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Sub-Saharan Africa's Recent Growth Spurt

An Analysis of the Sources of Growth

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Abstract

Since the mid-1990s, Sub-Saharan Africa has experienced unprecedented levels of high economic growth. A key question follows: What accounts for the turnaround of the growth performance in the mid-1990s? The answer can provide insight into whether the recent growth spurt in Sub-Saharan Africa is merely temporary or the beginning of a sustainable takeoff. This paper examines the sources of growth of 32 countries in Sub-Saharan Africa in a growth accounting framework. The findings suggest that the recent growth spurt is largely associated with an increase in the share of working-age population, capital accumulation, and total factor productivity, unlike previous periods. Resources play a role by attracting capital inflows, particularly from foreign direct investment and shifting labor away from agriculture. However, the growth prospects for Sub-Saharan Africa seem promising beyond resources, with steady progress in decreased fertility, increased foreign direct investment, political stability, and structural transformation.

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Sub-Saharan Africa's Recent Growth Spurt: An Analysis of the Sources of Growth[†]

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1. Introduction

Sub-Saharan Africa has been experiencing a growth spurt with high growth rates in gross domestic product (GDP) and modest increases in GDP per capita since the mid-1990s (See Figure 1). The growth and overall economic performance of Sub-Saharan Africa (SSA) in the 1970s and 1980s was disappointing for various reasons and has often been described in negative terms such as a "growth tragedy".[1] After sluggish or negative growth in GDP per capita during the "lost decades," the region has been rapidly regaining its vitality. That the global recession in 2008 and 2009 carried little impact on SSA economies adds optimism for the region's growth prospects.[2] Such optimistic views are reflected in the positive tone and rhetoric in recent publications such as "Lion on the Move," "The Sun Shines Bright," and "African Growth Miracle."[3] Recent reports cautiously predict continued growth.[4]

A key question follows: What accounts for the turnaround of the growth performance in the mid-1990s? Answering this question can help explain whether the economic spurt is a temporary boom or the beginning of a sustainable takeoff. This is not to foretell the future of SSA, but to inform policy makers regarding what needs to be further promoted to make the economic environment conducive to sustainable development.

Mixed views on the growth prospect of SSA countries exist. A common optimistic view on SSA's economic takeoff stresses improved human development such as fertility decline, and better health and education. An improved political and business environment with the help of reduced conflicts is considered to be a contributing factor. In contrast, many existing studies that explain African growth (or lack of) tend to weigh on a pessimistic view. They often highlight features pertinent to the continent such as: Africa's colonial past, conflicted history, and geography[5];

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[1] See Easterly and Levine (1997).
[2] Although the global economic downturn of 2008 and 2009 hit Africa with a lag, the policy response to the crisis in Africa is deemed to be appropriate and arguably helped avoid a deeper recession. For example, see Dejaravan and Kasekende (2011).
[3] McKinsey Global Institute (2010) for "Lion on the Move," *The Economist* (December 3, 2011) for "The Sun Shines Bright," and Young (2012) for "African Growth Miracle."
[4] See International Monetary Fund (2012).
[5] See Sachs and Warner (1997).

ethnic diversity[6]; the resource curse[7]; and lack of social capital,[8] among others. Both sides, however, provide little explanation as to the sudden turnaround of the growth pattern in the mid-1990s as they point to gradual changes or invariant factors.

This paper investigates the turnaround of the growth pattern since the mid-1990s in Sub-Saharan Africa using a standard growth accounting framework. Growth accounting provides insights on the proximate determinants of growth and their changes over time among the following contributing factors: demographic transition, capital and labor accumulation, education, and total factor productivity (TFP). This approach has been widely applied in many parts of the world. For instance, the growth experience of East Asian countries was shown to be accounted for by large increases in inputs rather than gains in TFP.[9] More specifically, the main ingredients of rapid and sustained growth in East Asia include a favorable demographic transition,[10] and substantial investment in capital accumulation based on high savings rates and increases in labor equipped with improved education.[11] The adoption of policies conducive for the changes likely accelerated growth in East Asia.[12] This type of analysis informed countries such as China and India to promote policies to achieve similar growth paths.

Few growth accounting exercises for SSA have been conducted due to the limited availability of data. A few exceptions which made efforts to compile the region's data include Bosworth and Collins (2003), Tahari et al. (2004), and Zelleke and Sraiheen, (2012). Bosworth and Collins (2003) updated their 1997 work and accounted for growth of 84 countries from 1960 to 2000 including 19 African countries. They paid particular attention to measurement and procedural consistency, which had been missing in earlier studies. Their estimates show that the slow growth of output per worker, rising just 0.6 percent a year in SSA, was mostly due to

[6] See Easterly and Levine (1997) and Montalvo and Reynal-Querol (2005).
[7] See Sachs and Warner (1995).
[8] See Temple (1998).
[9] See Young (1995).
[10] See Bloom and Williamson. (1998) and Bloom et al. (2000).
[11] See Young (1995) and Kim and Lawrence (1996).
[12] See Pages (1994) and Stiglitz (1996).

progress in education but little contribution from TFP.[13] Tahari et al. (2004) focus exclusively on 30 countries in Africa between 1960 and 2002. Their results suggest that TFP has improved since the 1980s, although the overall GDP growth in SSA during the entire period was primarily due to factor accumulation similar to the results from Bosworth and Collins (2003). Recently, Zelleke et al. (2013) extended the analysis to 31 African countries through 2008, providing insights on the source of the region's recent economic spurt. Their findings emphasize the increases in investment after 1995 but provide little details on the dynamics of other factors.

In line with these studies, our research examines the sources of growth, paying particular attention to changes in the pattern of growth since the mid-1990s. We use data ranging from 1960 to 2010 and cover 32 SSA countries. We first conduct the standard growth accounting exercise by decomposing GDP growth, and unlike previous studies, delve deeper into the underlying dynamics and sources of changes. More specifically, we examine the determinants of each factor including demographic transition, capital accumulation, and TFP growth. In doing so, we investigate the heterogeneity of the patterns across different types of countries by fertility level and resource richness.[14]

Our findings suggest that the overall economic growth in recent years in SSA is largely due to increases in the share of the working age population, capital accumulation, and TFP growth.[15] Increases in the share of the working age population due to fertility declines, capital accumulation with an inflow of foreign direct investment (FDI), and progress in TFP are a clear deviation from earlier patterns in the region. Resource rich countries (both oil and non-oil resource producing countries) experienced significant inflows of FDI. Contrary to common conjecture, however, this is only a partial explanation for increased FDI, because FDI growth is observed in resource poor countries as well. Reduced political instability and structural transformation of the economy from agriculture to other sectors since the mid-1990s seem to have contributed to TFP growth.

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[13] Ndulu and O'Connell (2003) used Bosworth and Collins' data set and re-estimated the sources of growth for the 19 SSA countries using a different functional form and confirmed the main findings.
[14] See Appendix Table 1 for the list of countries by type.
[15] Arbache and Page (2013) also found that growth accelerations in the region are associated with increase in investment.

The next two sections present the methodology and data used in the paper to conduct a growth accounting exercise. Section 4 presents main results from the analysis. Section 5 delves deeper into each source of growth. In Section 6, we conduct comparative analysis among selected countries, and discuss growth prospects for SSA countries. Section 7 concludes the study.

2. Methodology

2.1. Standard Growth Accounting

A standard growth accounting framework, following the work by Solow (1957), Kendrick (1961), Denison (1962), and Jorgenson and Griliches (1967), to name a few, provides a useful tool to answer the following questions.[16] First, how much of a country's growth rate can be accounted for by the quantity of labor, such as population growth and demographic structure changes, and by labor productivity measured with output per worker? Second, how much of the labor productivity measured as output per worker can be accounted for by growth in factor accumulation and TFP growth? Third, how has the composition of the sources of growth changed over time? In addition, by comparing the patterns between countries, we can also answer how much of the differences in the pace of growth across different countries can be accounted for by cross-country differences in growth rates of factor accumulation and TFP.

Following the conventional approach, GDP per capita is decomposed into the three parts based on the identity (See equation (1)): output per worker; share of workers out of working age population (employment ratio); and share of working age population

$$\frac{Y}{P} = \frac{Y}{L}\,\frac{L}{W}\,\frac{W}{P} \tag{1}$$

[16] See Barro (1998) for detailed discussion on growth accounting.

where Y is aggregate income, P is population, L is the number of employed workers, and W is the working age population. Taking logs and differences of equation (1) we have the following equation that divides output per capita growth into components attributable to changes in the quality of labor (labor productivity) and quantity of labor (the labor force participation rate and share of working age population):

$$\underbrace{\Delta log\frac{Y}{P}}_{\text{Growth in per capita output}} = \underbrace{\Delta\log\frac{Y}{L}}_{\text{Growth in labor productivity}} + \underbrace{\Delta\log\frac{L}{W} + \Delta\log\frac{W}{P}}_{\text{Growth in quantity of labor}} \tag{2}$$

Now we introduce a standard Cobb-Douglas aggregated production function in which labor is augmented by education: $Y = AK^{\alpha}(Le^{\gamma s})^{\beta}$, where A is TFP reflecting the unknown technological progress in the economy, K is capital, L is labor, and s is average years of schooling of the workforce.[17] Then α, β, and $\gamma\beta$ capture the elasticity of output with respect to capital, labor, and average education, respectively. Assuming a constant return to scale, $\alpha + \beta = 1$, and plugging the production function into $\Delta\log\frac{Y}{L}$, we decompose the change in labor productivity over time into the changes of productivity, capital and labor inputs, and education:

$$\underbrace{\Delta log\frac{Y}{L}}_{\text{Growth in output per worker}} = \underbrace{\Delta logA}_{\text{Growth in technology}} + \underbrace{\alpha\,\Delta\log\frac{K}{L}}_{\text{Growth in per worker capital}} + \underbrace{\gamma(1-\alpha)\Delta s}_{\text{Growth accounted by the change in education}} \tag{3}$$

From this exercise, we can infer the contribution of changes in the labor productivity from progress in education, accumulation of capital per worker, and technology by the residual TFP growth. Our main concern is not only the relative importance of each factor in accounting for growth of per capita income over time,

[17] This is a slightly modified form of the production function from early growth accounting exercises such as Solow (1957) and Denison (1962), since it augments labor with education, which do not explicitly consider improvement in labor through education but instead captures it through TFP.

but also the potential factors behind the turnaround from negative to positive and modest increase in per capita income over the mid-1990s.

The elasticity of output with respect to capital, α, denotes the share of capital in the economy with the assumption of a competitive factor market. A conventionally used value for α is 1/3, following Bernanke and Gurkaynak (2002) which measures the average share based on both developing and developed countries. The value of α for SSA, however, may deviate from global average as it can vary widely across different countries (Gollin, 2002). Low-income countries where the share of self-employment is greater are generally believed to have greater α (lower share of labor) than other parts of the world, because wage compensation largely underestimates the labor share. To the contrary, some empirical evidence suggests that capital share of income can be lower in developing countries than in developed countries (See Oduor, 2010 for review). Factors like oil and minerals, education, and civil wars may affect the income share of capital in SSA.

Empirical estimates on the income share of capital using individual country data in SSA vary. Oduor (2010) finds that α for Kenya can be as low as 0.16, while Zelleke et al. (2013) find that α for Kenya and South Africa are 0.65 and 0.41 respectively. The estimates from Zelleke et al. (2013) are closer to the range of estimates from Bernanke and Gurkaynak (2002) for SSA: 0.61 for Botswana, 0.78 for Burundi, 0.62 for Congo, 0.57 for Ivory Coast, 0.52 for Zambia, and 0.41 for South Africa. Given this variation, we use the conventional value of α=1/3 for our base scenario for growth accounting, and conduct sensitivity tests with α=0.16 and α=0.65.

Average returns to education in SSA also vary widely particularly due to limited data availability and large measurement errors with the small wage sector. Studies such as Psacharopoulos (1994) suggest the returns in developing countries lie between 8 and 20 percent per year, with SSA attaining 12 percent. More recently, however, studies such as Uwaifo (2006) suggest that the returns in SSA countries may be much lower than previously expected. Using Nigeria's data, Uwaifo (2006) estimates the average returns to schooling at about 2.7 percent. Conventionally, returns to schooling are assumed to be around 7 percent at the global level, as in Bernanke and Gurkaynak (2002). Therefore, with respect to γ, we choose $\gamma = 0.1$ in

the base scenario and adjust it so that the returns to education remain the same for sensitivity tests.

2.2. Capital Accumulation

All the variables that appear in equation (3) except for the intangible total factor productivity (A) use the readily available measurement from the national data such as gross domestic output and number of workers. Measuring the level of physical capital (K), however, is not a straightforward procedure, and the data are not readily available. A frequently used method to construct the data on capital includes the Perpetual Inventory Method, since physical capital is accumulated through investment decisions.[18] The law of motion of capital accumulation is as follows:

$$K_{t+1} = (1-\delta)K_t + I_t \tag{4}$$

where δ is the depreciation rate and I_t denotes investment at time t.

Our paper uses this method taking 1960 as our initial year and capital depreciates at 5 percent per year as in Bosworth and Collins (2003).[19] As Nehru and Dhareshwar (1993) suggest, we assume a steady state at the initial year and use its capital/output ratio. The series of investment comes from gross fixed capital formation in the national accounts. With a sufficient data span, the impacts of the assumptions on capital at the initial year and 5 percent annual depreciation rate are expected to be little.[20]

Information on the trend of investment also comes from the Balance of Payment of a country considering the following identity on current account balance:

$$S - I = \text{(Net)capital transfer} + \text{(Net)export} + \text{Income balance} \tag{5}$$

where S and I denote domestic saving and investment, respectively. The equation implies that investment is supposedly financed by domestic saving in a closed

[18] Some studies such as Canning et al. (1994) use proxies such as infrastructure to capture the level of capital instead of constructing data on physical capital.
[19] The depreciation rate varies by types of assets, and different countries accumulate different types of assets. Estimating depreciation rates by countries or asset types is beyond the scope of this study, and we use a conventional depreciation rate of 5 percent.
[20] See Nehru and Dhareshwar (1993) for the Perpetual Inventory Method for capital accumulation procedure.

economy, but transactions in an open economy such as capital transfer can be used for investment. Capital transfer includes the foreign direct investment (FDI), official development assistance (ODA), grants or loans, and remittances, among others. Examining the trends of each component of the Balance of Payment informs the source of investment and capital accumulation.

2.3. Total Factor Productivity

Total Factor Productivity (TFP) conceptually measures how efficiently factors such as capital and labor are utilized in producing output. As widely discussed in the growth literature, TFP growth is often interchangeable with technological progress, and there are many contributing factors to its growth. The major determinants of TFP can be summarized as: macroeconomic factors such as managed inflation, debt, and government spending; knowledge spillovers through trade openness and FDI; quality labor; institutional factors such as political stability; structural transformation from lower to higher productivity sectors; and better utilization of labor through increased female labor force participation.[21]

3. Data

The variables considered for growth accounting are described in Table 1 along with the source of data for the 32 countries analyzed here.[22] The major source is the World Bank's *World Development Indicators* (WDI). From WDI series, Gross Domestic Product, the size of population by age and employment status,[23] and their growth rates are obtained for the period of 1960 - 2010.

[21] See Loko and Diouf (2009) and Isaksson (2007) for a discussion of the determinants of productivity growth.
[22] See Table A1 in Appendix for the full list of countries.
[23] Employment ratios (share of the employed among working age population) in WDI are indeed coming from the KILM (Key Indicators of Labor Market) constructed by the ILO (International Labour Organization). The statistics the KILM are not based on micro data but estimated using a model. This approach gives a large geographic and time coverage of data, which is needed for the growth accounting exercise, although the accuracy of the statistics is often questioned.

Information on investment and years of schooling, needed for data on capital and education, is often missing in the early periods of WDI. Thus, we partially rely on data from Bosworth and Collins (2003) and follow the same approach to update their data.[24] We use their data on capital formation, which were originally based on the Penn World Table (Summers and Heston, 1991) and later updated. We then augment the data set by adding 13 SSA countries, and update the entire data up to 2010.[25] [26] In addition, like Bosworth and Collins (2003), we use the average of Barro-Lee and Cohen-Soto for education.[27]

The information on saving and investment as a percent of GDP comes from WDI, which collects the National Accounts of each country. Likewise, capital transfer such as FDI, ODA, and remittances are obtained also from WDI to examine the trend of the Balance of Payment.

Finally we look into data that may affect TFP growth. We first use UN country-level data on sectors to assess changes in the contribution of each sector to output and capture the trend of structural transformation. The UN GDP data are disaggregated according to the following sectors: agriculture, hunting, forestry, and fishing (ISIC A-B); mining, manufacturing, and utilities (ISIC C-E); manufacturing (ISIC D); construction (ISIC F); wholesale, retail trade, restaurants, and hotels (ISIC G-H); transport, storage, and communication (ISIC I); and other activities (ISIC J-P). We use the broad category of three sectors: agriculture, industry, and service. In addition, to examine whether improved freedom and political stability have played a role in TFP growth, we use the Freedom House Index from 1980 to 2010 that captures political rights and civil liberty.[28]

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[24] Barry Bosworth and Susan Collins kindly supplied us with updated data, which included 19 SSA countries for the period of 1960 – 2007.

[25] For the recent period that both Bosworth and Collins (2003) and WDI cover, we compare the data on gross fixed capital formation from the two sources and find that they both lead to a similar level of capital formation.

[26] Due to a limited availability of data, a few countries do not have information up to 2010. The final year of observation for Burkina Faso is 2006; Central Africa Republic, 2009; and Democratic Republic of Congo, 2009.

[27] See Barro and Lee (forthcoming) and Cohen and Soto (2001). An exception is that we use Lutz data for Chad. See Lutz et al. (2007).

[28] The Freedom in the World survey provides an annual evaluation of the progress and decline of freedom in 195 countries and 14 related and disputed territories.

4. Sources of Growth

Figure 2 presents the base scenario decomposition results of GDP per capita growth between1960-2010 for the average of 32 Sub-Saharan African. The results are presented by five-year periods with annualized figures. The relative contribution of each factor to GDP per capita growth has been fluctuating over time, which reflects changing growth patterns. For instance, the two periods of 1975-1980 and 2000-2005 show the same per capita GDP growth at 1.5 percent per annum, but the source of growth is quite different: capital accumulation led growth during the earlier period, while positive TFP and working age share played a greater role during the latter period.

Overall from 1960 to 2010, about 56% of aggregate GDP per capita growth is accounted for by education and 40% by physical capital, and TFP growth is negative. This finding is consistent with previous studies such as Bosworth and Collins (2003) and Tahari et al. (2004). Education has been improving at a steady pace regardless of the economic cycles. Therefore, although progress in education certainly is an important factor for overall growth, it provides little explanation on the recent growth spurt. Likewise, employment ratios have been growing at a steady pace without any drastic turnaround.

There are three distinguishable features in the growth pattern of the post-1995 period, which provide clues to the turnaround of growth patterns since the mid-1990s. First, demographic structure turns favorable to growth as the share of working age population increases. Second, growth rates of capital per worker increase significantly particularly in the most recent period of 2005-2010. This is in line with Zelleke et al. (2013) which note a large increase in investment during the post-1995 period. Finally, there is a significant progress in TFP growth contrast to the lost decades between 1975 and 1995.

The relative importance of each of the three factors varies with the values of α (See Figure A1 in Appendix for the results of the sensitivity tests). A higher α indicates that the income share of capital in the economy is greater. In this case, the impact of capital growth on the overall growth is larger while that of TFP growth is

smaller, and the portion explained by growth in working age share remains unchanged. In the base scenario where α=0.33, about 18 and 30 percent of the post-1995 GDP per capita growth of 1.66 percent are explained by capital and TFP respectively, and the contribution of working age share growth is about 20 percent. When α=0.65, the contribution of capital growth goes up to 35 percent while that of TFP diminishes to 13 percent. In contrast, when α=0.18, the portion explained by capital accumulation becomes as low as 9 percent, while 39 percent is explained by TFP growth. The sensitivity tests, therefore, suggest that within the reasonable range of values of the capital share the main message remains unchanged: the accelerated growth in capital and working age share and positive turn of TFP growth are associated with the post-1995 growth spurt.

The overall pattern, however, masks large heterogeneity across countries with little explanation of why the three factors experience such changes. The next sections delve deeper into each of these.

5. Delving Deeper into the Sources of Growth

5.1 Changes in Demographic Structure

The age structure of the population matters in the economic growth of a country. In particular, a high proportion of working age population compared to that of children and the elderly can lead to a demographic dividend when the working age individuals in the labor market engage in productive activities (Bloom et al, 2000). Countries typically transition from a high fertility and mortality to a low fertility and mortality state. In this process, when the proportion of children in the population declines with the reduction in fertility rates and its pace exceeds the increase in the number of elderly resulting from diminishing mortality rates, the proportion of working age population increases. This period provides a window of opportunity for demographic dividend if well managed.

In SSA, many countries are at different stages in terms of the demographic transition, and the pace of the change varies widely. In order to see the influence of

demographic change and its timing on economic growth, we disaggregate the countries by the fertility level. Countries are categorized into low-, mid-, and high-fertility groups based on the total fertility rate (TFR) in 2008. Low-fertility countries such as Botswana and South Africa experienced a fall in TFP from the early 1960s, and their TFR in 2008 is below three. Mid-fertility countries such as Ethiopia, Kenya and Ghana, began their transition around the 1980s and 1990s, and their current TFR is below five. High-fertility countries, mostly low income countries, have not experienced major fertility falls yet, and their TFR remains about five and above.

The old and young dependency ratios of SSA countries by fertility level are presented in Figure 3. A few stylized facts are observed: the young dependency ratio dominates the overall pattern due to the large number of children compared to the elderly, suggesting potentially large impacts of policies on fertility on growth prospect; despite a slight increase in the number of the elderly among low fertility countries, the overall dependency ratio rapidly decreased in the 1990s and 2000s; and the dependency ratio in high-fertility countries began to decrease while the decrease of the ratio in mid- and low-fertility countries accelerated in the early 1990s.

To further examine the relationship between demographic transition and economic growth, we disaggregate the accounting exercise by fertility level (See Figure 4).[29] The growth spurt in the last decade is mostly associated with the recovery among high fertility countries, although the demographic transition in these countries is slowest (Panel C). Countries such as Burkina Faso, Mozambique, Nigeria, Rwanda, and Uganda are among the high performing, high-fertility countries with both per capita GDP and output per worker growth rates greater than 4 percent per annum. The turnaround of growth in capital and working age share from negative to positive and huge progress in TFP seem to have contributed. These countries have yet to further benefit from the demographic transition. The population growth is dampening GDP per capita despite high growth in GDP, and the share of working age population has only begun to grow slowly. The growth prospect of these countries can substantially change how effectively policies on fertility suppress population growth and how efficiently their young workers are utilized in the labor market.

[29] See Table A2 in Appendix for the full results by fertility level.

Low-fertility countries, to the contrary, manifest quite different experiences in their demographic transition and growth pattern. The turnaround of their economies since the mid-1990s is not as drastic as that of high-fertility countries, but the growth rates mildly recovered, reversing the steady downward trend from the 1970s. The recovery benefits from the slowdown in population growth and accelerated growth in the share of working age population. In addition, the progress in TFP contributes to growth. However, unlike in other countries, capital accumulation in low-fertility countries has slowed down.

Mid-fertility countries still experience population growth at a steady pace like the high-fertility countries. Among the three types, mid-fertility countries experience the slowest growth in GDP per capita and output per worker during the post-1995 period, although the share of working age population was on the rise similar to that of low-fertility countries. Growth in TFP and capital accumulation improved but turned positive only in the recent 2005-2010 period. For these countries, policies to promote continued fertility decline and positive TFP growth are particularly critical for growth.

5.2 Where Does Capital Come From?

As seen in the previous section, capital accumulation (investment) plays an important role in accounting for growth. Figure 5 presents the level of investment as a percent of GDP and confirms an upward trend since the mid-1990s and particularly in the late 2000s.[30] By 2010, investment as a percent of GDP is up to 23 percent. The same statistics were 38, 35, 27, and 21 percent in the Republic of Korea; Singapore; Hong Kong; and Taiwan, respectively, in 1990 when their economic growth peaked. Rapidly growing countries like China and India recorded 48 and 37 percent of GDP as investment in 2010. These examples suggest that investment needs to be further promoted in SSA to ensure sustainable growth.

A strong association is believed to exist between public investment and economic growth as long as debt sustainability is managed. Thus improving

[30] In this section, statistics on investment, savings, FDI, ODA, and remittances are based on three-year moving averages.

infrastructure through large scale, public investment is often considered to be a strategy for boosting the economy and promoting growth (Buffie et al., 2012). Given the high debt level and limited fiscal space of SSA countries, however, public investment has not been an option for economic stimulus. The disaggregated figures by public and private investment confirm that private investment has played a larger role in explaining overall investment in SSA. This may be changing with reduced debt and strengthened fiscal environment since the late 2000s from a healthier economy and stronger revenue from resources.

We now move onto sources of capital based on equation (5). Investment is to be financed through (domestic) savings, and the gap between investment and savings is filled by international financial transfers. The trend of international financial inflows can be learned from disaggregated funds into FDI, ODA, remittances, and net export. The financing gap between investment and savings persisted in the region for the past 30 years from 1980 to 2010 (see Figure 6A). That gap has widened markedly since the mid-1990s, with investment increased but savings almost unchanged.

It appears that the widening financing gap since the mid-1990s has been financed through increased international capital inflow, particularly through FDI (see Figure 6B). Financial inflows to developing countries after World War II up until the early 1990s were known to be generally very low and predominately concentrated in ODA provided by the governments of high-income countries.[31] The volume of ODA has plummeted as its effectiveness to promote economic growth was widely questioned and debated among donor countries in the early 1990s.[32] Remittances from migrant workers abroad have changed little over time. Net export has been negative for the past 30 years and the trade deficit was on the rise in the 2000s. Meanwhile, private capital flows, particularly in the form of FDI, have largely increased during the same period.[33]

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[31] See Lucas (1989) and Fernandez-Arias and Montiel (1996).

[32] ODA has three components: (i) grants, (ii) concessional loans with a long period of repayment and lower interest rates than market rates, and (iii) contributions from multilateral institutions such as the World Bank. Depending on the composition of ODA and its use, the effectiveness and usefulness of aid for economic development has been an ongoing controversy.

[33] Private capital flows consist of foreign direct investment (FDI) and foreign portfolio investment (FPI). Among the two, FDI is believed to be more effective in promoting economic growth in developing countries by bringing new technology, innovation, and global business practices. Also due

It is widely believed that resources play a critical role in attracting capital inflows in the region. The main channels include FDI increase for resource extraction and export increase due to the rise of international commodity prices and improved terms of trade since the mid-1990s. Disaggregated by the country type (oil producing, non-oil resource rich, and resource poor countries), FDI and net exports as a percent of GDP are presented in Figure 7.[34] In line with the common belief, resource rich countries – both oil and non-oil – clearly benefit from increased FDI. However, even the resource poor countries experience significant increases in FDI, suggesting that resource presence is not the only explanation for the increased capital inflow.[35] Unlike FDI, the commodity price boom since the mid-1990s disproportionately affected different type of countries: oil producing countries get better off while non-oil resource rich and resource poor countries became worse off (see Figure A3 in Appendix).

5.3 Total Factor Productivity Growth

Finally, a distinguishable feature of the growth patterns in SSA this time is substantial gains in TFP. Many factors can determine TFP growth as discussed above, but we focus on two potential sources. The first is structural transformation as learned in the East Asian experience. Structural transformation involves a shift from low- to high-productivity sectors in its employment and output production.[36] Productivity of agriculture is generally believed to be lower than that of other sectors. The contribution of agriculture to GDP in Tanzania in 2009, for example, is 29 percent,

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to relatively less developed financial markets in SSA, capital flows through FPI in the region has been quite limited until recently. For more information on FDI and FPI, see Itay and Razin (2005).

[34] See Table A1 in Appendix for the list of countries by resource wealth. Note that some oil producing, rapidly growing countries such as Angola and Equatorial Guinea are not included in the analysis due to limited data availability. This may downplay the important role of resources in FDI increase and economic growth.

[35] We conduct the growth accounting exercise by resource wealth (not shown here), and find that capital accumulation in the post-1995 period among resource poor and non-oil resource rich countries is faster than in oil producing countries. This supports the argument that resource is not the only explanation for the increased capital inflow.

[36] Economic development occurs as surplus labor transitions out of low-productivity traditional agriculture into high-productivity modern industry. See for example Lewis (1954).

which is much lower than its employment share, 61 percent. Thus shifting out of agriculture likely improves TFP growth.

Some caveats exist when making an inference between structural transformation and TFP growth in SSA. The assumption that agriculture is a low productivity sector can be challenged due to the high degree of underemployment in agriculture. Agriculture is highly seasonal and agricultural workers may not be continuously employed, making measurement of their productivity difficult. With many African households engaged in non-agricultural activities this can be especially problematic.[37] In addition, TFP growth in agriculture is not necessarily slower than in other sectors. The limited studies that compare TFP growth between agriculture and non-agriculture sectors provide inconclusive evidence.[38] Studies such as Block (2010) suggest that TFP growth is highly non-linear over time, and TFP in agriculture in SSA largely improved since 1980s. Therefore TFP growth can take place even without structural transformation.

While admittedly imperfect, the trend of structural transformation suggests its association with TFP growth. Figure 8A shows the share of each sector in GDP over time. It shows that structural transformation in SSA had been slow up until the mid-1990s, with the contribution of the agriculture, industry, and service sectors to GDP being quite steady. Since the mid-1990s, however, structural transformation accelerated; the share of agriculture to GDP has significantly declined and that of industry largely increased. When the changes in TFP and the share of agriculture to GDP are plotted, a negative association between the two is observed (see Figure 8B), indicating that sectoral shifts from agriculture to the more modern sectors are related to the gains in factor productivity.

Structural transformation in employment may not be as evident as in output if the increase in the share of industry in output is driven by extractive industries where employment generation is believed to be small due to the capital intensive nature of their work. In such case, TFP growth coming from reallocation of labor may not be as large as the output transformation suggests. Policies to promote transition from

[37] See Gollin (2002) for the empirical evidence for this.
[38] See Christiaensen et al. (2011) for a discussion.

agriculture to the manufacturing, construction, retail, and service sectors outside extractive industry would be conducive for TFP growth.

The second factor in accounting for TFP growth, which naturally emerges from Africa's own experiences, is improved political stability. It is believed that instability due to conflicts and dysfunctional government is a barrier to economic development. We use the index (Freedom in the World data) from 1980 to 2010 from Freedom House to examine whether improved freedom and political stability have played a role in TFP growth and thus the turnaround of the economic growth.[39] As shown in Figure 9A, there has been a significant change in freedom and political stability in SSA since the mid-1990s: many countries shifted from the "not free" to "partly free" or "free" status.[40] These "stabilized countries," such as Burkina Faso, Ethiopia, Mozambique, and Tanzania, experience faster TFP growth than others by 1.4 percentage points from pre- to post-1995 period (see Figure 9B).[41]

The "stabilized countries" include some resource rich countries: Mali and Burkina Faso (gold) and Mozambique and Ghana (oil). Considering that resources have been often the source of instability,[42] maintaining stability and managing the revenues from the resources to harness investment in human and social capital should be prioritized in these countries for sustained growth.

In addition to these two factors – structural transformation and political stability – we consider potentially important determinants of TFP that went through a large change from pre- to post-1995 period when data permit. They include external debt and FDI. External debt as a percent of Gross National Income (GNI) among SSA countries peaked at 134 percent in 1993 but rapidly decreased to 31 percent in 2009. The increase in FDI is as shown above. However, we do not find any relationship between these factors and TFP growth.

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[39] The Freedom in the World survey, which includes both analytical reports and numerical ratings, measures freedom according to two broad categories: political rights and civil liberties. Political rights ratings are based on an evaluation of three subcategories: electoral process, political pluralism and participation, and functioning of government. Civil liberties ratings are based on an evaluation of four subcategories: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights.

[40] See Table A1 in Appendix for the full list of countries that experienced "stabilization."

[41] The TFP growth rates for stabilized countries improved from 0.03 to 1.04 percent from pre- to post-1995 periods, while they changed from -0.18 to -0.58 percent for others.

[42] See Sachs and Warner (1995).

6. Discussion: Does the Recent Growth in Africa Resemble Asian Experiences?

Many wonder whether Africa's recent growth is a prelude of economic takeoff and seek similarities with the Asian growth experience. We present the initial conditions and the trends in various growth factors for several selected countries at various points of time (see Table 2). We first consider the four East Asian "Tiger" countries that experienced a huge leap from the mid-1960s up until the early 1990s. The next group of countries includes large emerging economies including Brazil, China, India, and Malaysia. Finally, we add four African countries that represent different types and income groups: Ethiopia (low income), Ghana (lower middle income), Nigeria (oil producing), and South Africa (upper middle income).[43]

As indicated by many studies, the four Tiger countries have followed a relatively homogeneous pattern despite their differences in initial conditions, including the level of GDP per capita. First, they experienced rapid changes in demographic structure, benefiting from drastic declines in fertility and increases in life expectancy, and thus large increases in working age share (by 12-19 percentage points). Second, during the takeoff period, there were large increases in the labor force participation rates (except for Taiwan) and the years of schooling ranged from a 2.3 year increase in Singapore to 4.8 years in Korea. Finally, apart from Hong Kong, all three countries experienced a substantial increase in investment.

The large emerging countries – Brazil, China, India, and Malaysia – are quite heterogeneous in both the initial level and size of changes. Focusing on the relatively high growth period of 1990-2010, their demographic change and increase in labor force participation were not as drastic as the Tiger countries. Regarding investment, both China and India experienced enormous increases. One notable feature is that by 1990 the education level of the large emerging countries reached that of the Tiger countries in 1966 (average 5.2 years). This suggests that economic takeoff may

[43] We follow classification of the World Bank where low income is defined as GNI per capita of $1,005 or less, lower middle income between $1,006 and $3,975, and upper middle income between $3,976 and $12,275 as of 2010.

require a critical stock of equipped human capital that can trigger technological progress and innovation.

When juxtaposing African countries to the Asian Tigers and large emerging countries, one can see that the pace of change in SSA, although headed in the right direction, has been far slower. South Africa experienced a fertility decline as large as India or Malaysia and huge progress in education, yet improvement in life expectancy is little, the labor force participation rate remains low, and investment has been stagnant. With respect to demographic structure, Ethiopia, Ghana, and Nigeria today look similar to the conditions of economic takeoff of other countries: TFR between four and five (similar to the Tigers), life expectancy similar to that of Korea in 1966 or India in 1990, and substantial progress in education and growth in investment already seem to be taking place in Africa.

7. Concluding Remarks

Can Africa's economy take off as the East Asian industrial countries did in the 1960s and the large emerging countries like China and India did in the early 1990s? This paper provides some answers by examining the sources of growth, particularly focusing on the turnaround of economic performance in the mid-1990s in SSA. An optimistic outlook emerges in that since the mid-1990s SSA has experienced unprecedented growth performance, in large part due to favorable demographic transition, capital accumulation particularly through FDI, and TFP progress. Moreover, a few human capital indicators suggest that the conditions in SSA may be ripe for rapid growth, as they are similar to the initial conditions of the countries that experienced growth earlier.

Our examination of sources of growth, of course, may have overlooked potentially important factors that could reverse the economic outlook. In particular, the lack of data prior to 1995 presents limitations. Financial sector development, for instance, accelerated in the late 2000s. This may have affected capital accumulation and investment as private sector obtained better access to credit.[44] However,

[44] See Iossifov and Khamis (2009).

information on financial sector development for the pre-1995 period is largely missing. Lack of micro data is also part of the issue. Without labor and capital data by sector over time, it would be difficult to examine the contribution of each factor across different sectors.

Nevertheless, our analysis suggests a set of policies that could help Sub-Saharan Africa continue its high growth performance and use this momentum for economic takeoff. Reducing fertility and improving human capital is a first step toward demographic dividend. Policies to promote informed decision-making on fertility, recognizing the tradeoff between quantity and quality or utilizing contraceptive methods, for instance, can contribute to favorable demographic structure. For capital accumulation to continue, policies to attract private capital should be considered. Maintaining openness to international trade, fostering an investment climate and political environment conducive to international business and investment, and building skilled labor should be prioritized. In addition, structural transformation from traditional agriculture to modern sectors should be accelerated. Policies that diversify income sources by promoting non-farm business for agricultural workers, transitioning workers to higher productivity sectors, and improving productivity in each sector are critical.

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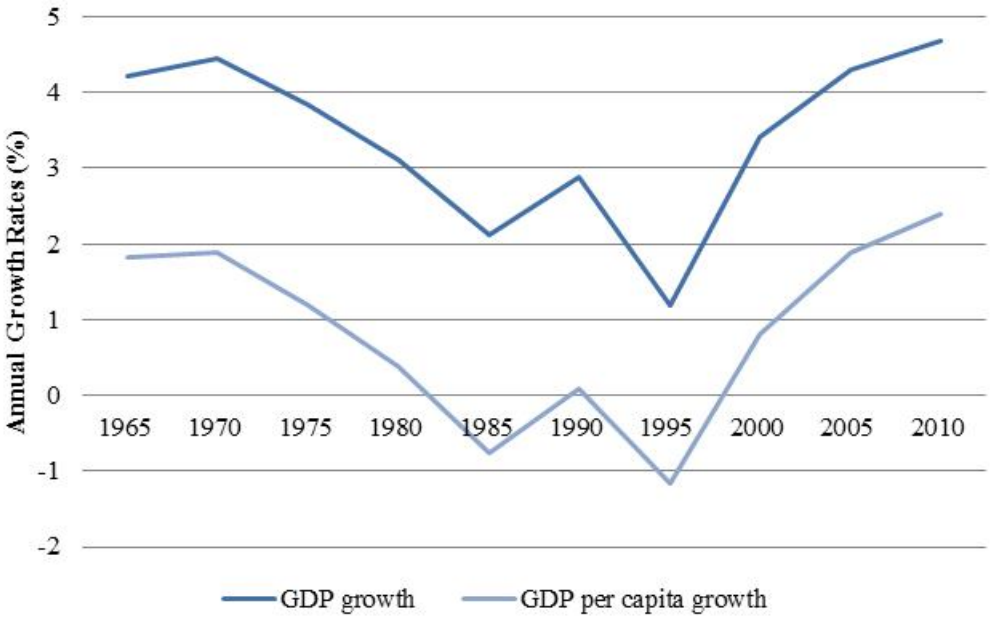
Figure 1. Annual Growth Rates of GDP and GDP per capita



Source: Author's compilation of 32 SSA countries

Figure 2. Decomposition of GDP per capita over time

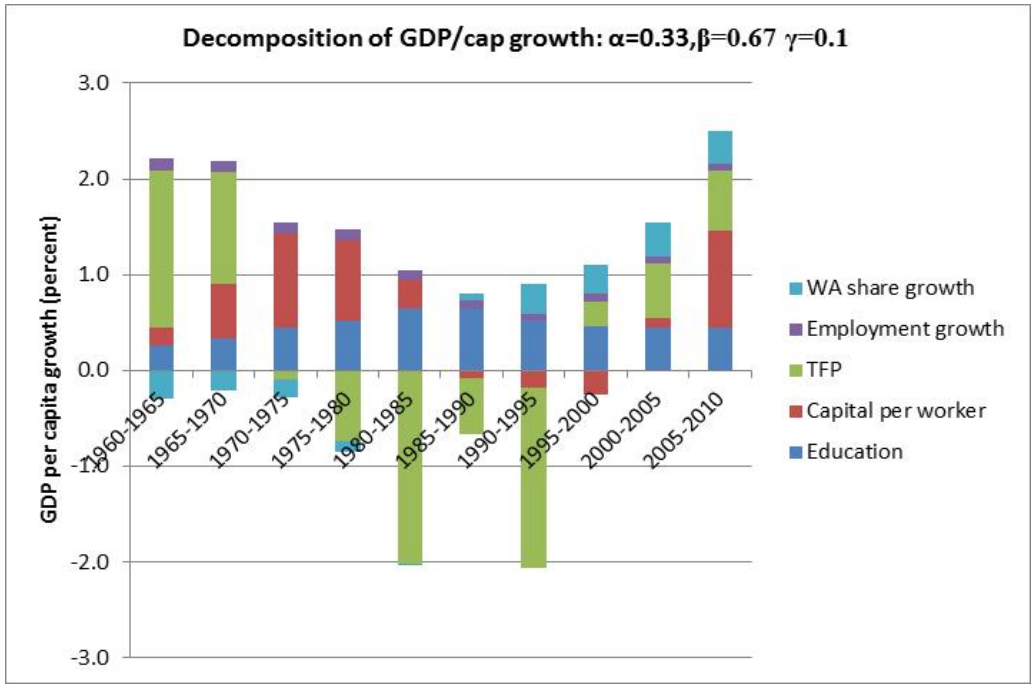


Figure 3. Dependency Ratios by Fertility Level

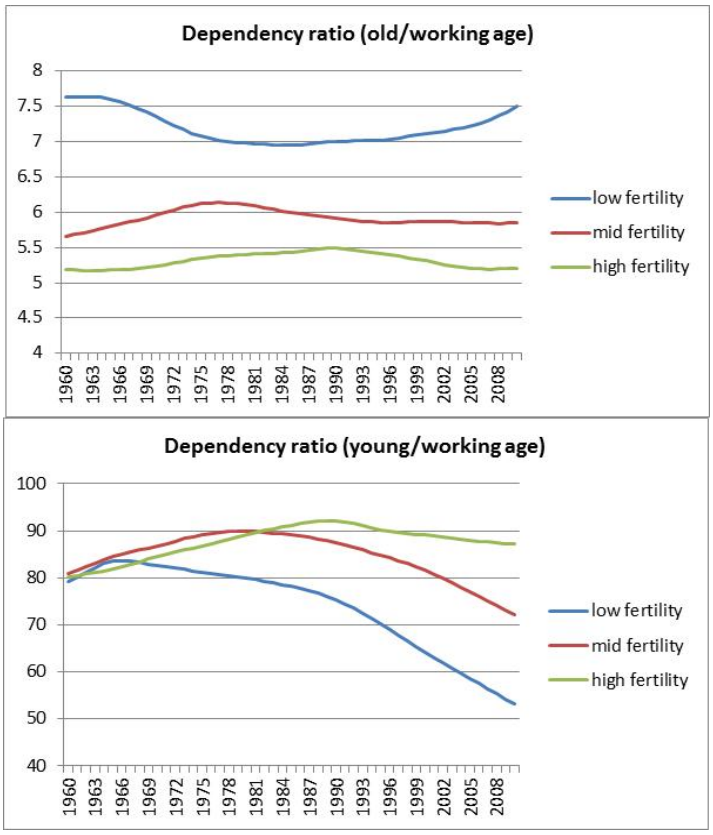


Figure 4. Results of Growth Accounting: by Fertility Level

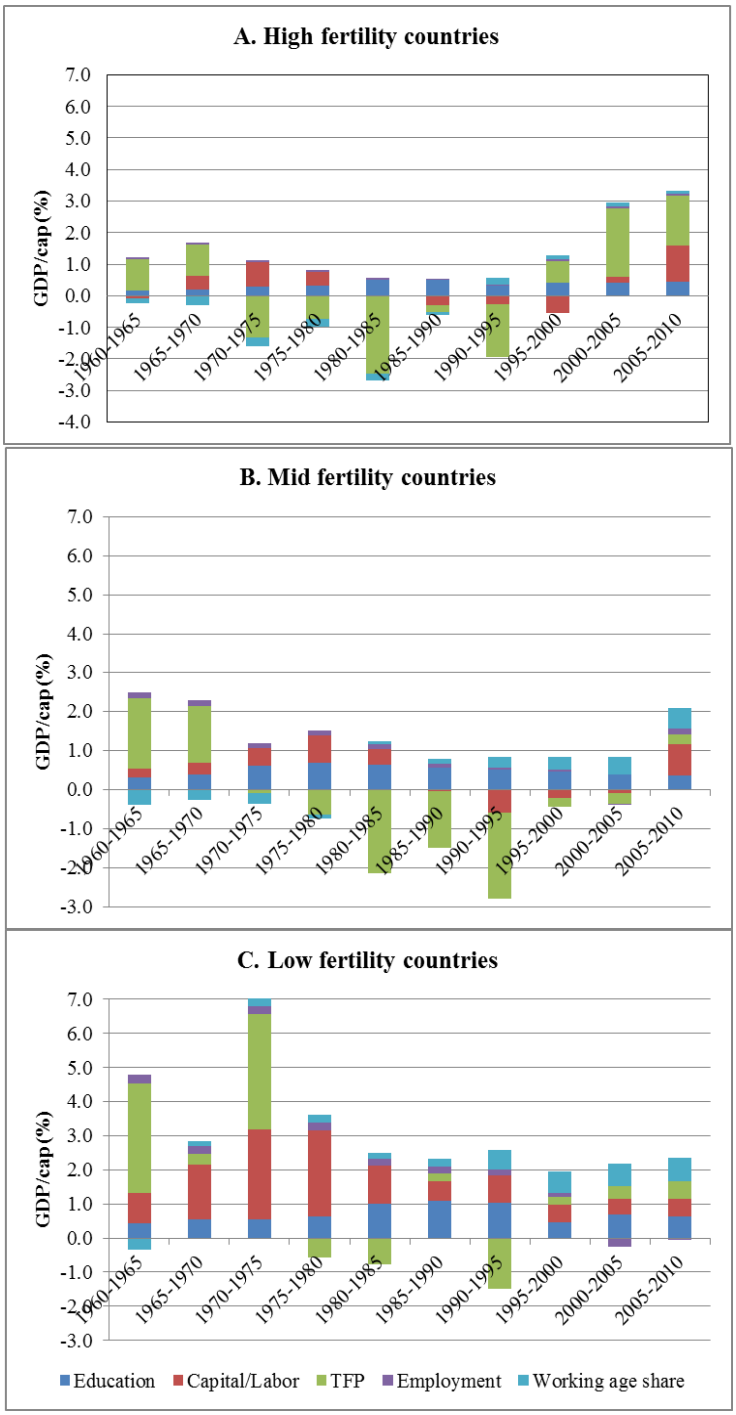
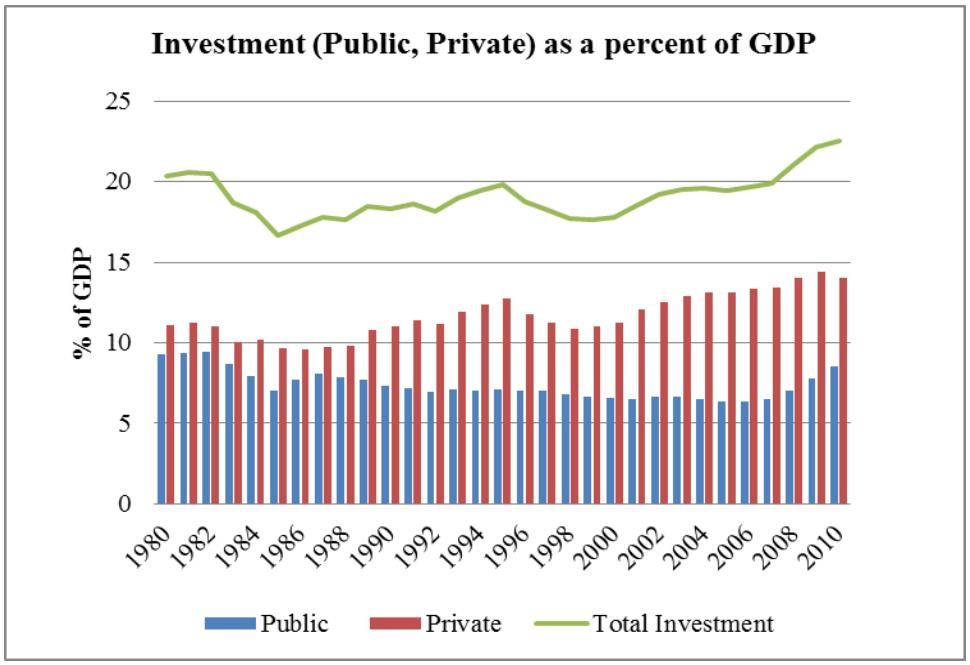


Figure 5. Public and Private Investment as a percentage of GDP



Source: Author's compilation of 32 SSA countries

Figure 6. Saving and Investment Gap, and Source of Capital Inflows

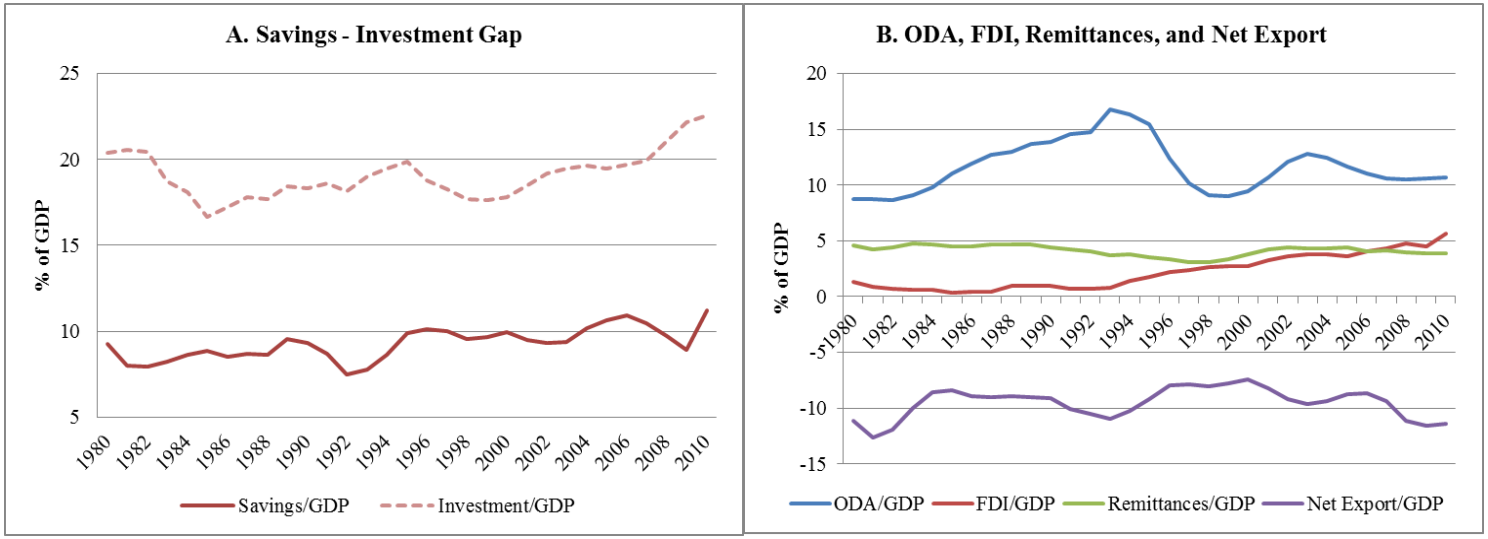
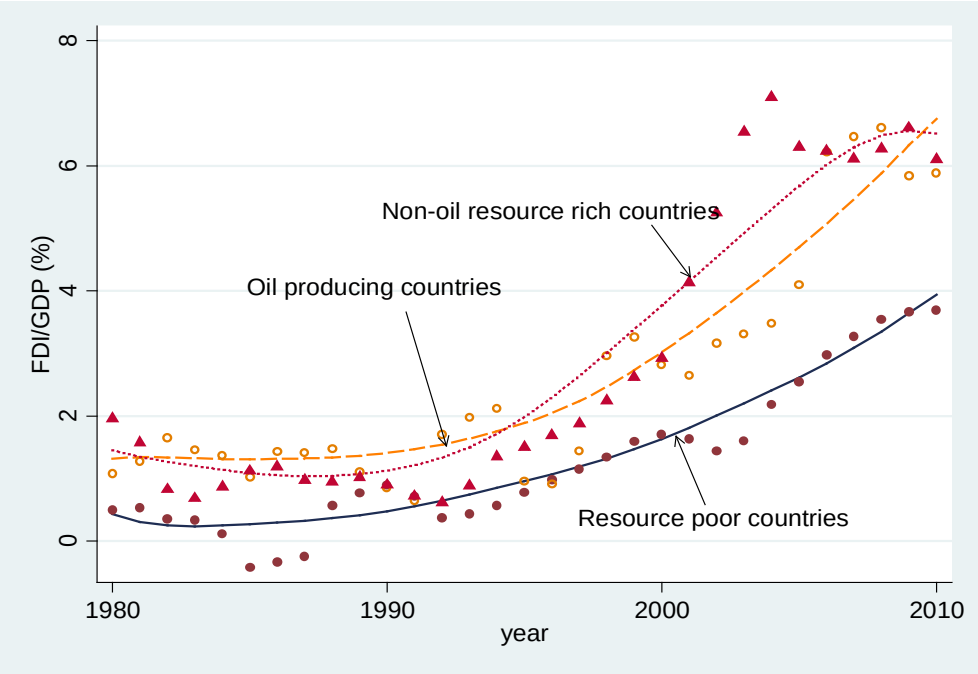


Figure 7. FDI/GDP Trends by Resource Status



Notes: Based on 30 SSA countries excluding the two outliers – Chad (oil exporting) and Lesotho (non-oil exporting); Lowess smooth lines were used for the graph.

Figure 8. Structural Transformation and TFP in SSA

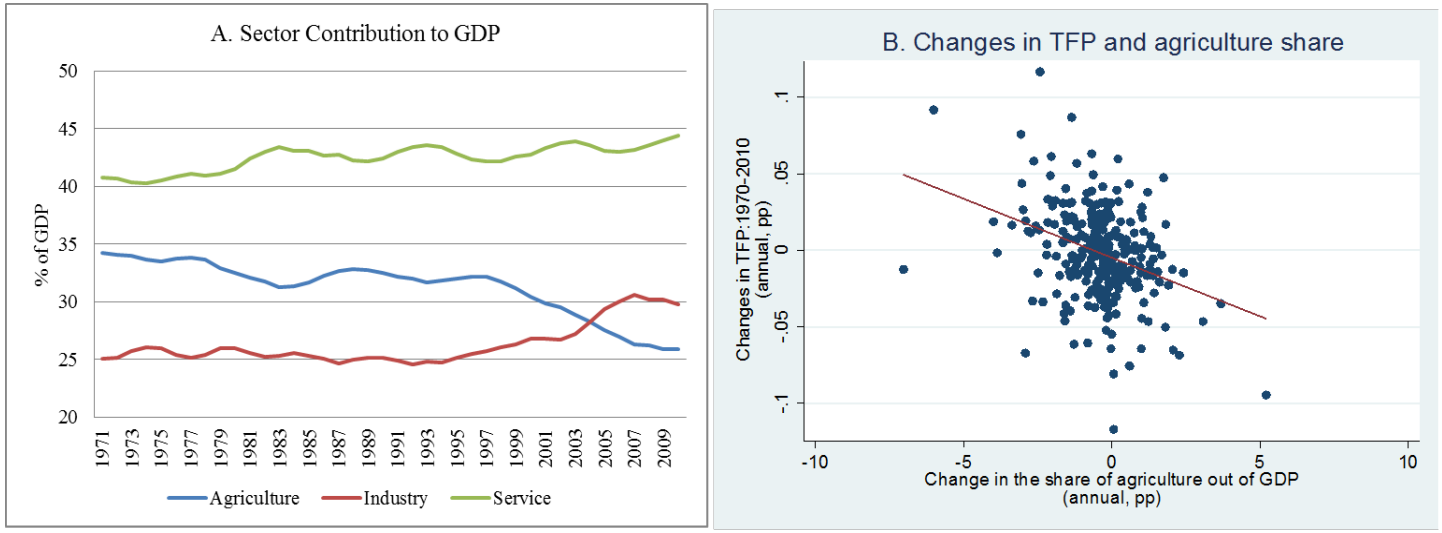


Figure 9. The Trend in Political Stability in SSA countries

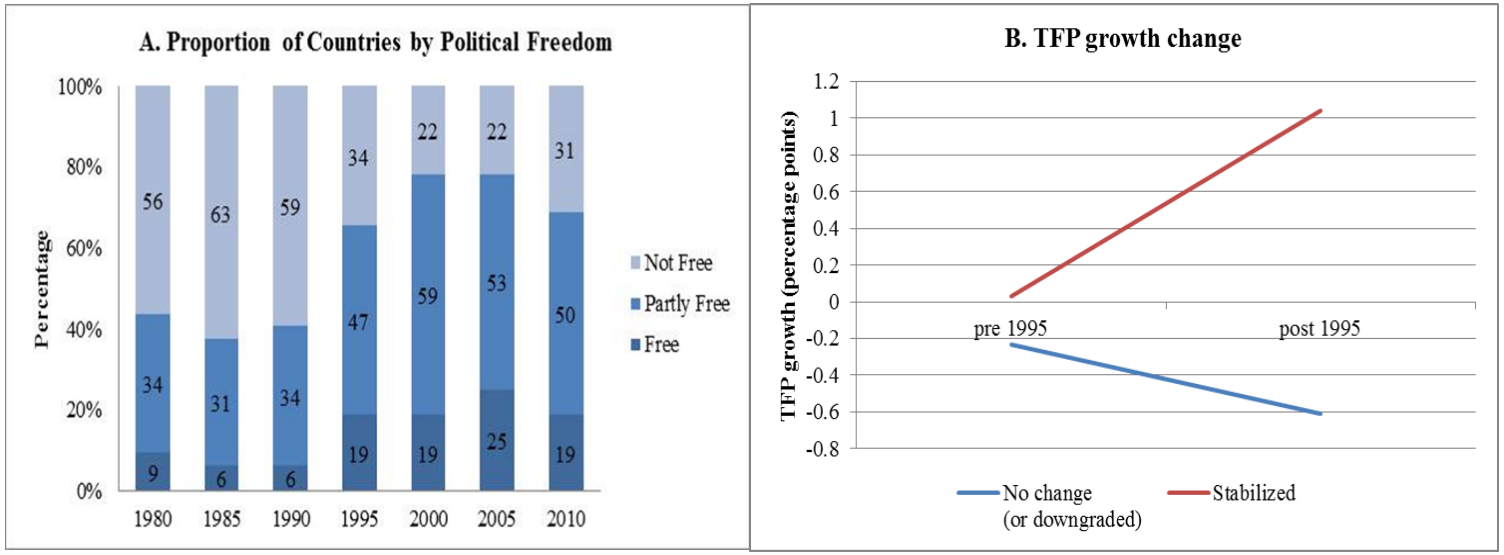


Table 1. Sources of Data Used in the Analysis

Variables	Period	Source
	Growth Accounting	
GDP	1960-2010	World Development Indicators
Population by age	1960-2010	World Development Indicators
Labor force participation	1960-2010	ILO, KILM
Capital		
-- 19 SSA countries	1960-2007	Bosworth and Collins
-- 13 additional SSA countries	1960-2010	Authors' construction using perpetual inventory method
-- 32 SSA countries	2008-2010	Authors' construction using perpetual inventory method
Years of schooling	1960-2010	Average of Barro Lee and Cohen and Soto, and imputed for annual data
-- for Chad	1960-2010	Lutz data
	Capital accumulation	
Gross capital formation		
-- 19 SSA countries	1960-2007	Bosworth and Collins
-- 13 additional SSA countries	1960-2010	World Development Indicators
-- 32 SSA countries	2008-2010	World Development Indicators
Foreign direct investment	1980-2010	World Development Indicators
Official development assistance	1980-2010	World Development Indicators
Domestic Saving	1980-2010	World Development Indicators
	Structural Transformation	
Sector contribution to GDP	1970-2010	UN
Sectoral share of employment	selected countries, selected years	
-- Ghana	1992, 2006	International Income Distribution Database
-- Nigeria	1986, 2004	International Income Distribution Database
-- Kenya	1997, 2005	International Income Distribution Database
-- Tanzania	2000, 2009	International Income Distribution Database
-- Ethiopia	1995, 2005	International Income Distribution Database
	Political Stability	
Freedom house index	1980-2010	Freedom House
	Comparative analysis	
Demographics	1966, 1990, 2010	World Development Indicators
Labor force participation (Hong Kong)	1966, 1990	Young (1995)
Data on Taiwan	1966, 1990, 2010	Taiwan Statistical Data Book
Education	1965, 1990, 2010	Barro-Lee

Table 2. Comparisons of Selected Economic Indicators over Time

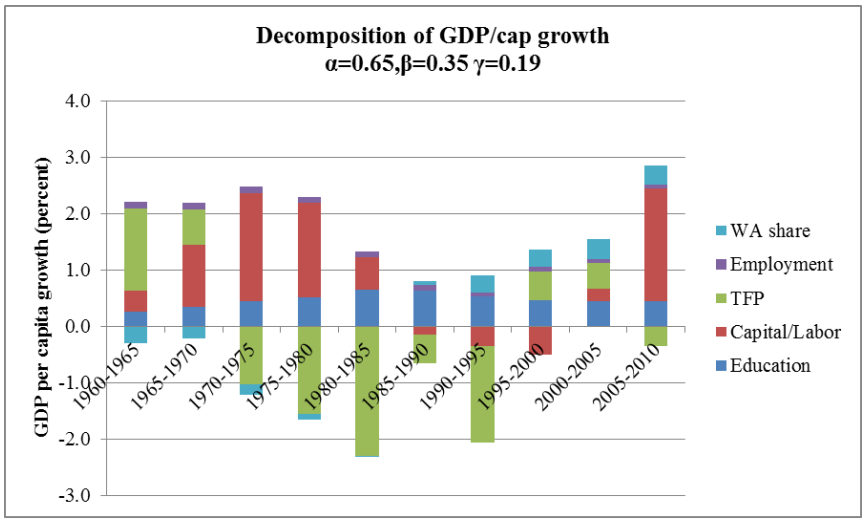
Period	1966	1990	2010	1966	1990	2010	1966	1990	2010	1966	1990	2010
East Asian Countries (Young)		Korea			Hong Kong			Singapore			Taiwan	
GDP per capita (2000 US dollars)	1,487	6,895	16,219	5,538	20,424	36,208	3,010	15,788	32,641	1,020	9,857	13,643
GDP growth		8.54%			7.45%			9.32%			8.60%	
GDP per capita growth		6.78%			5.48%			7.23%			6.80%	
Fertility	4.99	1.59	1.23	4.25	1.27	1.13	4.50	1.87	1.15	-	-	-
Life expectancy	57.7	71.3	80.6	70.0	77.4	83.0	67.3	75.6	81.5	-	73.5	79.2
Working age share	53.5%	69.4%	72.4%	57.5%	69.8%	75.8%	54.2%	72.9%	73.6%	52.5%	66.7%	73.6%
Labor Force Participation rate	53.6%	60.7%	65.0%	66.1%	70.2%	68.1%	63.5%	70.7%	72.8%	58.2%	59.2%	58.1%
Years of schooling	5.5	10.3	11.9	5.7	9.4	10.4	4.3	6.6	9.1	5.4	8.7	-
Investment/GDP	22.5%	37.5%	29.5%	27.6%	27.2%	23.9%	21.7%	35.1%	22.1%	9.0%	21.0%	22.1%
Emerging countries		China			India			Malaysia			Brazil	
GDP per capita (2000 US dollars)	108	392	2,427	189	316	804	1,013	2,593	5,169	1,579	3,353	4,717
GDP growth		10.15%			6.53%			6.07%			3.10%	
GDP per capita growth		9.22%			4.73%			3.70%			1.75%	
Fertility	5.91	2.34	1.60	5.75	3.92	2.63	5.57	3.51	2.64	5.66	2.81	1.83
Life expectancy	54.2	69.5	73.3	46.5	58.4	65.1	62.3	70.1	74.0	57.1	66.3	73.1
Working age share	56.1%	66.0%	72.4%	55.1%	58.3%	64.5%	50.6%	59.3%	64.9%	53.1%	60.4%	67.5%
Participation rate	86.3%	85.4%	80.4%	65.9%	63.3%	57.7%	64.1%	65.3%	62.8%	63.8%	69.4%	74.8%
Years of schooling	2.7	5.6	8.1	1.3	3.4	5.2	3.4	7.0	10.2	2.4	4.6	7.6
Investment/GDP	27.1%	36.1%	48.2%	16.5%	24.9%	37.0%	17.7%	32.4%	23.1%	19.9%	20.2%	20.2%
African countries		South Africa			Ghana			Ethiopia			Nigeria	
GDP per capita (2000 US dollars)	2,749	3,152	3,753	266	221	360	na	128	219	293	359	541
GDP growth		2.54%			4.99%			5.59%			4.78%	
GDP per capita growth		0.75%			2.38%			2.76%			2.27%	
Fertility	5.89	3.66	2.46	6.94	5.62	4.17	6.88	7.08	4.19	6.34	6.40	5.53
Life expectancy	51.4	61.5	52.1	47.6	56.8	63.8	41.7	47.0	58.7	40.7	45.6	51.4
Working age share	54.2%	57.9%	65.2%	52.8%	53.0%	57.6%	53.8%	52.1%	55.2%	54.4%	52.0%	53.8%
Participation rate	50.2%	48.9%	55.2%	72.8%	75.1%	70.4%	80.6%	85.7%	85.8%	58.0%	58.1%	55.5%
Years of schooling	4.5	6.8	8.5	2.2	5.9	7.3	0.2	1.3	2.6	1.2	2.6	4.4
Investment/GDP	24.0%	17.7%	19.3%	12.9%	14.4%	28.0%	15.8%	12.9%	24.7%	13.2%	5.5%	10.9%*

* value of 2008

Source: Taiwan - Taiwan Statistical Data Book, 2012 and Young (1994)

Appendix

Figure A1. Sensitivity Tests



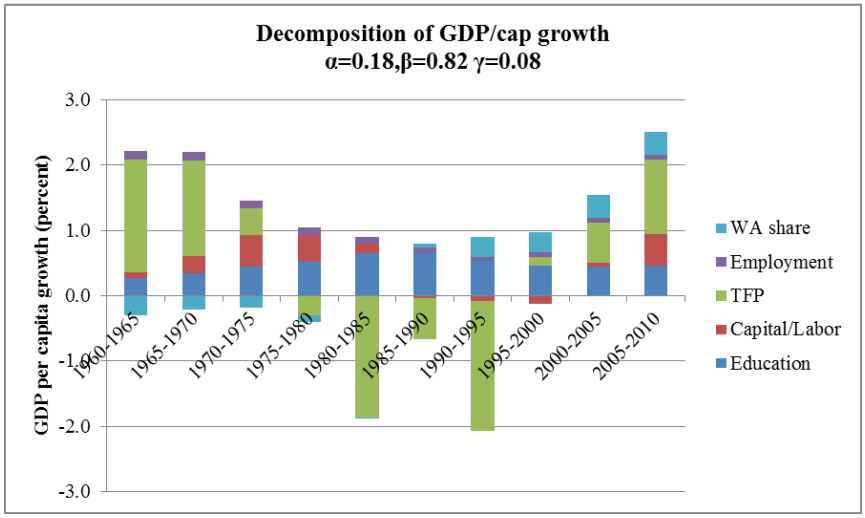


Figure A2. Trend of Net Export by Resource Wealth

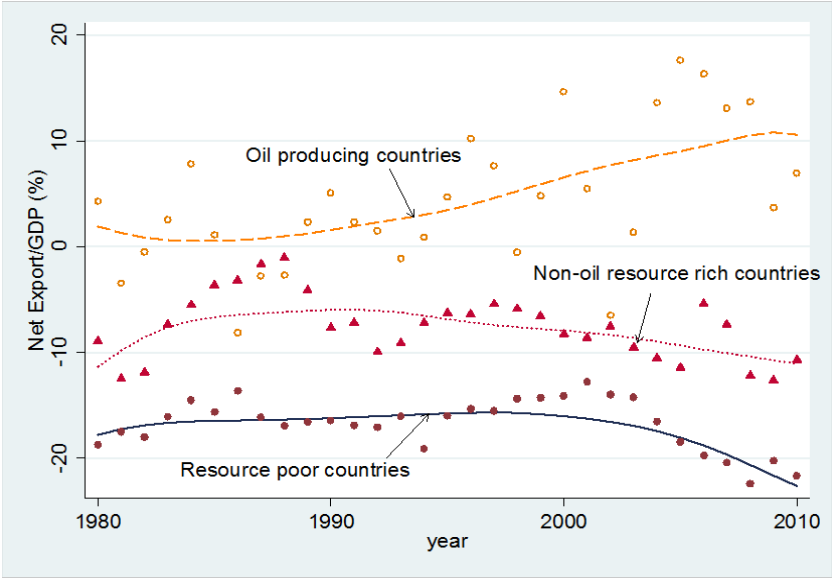


Table A1. List of Countries by Type

Country Type		Countries
Fertility	Low	Botswana, Gabon, Lesotho, Mauritius, South Africa, Zimbabwe
	Medium	Burundi, CAR, Cote d'Ivoire, Cameroon, Congo, Ethiopia, Ghana, Kenya, Madagascar, Mauritania, Togo
	High	Benin, Burkina Faso, Mali, Mozambique, Malawi, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Chad, Tanzania, Uganda, DRC, Zambia
Resource	Oil	Cameroon, Congo, Gabon, Nigeria, Chad
	Non-oil	Botswana, DRC, Ghana, Liberia, Mali, Mauritania, Mozambique, Sierra Leone, South Africa, Tanzania, Zambia, Zimbabwe
	ResourcePoor	Benin, Burkina Faso, Burundi, CAR, Cote d'Ivoire, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Niger, Rwanda, Senegal, Sierra Leone, Uganda, Togo
Political stability and freedom	Stabilized	Burkina Faso, CAR, Congo, Ethiopia, Tanzania, Ghana, Lesotho, Malawi, Mali, Mozambique
	No change (or downgraded)	Botswana, Burundi, Benin, Cote d'Ivoire, Cameroon, Chad, DRC, Gabon, Kenya, Madagascar, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Table A2. Growth Accounting Results: by Fertility Level

Period	GDP growth	Population growth	GDP per capita Growth	Output per worker growth	LFP growth	Working age share growth	Output per worker growth	Education	Capital/Labor	TFP
A. Low Fertility										
1960-1965	6.498	2.067	4.431	4.519	0.264	-0.353	4.519	0.432	0.886	3.202
1965-1970	4.870	2.025	2.845	2.453	0.248	0.144	2.453	0.538	1.603	0.312
1970-1975	9.339	2.339	6.999	6.541	0.233	0.226	6.541	0.535	2.631	3.375
1975-1980	5.617	2.593	3.024	2.574	0.219	0.231	2.574	0.630	2.523	-0.579
1980-1985	4.229	2.507	1.722	1.342	0.207	0.174	1.342	1.005	1.110	-0.773
1985-1990	4.592	2.276	2.315	1.901	0.196	0.219	1.901	1.082	0.575	0.243
1990-1995	3.286	2.196	1.089	0.355	0.183	0.552	0.355	1.028	0.802	-1.475
1995-2000	3.925	1.977	1.948	1.194	0.123	0.631	1.194	0.467	0.502	0.224
2000-2005	3.268	1.344	1.924	1.510	-0.260	0.674	1.510	0.693	0.449	0.368
2005-2010	3.473	1.194	2.278	1.662	-0.069	0.686	1.662	0.631	0.528	0.502
B. Mid Fertility										
1960-1965	4.626	2.521	2.105	2.354	0.143	-0.392	2.354	0.308	0.231	1.815
1965-1970	4.828	2.806	2.022	2.157	0.135	-0.270	2.157	0.393	0.303	1.461
1970-1975	3.576	2.742	0.833	0.981	0.127	-0.275	0.981	0.628	0.434	-0.081
1975-1980	3.543	2.748	0.794	0.767	0.120	-0.092	0.767	0.692	0.709	-0.633
1980-1985	2.294	3.175	-0.881	-1.089	0.112	0.095	-1.089	0.635	0.412	-2.136
1985-1990	2.252	2.940	-0.688	-0.906	0.102	0.116	-0.906	0.571	-0.037	-1.441
1990-1995	0.793	2.722	-1.929	-2.264	0.045	0.290	-2.264	0.518	-0.595	-2.187
1995-2000	2.919	2.508	0.411	0.033	0.051	0.327	0.033	0.473	-0.223	-0.217
2000-2005	2.881	2.396	0.485	0.034	-0.020	0.470	0.034	0.382	-0.073	-0.275
2005-2010	4.474	2.386	2.088	1.431	0.139	0.518	1.431	0.365	0.796	0.269
C. High Fertility										
1960-1965	3.385	2.376	1.009	1.092	0.073	-0.157	1.092	0.153	-0.070	1.010
1965-1970	3.928	2.540	1.388	1.615	0.068	-0.294	1.615	0.206	0.430	0.979
1970-1975	2.212	2.673	-0.461	-0.269	0.063	-0.255	-0.269	0.288	0.778	-1.334
1975-1980	2.603	2.767	-0.164	0.015	0.058	-0.237	0.015	0.318	0.432	-0.735
1980-1985	0.602	2.716	-2.114	-1.967	0.054	-0.200	-1.967	0.510	-0.008	-2.469
1985-1990	2.749	2.799	-0.051	-0.018	0.051	-0.085	-0.018	0.497	-0.310	-0.204
1990-1995	0.702	2.072	-1.370	-1.624	0.043	0.210	-1.624	0.320	-0.273	-1.671
1995-2000	3.701	2.954	0.747	0.546	0.065	0.136	0.546	0.426	-0.559	0.679
2000-2005	5.886	2.932	2.954	2.769	0.058	0.128	2.769	0.408	0.188	2.173
2005-2010	6.125	2.794	3.331	3.183	0.056	0.092	3.183	0.451	1.153	1.579