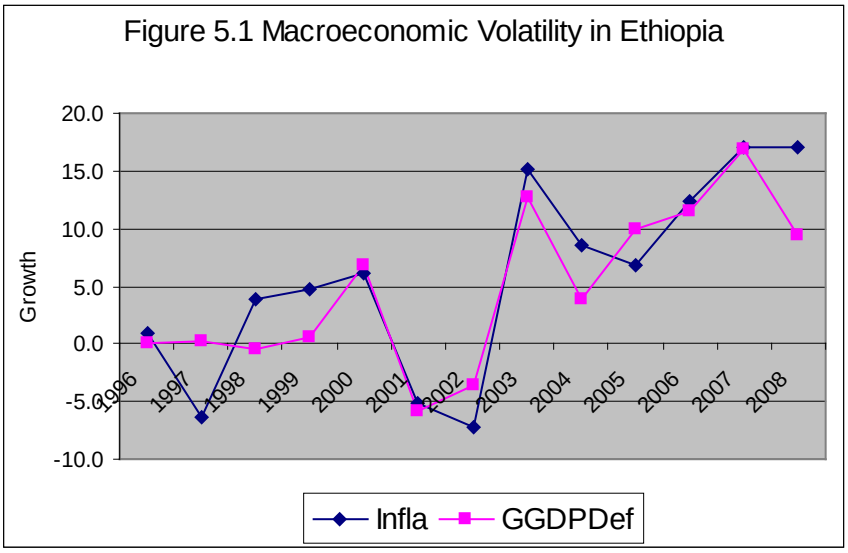
the current growth can be sustained(is robust). We start with findings peculiar to sustained growth(reform and macroeconomic stability variables).

- *Economic and Financial Reforms*: Episodes associated with major economic and financial reforms were found to be sustainable, implying that African countries need to undertake reforms in the trade and financial sector. Following years of economic stagnation, Ethiopia has a decade and half ago embarked on a comprehensive reform program on economic and financial sector sponsored by the IMF and the World Bank. It is clear that these reforms have an overwhelming impact on various economic issues. The government has been abolishing major trade barriers which have lead to increasing performance in the export sector. Not only the volume of exports has increased but also that the composition of export commodities has diversified. There were some moves taken to privatize some public firms. A long way is also taken in the financial sector after the introduction of the structural adjustment program. Private banks have flourished; insurance and microfinance have evolved.

However, an overall financial and economic reform is still required. This, of course, should be implemented wisely. Foreign banks are not allowed to operate in the country, there is poor development of financial products, public banks are still dominating the sector, the financial sector generally lacks dynamism, the sector still remains closed and much less developed than even its neighbors(simply take Kenya for that matter). The government should open the financial sector to foreign competitions wisely. There is non-competitive market structure, and strong capital controls. Ethiopia's financial system is characterized by a shallow bond market, regimented forex allocation, and short-term-oriented commercial lending. In additions, there is still a lot of way to

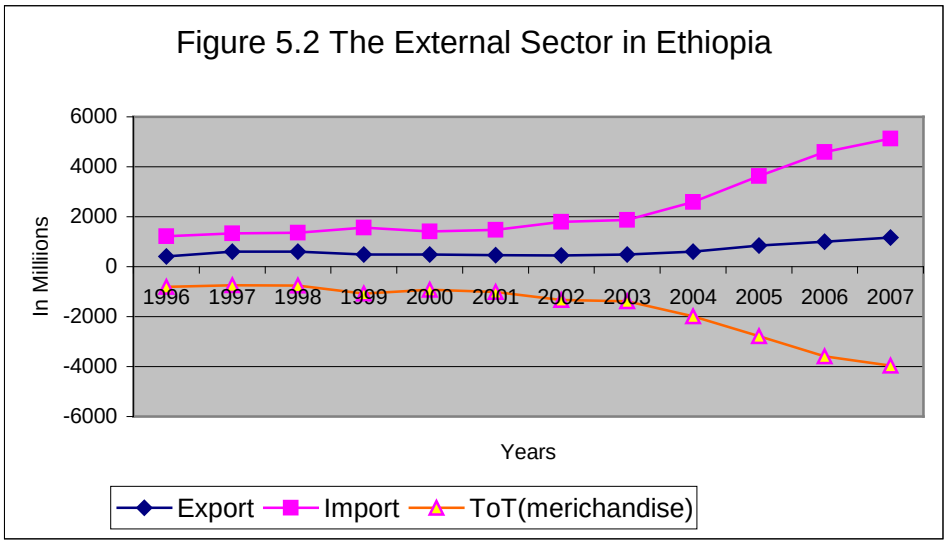
go related to economic reforms: still the government is taking full control of the majority of the economic sectors. Infrastructure and telecommunications are fully provided by the public sector, the financial sector is still dominated by public banks. Property rights and rule of low to enforce contracts are poor. This may go inline with the need for institutional reforms.

- *Macroeconomic Stability*: The regression analysis suggests that macroeconomic stability as peroxide by growth rate of GDP deflator is highly and negatively correlated with sustained growth implying that countries with stable macroeconomic management experience sustained growth. Though not a robust determinant of sustained growth, our favorable inflation shock variable was also a good predictor of sustained growth. Ethiopia was known for better macroeconomic stability explained by lower growth rate of GDP deflator and single digit inflation level. Only the few recent years are outliers in Ethiopian context. Inflation has reached as high as 17 percent. There are numerous efforts to contain it, though the efforts are being constrained by the increase in international oil and food prices. The growth rate of GDP deflator has surged from 1.3 in the turn of this millennium to 7.8 in 2005. These imply that increased commitment is required to achieve stability so as to sustain growth.



- *Terms-of-Trade*: Favorable terms-of-trade was highly correlated with sustained growth implying that high commodity price not only triggered growth but also have become main factors behind medium and long-term growth in SSA. This finding is surprisingly different from Hausmann et al(2004) and Arbache et al(2008). Terms-of-trade is a function of competitiveness and the behavior of the external economy. While competitiveness is a function of products quality and good trade policies, the performance of the external economy is exogenous(depends on good luck). The country is abolishing taxes on export sector, and put efforts to increase quality. Nevertheless, some studies still show that the country is not using opportunities including African Growth and Opportunity Act (AGOA) due to lower improvement in quality through time. The good luck, however, is that the global economy has been expanding at 3.2 percent a year, and global trade have been expanding by 40 percent since the mid of 1990's(Arbache and Page, 2008). These have lead to higher export prices, and hence the gains from export reached to USD 1.2 billion in 2006/07 growing by 37 percent from USD 847.2 million in 2004/05(NBE, 2007). The bad luck is that the world oil price is shooting leading to

higher overall import bills of Ethiopia, creating mixed image about the country's opportunity to sustain growth as far as terms-of-trade is concerned.



- *Institutional Factors*: Estimation result suggests that ethically diversified societies tend to experience more growth volatility and a high probability that a growth spell will end. In light of this, how are our leaders doing? African leaders are taking control of their own destiny and are implanting appropriate actions to reduce local tensions and install good leadership and governance. Likewise, Ethiopian government is showing increasing commitment to assume better leadership. However, same commitment is required at regional and local administrative levels. The country should implement institutional and governance reforms in a more sustained manner. This is crucial in the face of over 80 ethnic groups just in a poor country competing for scarce resources to provide for public services such as infrastructure, education, health, etc.

- *Public Health*: Age dependency ratio can be sub-divided in to old-age dependency ratio and youth-dependency ratio. A significant decline in old-age dependency ratio will contribute to reduced public spending in health, long-term care and pensions. A significant fall in the youth-dependency ratio may contribute to lower public expenditures in education. The growth analysis we have undertaken implies that public policies, more importantly policies that affect multitude variants of age dependency ratio, tend to reward economies a sustained growth. Sustained growth episodes are highly correlated with declining age dependency ratio. The age dependency ratio in this economy is as high as 0.94 in the turn of the 1990's due to the high proportion of youth population, but has marginally declined to 0.89(the average for SSA) in 2006. However, the ratio is still one of the highest in Africa implying a need to significantly reduce the ratio so that the country can reduce the burden and rather sustain the recent growth.

In general, the picture in Ethiopia is mixed. The country is doing fine in infrastructure development and the export sector is performing well. However, there is an ever-increasing import bill worsening the terms-of-trade. The macroeconomic environment explained by high prices should also be improved. The country is experiencing higher level of inflation at least as compared to its own inflation history. Though there are recent improvements in institutional conditions, it is still characterized by rigidities. Improving the quality of democratic institutions is crucial to sustain the recent growth in the country. There are, on the other hand, clear improvement in health services. The country's health service coverage has reached to 86 percent(AGH, 2008). The sector, however, is complicated by HIV/AIDS, malaria and tuberculosis, which are known to attack the working age population.

5.5. The MDG of Poverty Reduction: Will it be met?

The purpose of this paper was also to see how strongly growth in SSA is related to poverty alleviation. This is crucial given the MDG of poverty alleviation for which Africa has been far. The elasticity estimates of poverty to inequality and poverty to growth are helpful in deciding whether Africa in general and Ethiopia in particular will meet the goal of poverty alleviation, given the level of growth being recorded. The United Nations Millennium Declaration notified that poverty as defined by the number or proportion of people living on less than $1 per day should be halved between 1990 and 2015. Looking back to Figure 2.6, this calls for reducing the proportion of Africans living in absolute poverty to about 23 percent in 2015 from 46.8 percent in 1990. However, the level of poverty as a proportion of the entire population reached about 41.1 percent in 2004 as shown in PovecalNet of the World Bank.

On the other hand, the picture in the rest of the world including Asia and Latin America is improving and most of countries in these regions are most likely to meet the MDG goal of poverty alleviation. Africa is also still far behind the rest of the world as far as the United Nations Human Development index is concerned. The slip in goals of Africa has been mainly due to poor economic performance and the decline in poverty at the global level is mainly attributed to the rapid growth in several Asian economies coupled with successful income distribution policies.

Based on the estimated net elasticity of poverty to growth[24], we have calculated the GDP growth needed to achieve the MDG goal of poverty reduction, and projected the amount of reduction in poverty for each year through 2015 given alternative growth scenarios. We have chosen three net

[24] Since the Hausmann test with the null hypothesis that there is no difference in the coefficients estimated by the random effects estimator and the fixed effects estimator is unable to reject the null, it is advised to rely on the random effects estimator.

elasticity coefficients from our finding. We have run the projection assuming 41.1 percent of poverty incidence as of 2004. The result reveals that Sub-Saharan African countries needs to grow by at least 7 percent each year through 2015 to reduce poverty to about 23 percent by 2015. Considering net elasticity of poverty to growth of -1.32, the growth requirement declined to about 4 percent consistent growth to achieve the same implying putting effective measures to secure equitable distribution of any growth pays.

Africa is currently growing by a rate of well above 5 percent from 2004 on. WB(2007a) reports that year-on-year basis, Africa is registering a growth momentum of 5.2, 5.3, and 5.7 percent in the consecutive years of 2004, 2005 and 2006. In addition, as many as 28 countries recorded improvements in growth rate in 2006 relative to 2005. Arbache and Page(2008) showed 70 percent of Sub-Saharan African countries in which 78 percent of the population of the region reside have grown by at least 4 percent per annum from 2000-2006. These countries on average have grown by 6.8 percent over the period. Despite the fact that the recent growth performance is impressive given Africa's growth history, the rate fails short of what our first two scenarios require. In addition, African countries should be committed to consistently register such high growth for the coming 8 years.

Table 5.12. Projection of Poverty in SSA

(in percent of population)

	Growth and Net elasticity=-0.68			Growth and Net elasticity=-0.73			Growth and Net elasticity=-1.32				
	5%	6%	7%	5%	6%	7%	3%	4%	5%	6%	7%
2004	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1	41.1
2005	39.7	39.4	39.1	39.6	39.3	39.0	39.5	38.9	38.4	37.8	37.3
2006	38.4	37.8	37.3	38.2	37.6	37.0	37.9	36.9	35.9	34.8	33.9
2007	37.0	36.3	35.5	36.8	35.9	35.1	36.4	34.9	33.5	32.1	30.7
2008	35.8	34.8	33.8	35.4	34.4	33.3	35.0	33.1	31.3	29.5	27.9
2009	34.6	33.4	32.2	34.1	32.9	31.6	33.6	31.3	29.2	27.2	25.3
2010	33.4	32.0	30.7	32.9	31.4	30.0	32.3	29.7	27.3	25.1	23.0
2011	32.3	30.7	29.2	31.7	30.0	28.5	31.0	28.1	25.5	23.1	20.8
2012	31.2	29.5	27.8	30.5	28.7	27.0	29.7	26.6	23.8	21.2	18.9
2013	30.1	28.3	26.5	29.4	27.5	25.6	28.6	25.2	22.2	19.6	17.2
2014	29.1	27.1	25.2	28.3	26.3	24.3	27.4	23.9	20.8	18.0	15.6
2015	28.1	26.0	24.0	27.3	25.1	23.1	26.4	22.6	19.4	16.6	14.1

Source: Author's calculations using estimated net elasticities of poverty to growth.

Making Ethiopia the center of discussion, clearly the country is one of the poorest in the world. This is reflected both in percapita earning and human development indicators. However, official figures exposed that the country is registering one of the highest growth in Africa in the past four years. The country has registered real GDP growth of 11.7 percent in 2003/04, 12.6 percent in 2004/05, 11.6 in 2005/06 and 11.4 percent for the year 2006/07(NBE, 2007). If the current trend sustainably continues, the country could meet at least the MDG goal of poverty reduction. This finding is consistent with what other studies have established. Ethiopia was among the five countries which are supposed to be well positioned to meet the poverty reduction goal(Pattilo et al, 2005).

CHAPTER SIX

CONCLUSION AND POLICY IMPLICATIONS

6.1. Conclusion

For the last couple of decades, what determines growth continues to be the concern of policy makers and various models have been run. However, the recent growth literature has come with the realization of economic growth as a sequence of different growth regimes(Jerzmanowski, 2006, Hausman et al,2004; Jones and Olken, 2005; Berg et al, 2006, Dovern and Nunnenkamp, 2006; and Arbache and Page, 2007) rather than a smooth process well described by the long-run average. The approach we follow builds on this complexity of the growth process and analyzes the impact of various correlates on the likelihood of quick and sustained growth. This is based on the supposition that long-run average growth analysis can mask the determinants of turning points.

Following Hausmann et al(2004), we have identified the timing of growth accelerations in selected African countries, and find that growth accelerations are more or less common phenomenon with unconditional probability of 2.46 percent. Moreover, we have undertaken another filtering to choose years of sustained episodes from the whole set of growth episodes in Africa. This restrictive filter allows only 28 of the 58 episodes as sustained, with unconditional probability of 2.01 percent.

We find that growth accelerations and sustained episodes are derived by different variables. While US interest rate(proxy of international interest rate shock), petroleum price shock, democratization, regime change, resource richness and government expenditure are strong and robust predictors of episodic growth, positive terms-of-trade shock, growth rate of GDP deflator,

economic liberalization, financial liberalization, ethnolinguistic factorization, resource endowment, and age dependency ratio robustly determine the probability of sustained growth. Since achieving sustained growth is crucial for African countries to meet the MDGs, the results suggest that countries should emphasize on the latter group of variables. These results are robust to alternative estimation techniques employed.

We were also engaged in a diagnostic analysis of whether factors that sustain growth are there in Africa; and most specifically in Ethiopia. We find a mixed picture: while the export sector is growing, public services coverage is increasing, and the institutional conditions are improving; prices of major imports is surging alarmingly and the macroeconomic environment represented by domestic prices is worsening quite recently.

Furthermore, we were interested in looking the link between growth, poverty and inequality in selected countries. We were initially interested in incorporating, in the study, SSA countries only. This left us with only fewer household surveys, and we were forced to include surveys from other low-income countries. This enabled us use a panel of survey data from 34 countries with 103 surveys. On the basis of this, we were able to find the impact of growth on inequality and poverty and of inequality on poverty in terms of elasticities. Accordingly, this study provided us with helpful coefficients based on a large set of homogenous countries.

The empirical estimation based on Wodon(1999) suggests that inequality stays constant or changes only marginally when growth is achieved. Consistent with this we find that economic growth in selected countries has led to reduction in poverty indicators. Thus growth in these countries is pro-poor as inequality is more or less constant overtime and growth can deliberately

be used to tackle poverty. This finding is robust to the two measures of economic growth used. The results are similar in terms of statistical significance. However, there is a strong impact of growth on poverty when growth is measured by survey mean income than when it is measured by percapita income.

Moreover, our effort to project poverty in the region based on the elasticities obtained reveal that African countries should grow consistently by about 7 percent(the worst scenario) to reduce poverty to 23 percent of the total population by 2015 as promised by the MDG of poverty alleviation.

6.2. Policy Implications

The purpose of this paper has been to identify factors that can increase the probability of experiencing quick growth and factors that can explain the timing of sustained episodes. To this end, the paper adopted limited dependant variable models. Moreover, it has the objective of empirically testing whether growth in Africa(where it has been observed) benefits the poor. Apart from that, it also implies some important policy implications.

In analyzing correlates of growth episodes, the result implies that growth accelerations and sustained growth are explained by different variables. Given the recently established growth in most of Africa including Ethiopia, and given the high frequency of experiencing growth accelerations, the concern should be on factors that can sustain it. Thus, our policy recommendations are based on this understanding.

Unlike similar studies(eg. Hausmann et al,2004; and Collier,2007), positive terms-of-trade shock is found to be one of the significant correlates of sustained growth episodes evoking Ethiopia and other African nations to diversify the export sector both geographically and commodity wise. It also calls for countries to resort to semi-processed and processed exports than depending on primary commodities that are highly susceptible to world price shocks. This could also enable countries to resist any rise in import bills, and be saved from the threat of ending a growth spell. Growth rate of GDP deflator is among the macroeconomic stability variables that could end an episodic growth. This implies that African countries should take up fiscal and monetary policies that cannot disturb the macroeconomic environment.

The econometric analysis surprisingly confirms that the reform variables are unique to the timing of sustained growth episodes. This means that, given the recent growth episodes we observe here and there in Africa, overall financial and economic liberalizations can aid in sustaining it. Countries should remove constraints in the economic and financial activities. They should aggressively go for privatization and make the economy open; and undertake vigorous financial reforms so that the financial sector can be dynamic and contribute for sustaining the economy.

We have also found that a more diversified country(one with higher ethnolinguistic factorization) is faced with the problem of sustaining growth. This suggests that countries should adopt a well-advanced institutional setup that can wisely handle civil strife and guarantee the society with human dignity. Resource endowment is also another important predictor of sustained growth. But, according to Alayli(2005) and Collier and Goderis(2007), this can work only when there are improved institutions. Public policies aimed at improving age dependency ratio also reward

countries with growth that can continue both in the medium and long run. This is because reducing age dependency ratio can affect a multitude of variables that can increase the probability that growth can be sustained. Thus, countries including Ethiopia should work wisely to improve all these conditions.

A diagnostic analysis on the robustness of the recent growth in most of Africa and in Ethiopia in particular provided us with mixed picture. The promising improvements (like in the export, public services coverage, and stability and institutional conditions) should continue to a greater stage so that these countries can sustainably grow. Apart from the bad luck of recently surging international prices of major imports, there is a need for increased commitment to stabilize the domestic macroeconomic environment by adopting non-inflationary policies.

We have also tried to analyze the link between growth, inequality and poverty. The findings expose that inequality is not elastic to growth in the set of selected countries. This observation together with the net elasticity of poverty to growth implies that growth benefits the poor.

The moderate effect of growth (as measured by percapita income) on poverty is mainly because of the less than 1 gross elasticity of poverty to growth. The net effect can be improved by following pro-poor growth policies[25]. Khan (2007) advocates employment friendly growth as pro-poor growth based on a success story from South Korea in the 1970's. It also suggests for policies that take distributional impact of growth into account including projects that benefit the lower segment

[25] Alemayehu et al(2008) declared pro-poor growth policies as growth policies that would result in equal distribution of growth over the different income groups.

of the population. This is so as to reduce even that small loss in the impact of growth on poverty due to the marginal increase in inequality.

We have also tried to project poverty in SSA to see if these countries can achieve the MDG of poverty alleviation. The projection implies that these countries should grow sustainably by about 7 percent all the way to 2015. This calls for African countries to consider our important predictors of growth accelerations and sustained growth.

References

Adams, R. (2003) "Economic Growth, Inequality, and Poverty; Findings from a New Data Set", Poverty Reduction and Economic Management Network, Poverty Reduction Group, The World Bank, Washington, D.C.

AGH(2008) Action for Global Health, http://www.actionforglobalhealth.eu/ news/ethiopia _ready_to_meet_health_related_mdgs_on_time.

Aghion, P. and Howitt, P. (1998) "Endogenous Growth Theory", The MIT Press, Cambridge, England

Aghion, P. and Howitt, P. (2005) "Appropriate Growth Policy: A Unifying Framework", IMF Institute, Economics Training Program, IMF, Washington, D.C.

Agenor, P.(2000) " The Economics of Adjustment and Growth", The World Bank, Washington, D.C.

Alayli, M.(2005) "Resource Rich Countries and Weak Institutions: The Resource Curse Effect"

Alemayehu Geda(2006) "Openness, Inequality, and Poverty in Africa" , United Nations Department of Economic and Social Affaires, Working Paper No. 25, New York.

Alemayehu Geda, Abebe Shimeles and John Weeks(2008) "Growth, Poverty and Inequality in Ethiopia: Which Way for Pro-poor Growth?", Journal of International Development, Forthcoming

Arbache, J., Go, D. and Page, J.(2008) "Is Africa's Economy at a Turning Point?", The World Bank, Africa Region, Office of the Chief Economist, Policy Research Working Paper 4519

Arbache, S. and Page, J.(2007) "Patterns of Long Term Growth in Sub-Saharan Africa", The World Bank

Arbache, J. and Page,J. (2007) "More Growth or Fewer Collapses? A New Look at Long-run Growth in Sub-Saharan Africa", The World Bank

Barro, R. (1996), "Democracy and Growth", Journal of Economic Growth

Bekaert, G., Harvey, C. and Lundblad, C. (2001) "Does Financial Liberalization Spur Growth", NBER Working Paper No. 8245

Benjamin F. Jones and Benjamin A. Olken(2007) "The Anatomy of Start-Stop Growth", National Bureau of Economic Research

Benjamin F. Jones and Benjamin A. Olken (2004) "Do Leaders Matter?" National Leadership and Growth Since World War II

Berg, A., Ostry, J., and Zettelmeyer, J. (2006) “What Makes Growth Sustained?” International Monetary Fund, 700 19th St. NW, Washington D.C. 20016

Berg, A., Ostry, J. and Zettelmeyer, J.(2008) “What Makes Growth Sustained?” IMF Working Paper, Research Department, Revised Version of Begr et al(2006)

Branson,W.(1989) “ Macroeconomic Theory and Policy” Third Edition, Princeton University

Caddia, G., and Lora, M. (2005) “Economic Growth, Poverty and Institutions: A Case Study of Bolivia”

Cerra, V. and Saxena, S.(2007) “Growth dynamics: The Myth of Economic Recovery”, BIS Working Papers, No 226

Collier, P.(2006) “African Growth: Why a ‘Big Push?” Center for the Study of African Economies, Department of Economics, Oxford University, Oxford, UK

Collier, P.(2007) “Africa’s Economic Growth: Opportunities and Constraints”, Africa Development Indicators (2007), Center for the Study of African Economies, Department of Economies, Oxford University, UK.

Collier,P. and Goderis, B.(2007) “Commodity Prices, Growth, and the Natural Resource Curse: Reconciling a Conundrum”, University of Oxford, CSAE WPS/2007-15

de Janvry, A., and Sadoulet, E.(1999) “Growth, Poverty, and Inequality in Latin America: A Causal Analysis, 1970 – 94”, University of California at Berkeley

Dornbush, R, S. Fisher, S.(1993) “Macroeconomics”, Sixth edition New York, 1994. R. J. Gordon. Macroeconomics. Sixth edition, New York, 1993

Dovern, J. and Nunnenkamp, P.(2006) “Aid and Growth Accelerations: An Alternative Approach to Assess the Effectiveness of Aid”, The Kiel Institute for the World Economy, Kiel Working Paper No. 1296

Foster, J. and Szekely, M.(2001) “Is Economic Growth Good for the Poor? Tracking Low Incomes Using General Means”, Asia and Pacific Forum on Poverty

Go, D., Nikitin, D., Wang, X. and Zou, H.(2007) “Poverty and Inequality in Sub-Saharan Africa: Literature Survey and Empirical Assessment”

Hausmann, R., Pritchett, L., and Rodrik, D.(2004) “Growth Accelerations”, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138

Heston, A., Summers, R. and Aten, B. “Penn World Table Version 6.2”, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September 2006.

IMF(2008) World Economic Outlook, April 2008, International Monetary Fund, Washington, DC.

IMF(2007) “Regional Economic Outlook: Sub-Saharan African”, World Economic and Financial Surveys, International Monetary Fund, Washington, DC.

Iradian, G.(2005) “Inequality, Poverty, and Growth: Cross-Country Evidence”, IMF Working Paper, Middle East and Central Asia Department

Jerzimanwski, M.(2006) “Acceleration, Stagnation and Crisis: The Role of Macro Policies in Economic Growth”, The John E. Walker Department of Economics, Clemson University

Jones, C. (1997) “On the Evolution of the World Income Distribution”, Department of Economics, Stanford University, Stanford, CA 94305

Johnson,S., D. Ostry, J., and Subramanian, A.(2007) “The Prospects for Sustained Growth in Africa: Benchmarking the Constraints”, National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138

Khan, A. (2007) “ Employment and Pro-poor Growth”, Poverty in Focus, International Poverty Center, Brazil

Lindauer,D. and Pritchett, L.(2002) “What’s the Big Idea?”, The Third Generation of Policies for Economic Growth, Economia

Lopez, J. (2004) “Pro-Poor Growth: A Review of What We Know (and of what we. don't)” , World Bank, Washington, DC.

McKay, A.(2004) “Economic Growth for Poverty Reduction in Africa: Recent History and Current Issues”, University of Bath, UK

NBE(2007) National Bank of Ethiopia(NBE) annual report of 2006/07, Addis Ababa, Ethiopia.

Nudulu, B., Chakraborti, L., Lijane, L., Ramachandran, V. and Wolgin ,J.(2007) “Challenges of African Growth, Opportunities, Constraints, and Strategic Directions”, The World Bank, Washington, D.C.

Obstfeld, M. and Rogoff, K.(1996), “Foundations of International Macroeconomics”, The MIT Press, England

Olofsgard, A. and Zahran, Z. (2007) “Corruption and Political and Economic Reforms: A Structural Breaks Approach”

Pattillo, C., Gupta, S. and Carey, K.(2005) “Sustaining Growth Accelerations and Pro-Poor Growth in Africa”, IMF Working Paper, WP/05/195

Pauw, K. and Mncube, L.(2007) “The Impact of Growth and Redistribution on Poverty and Inequality in South Africa”, Development Policy Research Unit, University of Cape Town, DPRU Working Paper 07/126

Perry, G., Arias, O., López,J., Maloney, W. and Servén, L.(2006) “Poverty Reduction and Growth: Virtuous and Vicious Circles”, The World Bank Washington, D.C.

Rao, B., Singh, R. and Nisha, F.(2006) “An Extension to the Neoclassical Growth Model to Estimate Growth and Level Effects”, Munich Personal RePEc Archive

Ravallion, M. and Chen, S.(1996) “What Can New Survey Data Tell Us about Recent Changes in Distribution and Poverty?”, The World Bank Policy Research Department, Working Paper No. 1694, The World Bank

Rodrik, D. (2004) “Growth Strategies”, John F. Kennedy School of Government

Rodrik, D. (2005a) “Rethinking Growth Strategies”, UNU World Institute for Development Economics Research, WIDER Annual Lecture 8

Rodrik, D.(2005b) “Why We Learn Nothing from Regressing Economic Growth on Policies”, Harvard University

Roeder, P.(2001) “Ethnolinguistic Fractionalization(ELF) Indices, 1961-85” http//:weber.ucsd.edu\proeder\elf.htm

Romer, D.(1996) “ Advanced Macroeconomics” , McGraw-Hill Companies

Singer, J. and Small, M.(2003) “Correlates of War International War Database” http://www.correlatesofwar.org

Srinivasan,T. and Park, S.(2000) “Growth, Poverty Reduction and Inequality”, Yale University

Wacziarg, R. and Welch, K.(2003), “Trade Liberalization and Growth: New Evidence, National Bureau of Economic Research”, NBER Working Series No. 10152

Wodon, Q.(1999) “Growth, Poverty, and Inequality: A Regional Panel for Bangladesh”, The World Bank

World Bank(2008a) “Success Strategies in Fast Growing Countries”, http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21771716~pagePK:64257043~piPK:437376~theSitePK:4607,00.html, The World Bank, Washington, DC.

World Bank(2008b) World Bank PovcalNet, http://w.w.w.iresearch.worldbank.org/PovecalNet/, The World Bank, Washington, DC.

World Bank(2008c) Global Poverty Monitoring Database, http://w.w.w.worldbank.org/research /povmonitor/, The World Bank, Washington, DC.

World Bank(2007a) Africa Development Indicators 2007: Spreading and Sustaining Growth in Africa, The World Bank, Washington, DC.

World Bank(2007b) World Development Indicators Database, April 2007, The World Bank, Washington, DC.

World Bank(2006) International Financial Statistics(IFS), Database and Browser International Monetary Fund, Washington, DC.

Vaish, M.(2002) "Macroeconomic Theory", Twelfth Revised Edition, Vikas Publishing House Pvt Ltd.

UNECA(2007) "Recent Economic Performance in Africa and Prospects for 2007: Accelerating Africa's Development through Diversification", United Nations Economic Commission for Africa, Economic Report on Africa 2007.

UNSD(2008) United Nations Statistics Division, http://unstats.un.org/unsd/default.htm

Villa, S.(2005) "Determinants of growth in Italy: A Time-Series Analysis", Dipartimento di Scienze Economiche, Matematiche e Statistiche, University of Foggia.

Table 3.1 Timing of Growth Episodes

Country	Country Code	Authors Computation		Arbache and Page	HPR	PGC
		Acceleration	Sustained Growth	Acceleration Episode		
Angola	AGO	1994		1984	1993	1993
Angola	AGO	2001		2000		
Benin	BEN	1977		1993		1993
Botswana	BWA	1982	1982	1985	1986	1986
Botswana				1996	1996	1996
Burkina Faso	BFA	1973	1973	1993	1994	1983
Burkina Faso				2000		1994
Burundi	BDI	1966	1966	1983		1983
Cameroon	CMR	1968	1968	1995		
Cameroon	CMR	1976				
Cape Verde	CPV	1965	1965	1992	1992	1992
Cape Verde	CPV	1974	1974	1996		
Central African Rep.	CAF	1975		1995		
Chad	TCD	1972	1972			
Chad	TCD	1980	1980		1983	1983
Chad	TCD	1999		2000	1999	1999
Comoros	COM	1976		1999		
Congo, Dem. Rep.	ZAR	1976				
Congo, Republic of	COG	1966	1966			
Congo, Republic of	COG	1975		1979		
Congo, Republic of	COG	1999			1984	1984
Cote d`Ivoire	CIV	1965	1965	1994	1993	1993
Equatorial Guinea	GNQ	1970				
Equatorial Guinea	GNQ	1987	1987			
Equatorial Guinea	GNQ	1992	1992	1993		
Equatorial Guinea	GNQ	1997				
Eritrea						
Ethiopia	ETH	1988	1988	1993	1992	1992
Ethiopia	ETH	2003				
Gabon						
Gambia, The	GMB	1977				1995
Ghana				1993		
Ghana				2000		1983
Guinea	GIN	1971	1971	1993		1994
Guinea Bissau				1986		
Kenya	KEN	1973		1985		1984
Lesotho	LSO	1970	1970	1986	1986	1986
Liberia	LBR	1975				
Liberia	LBR	1993				
Madagascar						
Malawi	MWI	1970	1970	1992	1994	1994
Mali	MLI	1974	1974	1994		
Mauritius	MUS	1968	1968			
Mauritius	MUS	1983	1983	1984	1984	1984

(cont'd)Table 3.1 Timing of Growth Episodes

Country	Country Code	Authors Computation		Arbache and Page	HPR	PGC
		Acceleration	Sustained Growth	Acceleration Episode		
Mauritania						
Mozambique	MOZ	1998		1994	1986	1986
Mozambique					1994	1994
Namibia	NAM	1975		1998		
Niger	NER	1972	1972			
Nigeria	NGA	1966	1966	1986		
Nigeria	NGA	1985		1997		
Papua New Guinea	PNG	1975				
Papua New Guinea	PNG	1994				
Papua New Guinea	PNG	2002				
Rwanda	RWA	1965	1965			
Rwanda	RWA	1973	1973			
Rwanda	RWA	1994		2000	1996	1996
Sao Tome				1997		
Senegal	SEN	1971	1971	1994		1994
Seychelles	SYC	1967	1967	1983	1987	1987
Seychelles	SYC	1975	1975	1995		1995
Sira Leon				2000	1999	1999
Solomon Islands	SLB	1975				
Somalia						
South Africa				1999		
Sudan	SDN	2002		1995		
Tanzania	TZA	1972				1985
Tanzania	TZA	1992	1992	1998	1999	1999
Togo				1994		
Uganda				1992	1986	1986
Zambia	ZMB	1962				1999
Zimbabwe	ZWE	1966	1966			
Zimbabwe	ZWE	1977				
Zimbabwe	ZWE	1986		1993		1986
Total		58	28	43	20	32

Note: Others except HPR did not investigate the years of sustained growth.

The years from HPR(Housman, Pritchett, and Rodrick; 2004) and PGC(Pattillo, Gupta and Carey; 2005) are taken from Arbache and Page(2007)

Table 4.1 Summary of Survey Data on Poverty, Inequality and Growth

Country	*Year*	*Percapita Income*	*Mean Income*	*Poverty Headcount ($1/person/day)*	*Poverty Gap*	*Squared Poverty Gap*	*Gini Coefficient*
Bangladesh	1983	890.48	48.16	26.16	5.99	1.96	25.88
Bangladesh	1988	1150.82	45.74	35.41	8.27	2.67	28.85
Bangladesh	1991	1359.69	46.11	33.71	8.06	2.68	28.27
Bangladesh	1995	1527.61	51.21	32.90	7.38	2.38	33.00
Bangladesh	2000	1851.16	46.85	41.30	10.42	3.48	33.42
Botswana	1985	2200.42	87.71	33.30	12.54	6.09	54.21
Botswana	1994	5076.06	116.84	28.53	10.14	4.72	60.96
Burkina Faso	1994	800.10	54.49	51.38	19.50	9.27	50.71
Burkina Faso	1998	882.17	55.67	44.85	14.42	6.27	46.85
Burkina Faso	2003	1240.04	62.68	28.65	7.62	2.89	39.60
Burundi	1992	836.93	43.82	44.07	13.31	5.40	33.33
Burundi	1998	727.28	40.24	54.56	22.68	12.66	42.39
Cambodia	1994	444.52	26.04	82.03	37.77	20.40	38.28
Cambodia	2004	687.70	36.33	66.01	27.24	13.79	42.94
Cameroon	1996	2016.33	66.35	35.77	10.56	4.06	46.82
Cameroon	2001	2609.68	87.86	20.15	5.17	1.85	44.56
Côte d'Ivoire	1985	2010.43	146.89	4.71	0.59	0.11	41.21
Côte d'Ivoire	1988	1863.94	104.39	7.46	1.37	0.40	36.89
Côte d'Ivoire	1993	1891.11	91.52	9.88	1.86	0.55	36.91
Côte d'Ivoire	1998	2276.39	93.31	15.53	3.82	1.42	43.75
Côte d'Ivoire	2002	2616.11	105.52	15.72	4.14	1.65	48.39
Ethiopia	1981	326.30	50.26	32.73	7.69	2.72	32.42
Ethiopia	1995	519.98	59.20	31.25	7.95	3.00	39.96
Ethiopia	2000	725.37	55.57	21.60	4.47	1.51	30.00
Gambia	1992	830.46	45.42	53.69	23.27	13.28	47.80
Gambia	1998	1356.00	92.39	27.91	9.47	4.17	50.23
Ghana	1987	972.75	42.48	46.51	16.06	7.51	35.35
Ghana	1991	1114.02	44.58	47.24	16.40	7.54	38.13
Ghana	1998	1384.80	57.38	36.17	12.89	6.07	40.75
Kenya	1992	1056.90	89.77	33.51	12.81	6.61	57.46
Kenya	1994	1243.53	73.74	26.54	9.03	4.50	44.54
Kenya	1997	1276.42	100.51	12.41	2.40	0.67	42.51
Kyrgyz Republic	1988		359.60	0.00	0.00	0.00	26.01
Kyrgyz Republic	1993	3941.61	319.67	8.03	3.28	1.82	53.70
Kyrgyz Republic	1997	2898.63	166.03	1.57	0.29	0.10	40.50
Kyrgyz Republic	2000	3389.28	96.05	2.11	0.23	0.04	30.27
Kyrgyz Republic	2003	3882.44	114.15	0.37	0.04	0.01	30.30
Lao PDR	1992	1146.50	58.52	18.57	2.95	0.73	30.40
Lao PDR	1997	1342.88	60.73	26.37	6.31	2.24	37.00
Lao PDR	2002	1485.26	57.92	27.37	6.26	2.04	34.67
Lesotho	1986	880.46	101.93	30.34	12.66	6.85	56.02
Lesotho	1993	1403.18	80.16	43.14	20.26	11.84	57.94

(cont'd)Table 4.1 Summary of Survey Data on Poverty, Inequality and Growth

Country	*Year*	*Percapita Income*	*Mean Income*	*Poverty Headcount ($1/person/day)*	*Poverty Gap*	*Squared Poverty Gap*	*Gini Coefficient*
Madagascar	1980	586.96	50.14	49.18	19.74	10.21	46.85
Madagascar	1993	747.73	51.79	46.31	17.64	9.02	46.12
Madagascar	1997	792.37	42.69	49.76	18.88	9.50	39.16
Madagascar	2001	887.26	40.28	61.04	27.91	15.71	47.47
Mali	1989	685.61	76.75	16.46	3.92	1.40	36.51
Mali	1994	786.31	32.47	72.29	37.39	23.09	50.50
Mali	2001	1190.30	56.73	36.35	11.86	5.09	40.01
Mauritania	1987	897.89	46.93	46.67	20.77	12.29	43.94
Mauritania	1993	1178.91	54.53	49.37	17.83	8.58	50.05
Mauritania	2000	1521.48	67.98	25.94	7.57	2.96	39.04
Moldova, Rep.	1988		324.88	0.00	0.00	0.00	24.14
Moldova, Rep.	1992	2394.05	106.24	7.33	1.35	0.33	34.32
Moldova, Rep.	1997	2500.08	116.52	5.98	1.59	0.75	36.90
Moldova, Rep.	2001	2392.37	77.19	15.07	3.62	1.38	36.18
Mongolia	1995	1505.16	79.80	13.32	2.89	0.92	33.20
Mongolia	1998	1462.11	53.44	26.15	7.77	3.25	30.27
Mongolia	2002	1543.48	84.32	10.82	2.23	0.70	32.84
Mozambique	1996	864.94	51.29	45.63	16.38	7.91	44.49
Mozambique	2002	1471.54	63.83	36.18	11.62	5.27	47.11
Nepal	1995	1182.29	55.07	34.42	8.96	3.23	37.67
Nepal	2003	1537.17	80.75	24.74	5.55	1.71	47.30
Nicaragua	1993	2921.61	54.47	47.88	20.36	11.21	50.41
Nicaragua	1998	3220.15	52.76	44.68	16.62	8.22	45.24
Nicaragua	2001	3498.34	47.82	47.67	18.11	9.07	43.06
Nigeria	1985	668.98	31.45	65.72	29.62	16.71	38.68
Nigeria	1992	981.84	36.79	59.19	29.25	18.27	44.95
Nigeria	1996	985.32	27.06	78.21	40.46	25.19	46.50
Nigeria	2003	1295.34	29.89	71.18	34.59	20.89	43.60
Pakistan	1987	1574.56	41.05	49.63	14.84	6.04	33.35
Pakistan	1990	1815.88	41.66	47.76	14.57	6.04	33.23
Pakistan	1996	2298.34	58.81	15.41	2.32	0.57	28.65
Pakistan	2001	2479.20	59.44	17.54	3.00	0.82	30.39
Pakistan	2004	2818.47	71.52	9.03	1.42	0.39	31.18
Rwanda	1984	830.12	47.04	35.01	7.41	2.11	28.90
Rwanda	2000	1018.07	40.84	60.29	25.57	13.80	46.68
Senegal	1991	1447.72	63.70	45.38	19.96	11.18	54.14
Senegal	1994	1397.05	70.49	24.04	6.25	2.40	41.44
Senegal	2001	1845.92	83.02	16.82	3.57	1.11	41.25
South Africa	1993	6557.30	224.59	10.02	1.42	0.26	59.33
South Africa	2000	8226.06	200.06	12.37	2.26	0.54	57.77
Tajikistan	1999	4655.80	69.18	13.87	3.44	1.47	31.52
Tajikistan	2003	4702.39	88.17	7.04	1.21	0.35	32.63

(cont'd)Table 4.1 Summary of Survey Data on Poverty, Inequality and Growth

Country	*Year*	*Percapita Income*	*Mean Income*	*Poverty Headcount ($1/person/day)*	*Poverty Gap*	*Squared Poverty Gap*	*Gini Coefficient*
Uganda	1989	566.03	18.47	87.67	52.72	36.29	44.36
Uganda	1992	638.33	19.03	90.26	52.08	34.15	42.62
Uganda	1996	859.98	19.99	87.94	47.30	29.21	37.13
Uganda	1999	1027.13	22.57	84.92	45.63	28.61	43.11
Uganda	2002	1133.78	25.21	82.28	43.30	26.73	45.77
Uzbekistan	1988		204.40	0.00	0.00	0.00	24.95
Uzbekistan	1993	3368.70	116.30	3.28	0.46	0.11	33.27
Uzbekistan	1998	3255.41	99.72	19.16	8.12	4.70	45.35
Uzbekistan	2002	3882.84	299.18	0.00	0.00	0.00	34.55
Vietnam	1993	1372.53	75.40	14.63	2.55	0.65	35.68
Vietnam	1998	1957.20	98.79	3.80	0.48	0.10	35.52
Vietnam	2002	2476.52	114.75	1.78	0.10	0.01	37.55
Yemen, Rep.	1992	825.06	151.02	3.38	1.07	0.65	39.45
Yemen, Rep.	1998	928.03	86.46	9.42	2.10	0.78	33.44
Zambia	1991	1124.91	37.97	60.44	33.44	22.54	50.16
Zambia	1996	870.51	31.43	72.22	37.39	23.60	49.79
Zambia	2004	1127.79	41.01	60.04	29.69	18.46	50.74
Zimbabwe	1990	2836.04	57.98	54.39	23.83	12.75	56.17
Zimbabwe	1995	2630.00	47.17	56.12	24.17	13.04	50.12

Source: World Bank World Global Poverty Monitoring Database

Appendix

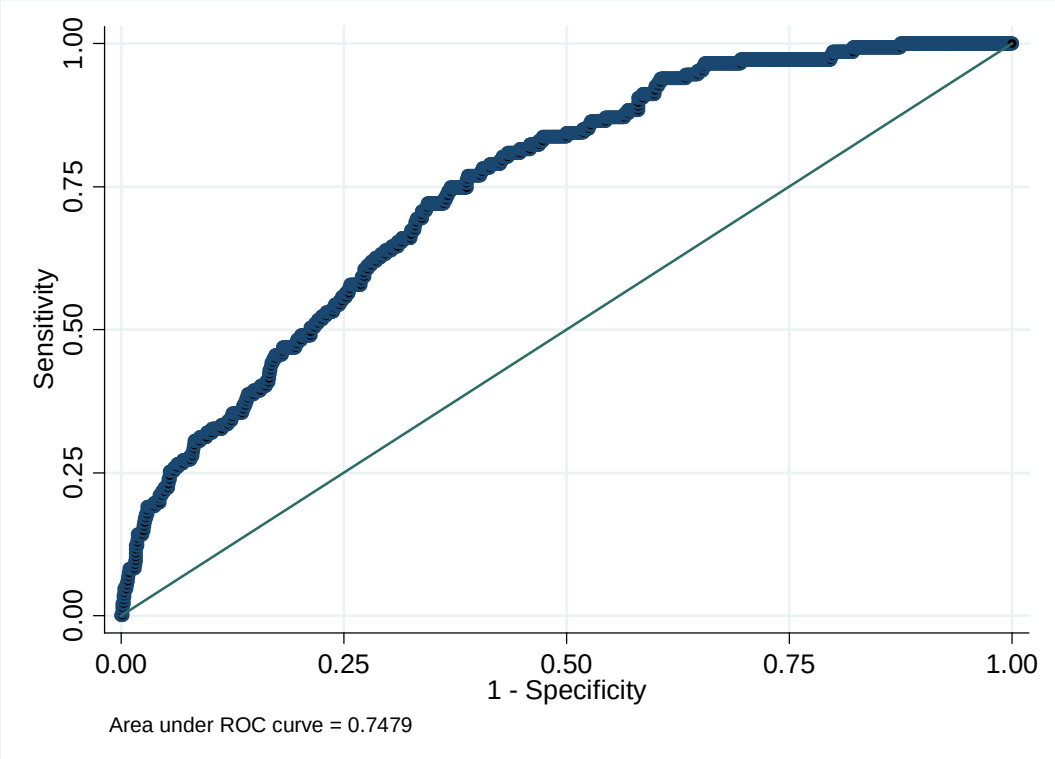
Annex I: Some Diagnostic Tests

Probit model for episodes, within sample prediction

Classified + if predicted Pr(D) >= .25
True D defined as episo != 0

Sensitivity	Pr(+ D)	17.01%
Specificity	Pr(-~D)	97.36%
Positive predictive value	Pr(D +)	37.31%
Negative predictive value	Pr(~D -)	92.71%
False + rate for true ~D	Pr(+~D)	2.64%
False - rate for true D	Pr(- D)	82.99%
False + rate for classified +	Pr(~D +)	62.69%
False - rate for classified -	Pr(D -)	7.29%
Correctly classified		90.57%

ROC for episodes



number of observations = 1740
area under ROC curve = 0.7479

Probit model for episodes, goodness-of-fit test

```
      number of observations =      1740
number of covariate patterns =      1740
            Pearson chi2(1679) =   1588.09
                  Prob > chi2 =    0.9437
```

Probit model for episodes, goodness-of-fit test
(Table collapsed on quantiles of estimated probabilities)

```
    number of observations =      1740
          number of groups =        10
Hosmer-Lemeshow chi2(8) =        11.63
                  Prob > chi2 =    0.1684
```

Probit model for episodes, goodness-of-fit test

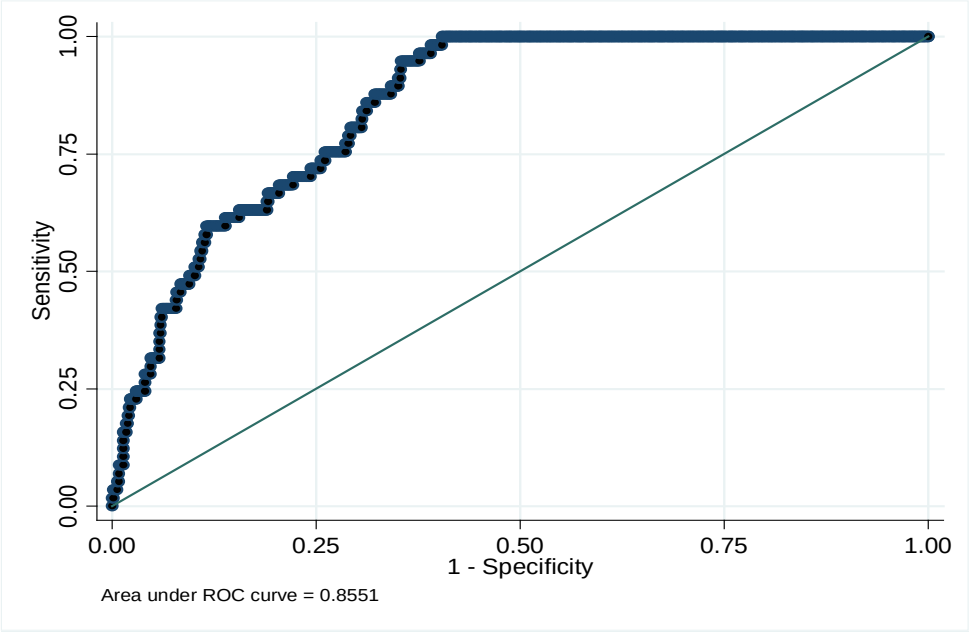
```
. linktest

Probit regression, reporting marginal effects          Number of obs =    1740
LR chi2(2)    = 116.30
Prob > chi2   = 0.0000
Log likelihood = -445.72343                    Pseudo R2     = 0.1154

------------------------------------------------------------------------------
episo        dF/dx       Std. Err.      z    P>z     x-bar  [    95% C.I.   ]
-------------+----------------------------------------------------------------
_hat         .0734568    .0541483     1.45  0.146  -1.56246  -.032672   .179586
_hatsq      -.0154249    .0185838    -0.79  0.427   2.74666  -.051848   .020999
obs. P       .0844828
pred. P      .056042  (at x-bar)
------------------------------------------------------------------------------
z and P>z correspond to the test of the underlying coefficient being 0
```

Probit model for sustained episodes, within sample prediction

Classified + if predicted Pr(D) >= .25
True D defined as susepiso != 0

Sensitivity	Pr(+ D)	31.58%
Specificity	Pr(-~D)	95.01%
Positive predictive value	Pr(D +)	30.51%
Negative predictive value	Pr(~D -)	95.24%
False + rate for true ~D	Pr(+~D)	4.99%
False - rate for true D	Pr(- D)	68.42%
False + rate for classified +	Pr(~D +)	69.49%
False - rate for classified -	Pr(D -)	4.76%
Correctly classified		90.89%

ROC for sustained episodes



number of observations = 878
area under ROC curve = 0.8551

Probit model for sustained episodes, goodness-of-fit test

number of observations = 878
number of covariate patterns = 878
Pearson chi2(838) = 539.47
Prob > chi2 = 1.0000

Probit model for sustained episodes, goodness-of-fit test
(Table collapsed on quantiles of estimated probabilities)

number of observations = 878
number of groups = 10
Hosmer-Lemeshow chi2(8) = 12.02
Prob > chi2 = 0.1504

Probit model for sustained episodes, goodness-of-fit test
linktest

Probit regression, reporting marginal effects Number of obs = 878
LR chi2(2) = 101.74
Prob > chi2 = 0.0000
Log likelihood = -160.11137 Pseudo R2 = 0.2411

susepiso	dF/dx	Std. Err.	z	P>z	x-bar	[95% C.I.]	
_hat	3.05e-06	.0000266	0.52	0.605	-2.67929	-.000049	.000055
_hatsq	-3.10e-06	.0000191	-1.31	0.191	12.0114	-.000041	.000034

obs. P .0649203
pred. P 2.24e-06 (at x-bar)

z and P>z correspond to the test of the underlying coefficient being 0

Annex II: Correlation Matrix

Pairwise Correlation Matrix for Episodes Model Variable

	ToT_ Thresh90	*Usintrate*	*PoP _Thresh90*	*Infla*	*NERDep*	*Econ_lib*	*Finan_lib*
ToT_Thresh90	1.00						
Usintrate	0.01	1.00					
PoP_Thresh90	0.18	0.13	1.00				
Infla	0.01	-0.02	0.08	1.00			
NERDep	0.33	0.08	0.35	-0.07	1.00		
Econ_lib	0.14	-0.02	0.20	0.04	0.19	1.00	
Finan_lib	0.13	0.03	0.14	-0.08	0.27	0.07	1.00
Civil_war_end	0.00	0.06	0.08	-0.02	0.10	0.04	0.03
Conflictend	0.03	0.05	0.13	0.01	0.03	0.04	-0.02
Democ	0.03	0.06	0.15	0.01	0.18	0.06	0.02
Regchange	0.08	0.11	0.19	0.00	0.21	0.14	0.08
Ethnoling	-0.02	0.00	0.00	0.01	0.03	0.03	0.05
ResourceRich	-0.07	0.00	0.00	-0.10	0.07	-0.06	0.03
GovExp	0.27	-0.01	0.04	0.02	0.06	0.00	0.02
PrivInves	0.09	-0.01	0.10	0.03	-0.06	0.01	0.02

	Civil _war_end	*Conflictend*	*Democ*	*Regchang*	*Ethnoling*	*Resource Rich*	*GovExp*	*PrivInve*
Civil_war_end	1.00							
Conflictend	0.63	1.00						
Democ	0.09	0.08	1.00					
Regchange	0.16	0.11	0.35	1.00				
Ethnoling	-0.04	-0.04	0.02	0.02	1.00			
ResourceRich	-0.04	-0.02	-0.06	0.01	0.17	1.00		
GovExp	-0.03	-0.02	0.02	0.03	-0.05	0.08	1.00	
PrivInves	-0.08	-0.07	-0.07	-0.07	-0.15	-0.01	0.22	1.00

Pairwise Correlation Matrix for Sustained Episodes Model Variable

	Tot_~90	*Usintrate*	*PoP_~h90*	*GGDPDef*	*Infla*	*NERDep*	*Econ_lib*
ToT_Thresh90	1.00						
Usintrate	0.01	1.00					
PoP_Thresh90	0.06	0.18	1.00				
GGDPDef	0.21	0.02	0.19	1.00			
Infla	-0.04	0.00	-0.08	-0.25	1.00		
NERDep	0.27	0.10	0.28	0.51	-0.19	1.00	
Econ_lib	0.12	-0.04	0.14	0.16	-0.01	0.21	1.00
Finan_lib	0.11	0.07	0.11	0.14	-0.08	0.23	0.15
Civil_war_end	0.00	0.08	0.04	-0.03	-0.05	0.06	0.05
Regchange	0.03	0.13	0.06	0.12	-0.05	0.13	0.04
Ethnoling	-0.10	0.01	0.00	0.04	0.00	0.00	0.02
ResourceRich	-0.10	-0.01	0.00	0.10	-0.11	0.04	-0.03
AgeDep	0.03	0.05	0.16	-0.02	0.04	0.03	0.03
GovExp	0.24	-0.02	-0.08	0.00	-0.04	-0.03	-0.06
PrivInves	0.06	-0.03	0.01	-0.08	-0.01	-0.11	-0.01

	Finan_lib	*Civil_~d*	*Regchange*	*Ethnoling*	*Resour~h*	*AgeDep*	*GovExp*	*PrivInves*
Finan_lib	1.00							
Civil_war_end	-0.02	1.00						
Regchange	0.09	0.15	1.00					
Ethnoling	0.08	0.03	0.04	1.00				
ResourceRich	-0.02	-0.02	0.06	0.17	1.00			
AgeDep	-0.08	0.06	0.08	-0.12	-0.15	1.00		
GovExp	-0.02	-0.05	0.00	-0.12	0.06	0.06	1.00	
PrivInves	-0.02	-0.05	-0.07	-0.19	-0.06	0.06	0.19	1.00

Pairwise Correlation Matrix of Growth, Poverty and Inequality Variable

	logGit	logWit1	logWit2	logPit1	logPit2	logPit3
logGit	1.00					
logWit1	0.05	1.00				
logWit2	-0.11	0.65	1.00			
logPit1	0.48	-0.57	-0.86	1.00		
logPit2	0.52	-0.56	-0.84	0.95	1.00	
logPit3	0.54	-0.53	-0.80	0.87	0.98	1.00

Note: logWit1=Percapita income
logWit2=Survey mean income
logPit1=Headcount index
logPit2=Poverty gap index
logPit3=Squared poverty gap index

Declaration

I, the undersigned, declare that this thesis is my original work and it has never been presented in any other university. All sources of materials used for this thesis are duly acknowledged.

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