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Is the Senegalese accelerated growth strategy pro-poor?

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The main purpose of Senegalese accelerated growth strategy (AGS) is to boost economic growth so as to make poor people share its benefits. In any given economy, there is a relationship between growth, poverty reduction and income distribution. In this paper, based on a dynamic computable general equilibrium model and pro-poor measures, the author experiment the quality of AGS pattern. It turns out that growth generated by AGS is not pro-poor. However, its path is better for poor people than the one generated by the "business as usual" growth pattern.

Key words: Dynamic CGE model, poverty, inequality.

INTRODUCTION

Like many developing countries, Senegal has developed an accelerated growth strategy (AGS) to increase the wealth creation while making it more beneficial to the poor. Its aim is to accelerate growth by making it beneficial to the poor, and expanding its bases for removal of random shocks. One of the major objectives of this strategy is the doubling of GDP per head in 15 years. The implementation of AGS raises the question of the relationship between the nature of growth and development of the incidence of poverty. From the past growth trend, it appears that, while real GDP was growing faster after 1994 CFA adjustment, the rate of poverty decrease was quite low. This growth path was characterized by high inequality level even if it's slightly decreasing. With the establishment of frameworks against poverty and the production of Poverty Reduction Strategy Papers (PRSP) incorporating the Millennium Development Goals (MDGs), a consensus was reached on the need of a redistributive content of policies or economic growth strategies.

However, although necessary, it is not a sufficient condition to ensure poverty reduction (Mourji et al., 2006). Indeed, countries that have combined rapid growth with good income redistribution have reduced poverty more quickly. However, when growth is accompanied by an accentuation of inequality in income distribution, its impact on poverty is limited and/or even negative. Similarly, when redistributive policies negatively affect growth, their impact on growth reduction is limited or

even negative (UNDP, 2003). Therefore, taking into account the relationship between growth and income distribution is central to any strategy to ensure equitable growth.

Because of the globalization, the debate on the relationship between growth, inequality and poverty has been revived. For some authors, poverty has declined, or declined slightly in developing countries (Bhalla, 2002; Chen and Ravallion, 2001). For others, it has increased (UNCTAD, 2002). The levels of inequality have increased according to some (International Forum on Globalization, 2001) or decreased or stagnated, according to others (Bhalla, 2002; Dollar and Kraay, 2000). According to Dollar and Kraay (2000) who have studied 80 developed and developing countries, the average income of poor people has grown at the same rate as the GDP per capita over the last four decades.

Economic growth during this period did not affect the income distribution but has even produced proportional gains between the poor and non poor. These authors concluded that it is not necessary for governments to pursue pro-poor growth policies but just put in place reforms that will lead to a macroeconomic growth framework. However, favorable political reforms do not all contribute to poverty reduction, because of the heterogeneous distribution of income and the growth impact. It is possible that rapid economic growth increases poverty. As noted by Bhagwati (1988), an impoverishing growth mechanism can prevail when the increase in inequality is
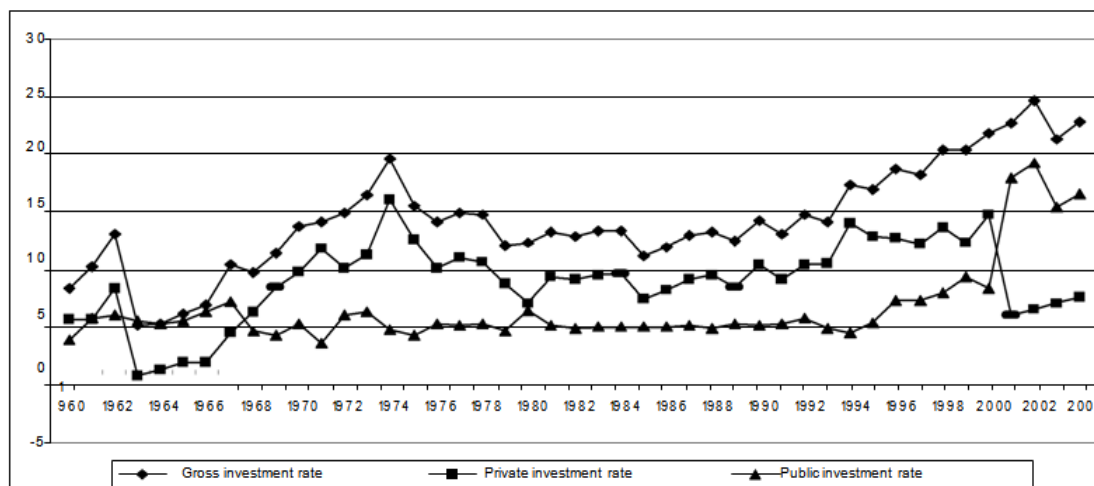
Figure 1. Investment rate pattern.
Source: Calculations based on data from the DPS.

so strong that the positive impact of wealth creation is more than offset by the negative effect of the increase in inequality.

In recent literature, two approaches are generally used to define the pro-poor growth concept. The first one, which is a relative definition, compares the poor income variation to non-poor. Under this definition, growth is pro-poor when changes in income distribution favor relatively the poor (Klasen, 2003; Kakwani and Pernia, 2000; McCulloch and Baulch, 1999; Kakwani and Son, 2002). The second approach called absolute growth is characterized pro-poor if and only if, in absolute terms, the poor benefits from it (Ravallion and Chen, 2003; Kraay, 2003). In this case, the growth pro-poor nature will depend on the poverty rate change which is determined by both the growth rate and income distribution. The subtext underlying this definition is the search for poverty reduction, the highest possible, through growth and a gradual change in income distribution. Beyond those approaches, the authors have built indexes to measures the content of growth. It is rather possible to assess the impact of growth on poverty by decomposing the variation of this latter in "growth" and "redistribution" components (Kakwani, 1997; Kolenikov and Shorrocks, 2001) on which a residue could be added (Datt and Ravallion, 1992). But approaches to measuring pro-poor growth's content developed by Ravallion and Chen (2001, 2003), Kakwani and Pernia (2000) and Kakwani and Son (2002), can establish a closer link between growth and poverty. Ravallion and Chen (2001) define an index of pro-poor growth from the growth incidence curve (CIC) which indicates how the growth rate of median income for a given quintile varies across quintiles and according to different levels of income / expenditure. Kakwani and Pernia (2000) and Kakwani and Son (2002) have also defined the measurements of the pro-poor

growth index in such a way that is also proposed by Ravallion and Chen (2003). The aim of this paper is to assess if Senegalese accelerated growth strategy which is focused on a set of so-called priority sectors, is likely to generate pro-poor growth. After this introduction, part 1 will analyze the reasons and justification of the Strategy. In part 2, the methodology and data sources are specified and the results presented in part 3.

GROWTH, POVERTY AND INEQUALITY IN SENEGAL: SOME FACTS

Despite long adjustment efforts that began in the late 70s and culminated in the devaluation of the CFA franc in 1994, the investment rate has remained relatively low in Senegal during the 1960 -1994 periods. During the years of commodities price increase (1973 -1974), the rate peaked at 20% before falling. The post-devaluation period led to record a shift in the investment effort (Figure 1). A clear break is observed from 1999. Indeed, the investment rate rose sharply from 20% to almost 25% between 1999 and 2002.

This increase is mainly drained by the effort of public investment whose rate increased from 9 to 19% during the same period. However, the private investment rate has decreased between 2000 and 2001. From 14% in 2000, this rate was estimated at 5% in 2001. A low increase of this investment category is then observed. In 2004, the rate is 8%. Whether or not due to a slight reflux of the public investment the overall investment rate has slightly decreased while remaining at a very significant level in 2004 (23%).

Consequently, economic growth remains structurally weak during the 1960 -1979 and1980 -1994 periods, with respectively an average of 2.2 and 3%. This rate was

Table 1. Incidence of households' poverty by place of residence (in %).

Year	Dakar	Other cities	Rural areas	Total
2001	33.3	43.3	64.9	48.5
1994	49.7	62.6	61.7	61.4
Gap	-32.9	-30.8	5.1	-21.0

Source : DPS, 2004.

below the population growth rate estimated at 2.7%, representing an average decrease of 0.2 and 0.9% of the GDP per capita during these two periods. After the devaluation, it was noted that economic activity growth rate was stronger than the population's. Indeed, while the rate of population growth was estimated at 3%, the growth rate over the1994 - 2000 and 2001 - 2003 periods is estimated respectively at 4.9 and 4.7%. Accordingly, the GDP per capita has increased by 2.1 and 4.2% during these periods. The households' poverty incidence shifted from 61.4% in 1994 to 48.5% in 2001, according to the extrapolations from the unified development indicators survey (Quid - DPS, 2004). Overall, the rural area is the main poverty focus in Senegal. The poverty reduction between 1995 and 2001 was accompanied by an improvement in income distribution (Table 1). The Gini coefficient which measures the degree of inequality in income distribution, increased from 0.386 in 1995 to 0.374, in 2001 (Senegal, 2004). The desire to consolidate and improve the growth profile is mainly responsible for the policymakers' willingness to implement an accelerated growth strategy.

METHODOLOGY AND DATA

This part describes the model and outlines the measures of pro-poor growth, while specifying the data sources.

The model

In many countries, general equilibrium models are used extensively for the analyses of economic policies and external shocks. They can assess the impacts of economic policies taking into account the important effects of interactions they induce in the economy. In the past, many general equilibrium models have been developed and applied in Senegal in order to analyze a wide range of policies[i1]. However, most of them are static models, except the one developed by Dumont and Mesplé-Somps (2001). The dynamic model presented below[2] has been constructed based on the Exter-DS model developed by Annab et al. (2004).

A set of features such as the inclusion of public capital, the introduction of a function of total productivity factor, the function specification of labor demand, the specification of the labor market marked by the introduction of a curve, and the integration of a function of export demand have been added to the recursive dynamic model, which means that it is solved as a sequence of

static equilibrium connected through time, through the accumulation of capital and increased labor and behavioral equations for endogenous variables. Its dynamics is on assumptions of growth rates for exogenous variables such as labor supply, government spending, transfers, but also behavioral endogenous savings and investment of economic agents. One of the advantages of a dynamic model specification is the ability to generate a path in the medium and long terms.

Furthermore, structural changes can be analyzed over time. The model is applied to a small economy for which world prices are given. There are four types of factors of production (skilled labor, unskilled labor, private capital and public capital) and three categories of institutions (households, firms, government and rest of world). One feature of this model is the segmentation of the labor market and the introduction of endogenous unemployment. The wage curve approach developed by Blanchflower and Oswald (1994) is used to model the labor market where the existence of unemployment in the segment of skilled labor was assumed. Workers in this segment are traditionally used in the modern sector - or formal - where there is relative rigidity in the wage determination. The wage rate evolves according to the behavior of the labor market and the situation described by the wage curve. It shows a negative relationship between levels of unemployment[3] and wages but reflects the fact that areas (or sectors) characterized by high unemployment rates are associated with low wages, while those with low underemployment are marked by high levels of wages. In the segment of unskilled labor, workers are generally in the informal sector. The wage rate is assumed to be determined by the interplay of supply and demand. Thus, in this market, the resulting balance of equality between the supply and demand of unskilled labor, determines the wage rate.

The added value (VA_{tr}^t) is shown as a *Constant Elasticity Substitution* (CES) which combines work composite (LD_{tr}^t) and the composite capital (KCF_{tr}^t) in the trade sectors:

$$VA_{tr}^t = A_{tr}^{KLt}\left[\alpha_{tr}^{KL}LD_{tr}^{t\,-\rho_{tr}^{KL}} + \left(1-\alpha_{tr}^{KL}\right)KCF_{tr}^{t\,-\rho_{tr}^{KL}}\right]^{-1/\rho_{tr}^{KL}}$$

The composite labor demand (LD_{tr}^t) is a function of Cobb-Douglas which combines different forms of work ($FD_{i,L}^t$):

$$LD_{tr}^t = A_i^{lb}\prod_L FD_{i,L}^{t\,\rho_L^i}$$

The composite capital (KCF_j^t) is a Leontief type function

[1] See : Dissou, 2000 ; dumont and Mesple-Somps, 2001 ; Deculuweet al. 2001; Diagne et al., 2003; Boccanfuso, Cabral and Savard. 2008; Cabral, 2005; Fofana et al., 2006, 2007, Diagne, Cisse and Cab et al.al, 2005.
[2] See Annex A.2 for a detailed description

[3] According to the World Bank's estimates (2007), the unemployment rate for Senegal is 13% in Senegal.

combining fixed share of private capital ($KDpriv_j^t$) and public capital ($KDpub_j^t$), under the complementarity scope of these two types of factors:

$$KCF_j^t = \min\left[\frac{KDpriv_j^t}{u\_k_j}, \frac{KDpub_j^t}{n\_k_j}\right]$$

In the no-trade sector, the added value (VA_{ntr}^t) is a CES function that combines labor composite (LD_{ntr}^t) and public capital ($KDpub_{ntr}^t$):

$$VA_{ntr}^t = A_{ntr}^{KLt}\left[\alpha_{ntr}^{KL} LD_{ntr}^{t\,-\rho_{ntr}^{KL}} + \left(1-\alpha_{ntr}^{KL}\right)KDpub_{ntr}^{t\,-\rho_{ntr}^{KL}}\right]^{-1\!/\rho_{ntr}^{KL}}$$

In the trade sectors, the stock of the total public capital creates for each productive activity, a positive externality (A_{tr}^t) which affects the sector of total productivity factor (PGF). This PGF depends on the ratio between the total public capital and private capital sector, $\left(\dfrac{KDpubG^t}{KDpriv_{tr}^t}\right)$ the elasticity of the PGF in this report and the scale parameter of (A_{tr}^t):

$$A_{tr}^t = \overline{A_{tr}^t}\left(\frac{KDpubG^t}{KDpriv_{tr}^t}\right)^\varepsilon$$

The sectorial private capital stock for the following period ($KDpriv_j^{t+1}$) is equal to the stock of the previous period ($KDpriv_j^t$) with net capital depreciation at a *dep* rate added to the investment flows for the period (IND_j^t):

$$KDpriv_j^{t+1} = KDpriv_j^t(1-dep) + IND_j^t$$

The sectorial rates of accumulation of private capital ($IND_j^t / KDpriv_j^t$) is supposed to be an increasing function of the capital cost-benefit (r_j^t / uc_t), the latter moving at a decreasing rate:

$$\frac{IND_j^t}{KDpriv_j^t} = g1_j\left(\frac{r_j^t}{uc_t}\right)^2 + g2_j\left(\frac{r_j^t}{uc_t}\right)$$

The public capital stock for the t+1 period (KDpubt+1j) is equal to the stock of period t (KDpubtj) net of consumption of fixed capital plus the volume of public investment allocated to the sector during period t (INGtj) :

$$KDpub_j^{t+1} = KDpub_j^t(1-dep) + ING_j^t$$

The flows of public investment destination (ING_{tr}^t) represent a proportion of the flow of private investment destination (IND_{tr}^t):

$$ING_{tr}^t = b * IND_{tr}^t$$

They are a part (mu_e) disposable income of state
They show the complementarity that exists between these two types of investment in the trade sectors. In the non-trade sector, the destination of the flow of public investment (ING_{ntr}^t) depends on the state budget. They are on one part (mu_e) income at the state's disposal:

$$ING_{ntr}^t = \mathrm{mu\_e}_{ntr} * YD_{GOV}^t$$

The value of investments by destination is equal to the total investment value by origin:

$$IT_t = pk_t\left(\sum_j IND_j^t + \sum_j ING_j^t\right)$$

The average price of capital is a weighted sum of consumer prices, the aggregate weight being the relative part of the demand of goods or services *i* in the global investment demand (origin):

$$pk_t = \sum_i pc_i^t * v_i$$

The user cost of the capital is equal to the average price of the *pk* capital which multiplies the amount of the interest rate (*ir*) and depreciation (*dep*):

$$uc_t = pk_t * (ir + dep)$$

To take into account the constraints of Senegalese exporters on the foreign market, the author is proposing an export demand function in the model which depends on the relationship between the world and FOB prices. Indeed, local producers are obliged to reduce their export prices in order to increase their market share abroad[4].

Apart from these specifications, other equations specified in the model are standard ones. In the closure process of the model, the current balance is fixed avoiding then the situation where an influx of capital would finance domestic policies.

Therefore, an increase in imports, a group of goods and services requires an increase in exports of other groups of goods and services, so as to maintain the stability of the account balance. The exchange rate and stock variations are fixed. The savings-investment balance is achieved through the introduction of an indirect endogenous tax allowing the state to collect additional resources needed for investment.

Savings rate of other institutions is fixed. Public spending is assumed fixed in real terms during the first period. However, they increase at the same pace as the population. It is the same for budgetary savings, remittances and labor supply which grow at the

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[4] In the case of Senegal, agricultural products and those of other industries are facing strong competition from foreign markets

same rate as the population. Therefore, these variables and the minimum consumption are set in the first period.

Measures of the pro-poor growth

In this sub-section, the method of poverty decomposition into growth and redistribution, and the impact measures of a pro-poor growth will be discussed.

Growth-redistribution decomposition

In analyzing the sources of variation in poverty, the question that arises is how much of this change can be attributed to changes in income distribution, as opposed to the change in the income variation. It is possible to decompose any change in measured poverty in order to quantify the relative importance of distribution and higher living standards.

Two methods are commonly used to assess the relative contributions of growth and redistribution in the modification of poverty: the one of Datt and Ravallion (1992) and the one of Kakwani (1997) and Shorrocks and Kolenikov (2001). For Datt and Ravallion's approach (1992), the decomposition of changes in the level of poverty is the sum of input growth (change in poverty that would be observed if the Lorenz curve had not moved), a contribution of redistribution (change that would occur if the average had not moved) and a residue (interaction between the effects of growth and redistribution). $P(z/\mu, L)$ is the measured poverty level when the distribution of living standards has a μ average and an L Lorenz curve. The change in poverty between the dates t and $t+n$ can be decomposed as follows:

$$P_{t+n} - P_t = G(t, t+n; r) + D(t, t+n; r) + R(t, t+n; r),$$

Poverty modification growth contribution distribution contribution residue the growth and redistribution contributions are defined by:

$$G(t, t+n; r) = P(z/\mu_{t+n}, L_r) - P(z/\mu_t, L_r)$$

$$D(t, t+n; r) = P(z/\mu_t, L_{r+n}) - P(z/\mu_t, L_r),$$

Whereas R is the residue and the reference period $r=t$,

$$R(t,t+n,r)=G(t,t+n,t+n)-G(t,t+n,t)=D(t,t+n,t+n)-D(t,t+n,t)$$

The residue can be interpreted as the difference between the growth components (redistribution) evaluated for the initial and final Lorenz curves (income average). The residue disappears when the average income or the Lorenz curve does not change during the decomposition, or when dealing with the initial and final years. This approach is used by Kakwani (1997) and Shorrocks and Kolenikov (2001). Changes in poverty can then be decomposed as follows:

$$P_{t+n} - P_t = \qquad \widehat{G}(t, t+n) \qquad + \qquad \widehat{D}(t, t+n).$$

Poverty modification   Growth contribution   Redistribution contribution

The growth contribution is an average effect of growth, when the initial distribution remains unchanged and when it is assumed that the final distribution is fixed. As for the redistribution component, it is an average of the redistribution effect when it is assumed that the initial average income remains unchanged, and the final period's average it fixed. Kakwani (1997) defines an average effect "growth"

and "redistribution" as:

$$\widehat{G}(t,t+n) = \frac{1}{2}[P(z,\mu_{t+n},L_t) - P(z,\mu_t,L_t) + P(z,\mu_{t+n},L_{t+n}) - P(z,\mu_t,L_{t+n})]$$

$$\widehat{D}(t,t+n) = \frac{1}{2}[P(z,\mu_t,L_{t+n}) - P(z,\mu_t,L_t) + P(z,\mu_{t+n},L_{t+n}) - P(z,\mu_{t+n},L_t)]$$

Even when it is assumed that inequality and poverty vary in the same direction, the observed change in the Gini index may be a poor indicator of the poverty quantitative effects.

Measurement of the impact of pro-poor growth

The analysis of the growth rate of income or expenditure per capita of the poor is a more direct assessment of the impact of growth on poverty. To assess the pro-poor or non pro-poor nature of growth, several indexes built by Kakwani and Pernia (2000), Kakwani and Son (2002) and Ravallion and Chen (2003) was used.

Pro-poor growth index

This index was built by Kakwani and Pernia (2000) who assume that growth is pro-poor when the poor reap the benefits of growth more proportional than the non-poor. Suppose that δ is the overall elasticity of poverty to growth, it means that a change in poverty is due to change in growth. H is the elasticity of poverty with increased growth, when it is assumed that there is no change in income distribution. The index of pro-poor growth (PPGI) is defined as the following ratio:

$$PPGI = \frac{\delta}{\eta}$$

This ratio is greater than 1 when the growth scenario is pro-poor. Growth is called pro-poor when the change in inequality that accompanies it reduces global poverty. Therefore, growth is pro-poor when the poverty total elasticity is greater than the elasticity of poverty growth. However, this index does not increase when the poverty reduction rate is higher. It captures the distribution of the growth benefits among poor and non poor. It does not reflect the current level of growth, since changes in poverty also depend on the growth effect.

Growth poverty equivalent ((PEGR[5]) built by Kakwani and Son (2002) is an alternative measure of pro-poor growth which tries to overcome the limitations of the pro-poor growth index defined by Kakwani and Pernia (2000). The PEGR index is defined as the growth rate that will lead to poverty reduction in the same magnitude as that obtained with the growth rate, when it is assumed that the income distribution is the same, that is to say, when each member of the society receives the same proportion of the growth benefits. The PEGR index is defined as the product of the pro-poor growth index ($\frac{\delta}{\eta}$ or ϕ) and the average income growth rate (γ):

$$\gamma^* = (\frac{\delta}{\eta})\gamma = \phi\gamma$$

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[5] Poverty equivalent growth rate

This equation implies that growth is pro-poor (anti-poor), if $\gamma*$ is higher (lower) to γ. If $0 < \gamma* < \gamma$, inequalities will be raise but the poverty rate will decrease. The PEGR index is close to the one developed by Ravallion and Chen (2003) from the regular rate of growth approach. Absolute pro-poor growth rate *(RPPG)* was defined by Ravallion and Chen (2003) to be the area that goes from below the growth incidence curve to the level of the poverty incidence index of the period of reference. The pro-poor growth index is then defined as the ratio of the change in total poverty, over time, with that obtained in the absence of a change in income distribution multiplied by the growth rate of the average income:

$$g_t^p = \frac{dW_t}{dW_t^*}\gamma_t,$$

Where g_t^p is the country's pro-poor growth rate in a *t* period, dW_t, the global change in poverty, dW_t, the change in poverty that would have prevailed in the absence of a change in income distribution, and y_t is the change in global income at the *t* period. This equation can be interpreted as the average growth rate that allows us to see if the changes in income distribution are pro-poor or not. However, it should be noted that the extent of the pro-poor growth refined by Ravallion and Chen (2003) is deducted from the average growth rate of each percentile. If the changes in distribution occur in favor of the poor, then the pro-poor growth rate is higher than ordinary income growth rate. If changes in income distribution are against the poor, then the pro-poor growth rate is lower than the ordinary income growth rate.

Data

The structure of the Senegalese economy, for the referenced period, is represented by the Social Accounting Matrix (MCS) of 2004. This is an aggregated version of the MCS 35 accounts, built by Ford and Cabral (2007). It was developed based on data from the 2004 input-output table (TES), the products balance table of resources (TAR), the State's table of financial operations (TOFE), and the 2004 Balance of payments table. The MCS consists of 13 sectors: agriculture and agro-industry, fisheries, aquaculture, mining, textiles, other industries, electricity, gas, water, construction, trade, repairs, transport, tourism, financial services, banks, insurance, Information communication technologies, real estate and non-market services. Households' information is taken from the ESAM II survey (Senegal, 2001).

SIMULATION AND RESULTS

The Senegalese accelerated growth strategy is simulated as proposed by policymakers. This strategy rests on two pillars: the establishment of a business environment class and the identification and promotion of pro-growth clusters. Typically, a cluster consists of leading sectors in contact with the markets, activities in support of firms and basic economic infrastructure. The selection of priority areas from the approach based around clusters was performed using the following criteria: the growth potential in the medium and long terms; the potential in terms of added value; the potential in terms of international competitiveness, the export potential and potential of new jobs creation. Based on this approach, five clusters were selected in Senegal: agriculture and

agro-industry, seafood and aquaculture, textiles and clothing; the Information Technology and (ICT) and tele-services, tourism, crafts and cultural industries. The AGS is trying to consolidate the renewed growth recorded by the Senegalese economy after the 1994 currency adjustment measure.

After an analysis of the strategy's macroeconomic and sectorial impacts, the author assess its impacts on poverty and income distribution. In a static model, the analysis is conducted by comparing the shocks' results to the baseline as traced by the MCS. In the opposite, for a dynamic model, the economy grows even in the absence of a shock. Therefore, the shocks are analyzed in reference to the growth path followed by the economy, in the absence of any shock (business as usual scenario). The implementation of the SCA will result in an investment planning of a group called priority sectors. It will change the production remuneration factors' due to the entailed effects of accumulation and redistribution. Consequently, the nominal income of households will vary according to their production factors endowments. The evolution of consumer prices will depend, on one hand on a combination of price change and volume of domestic sales, and on the other hand, on imports and households' consumption. The net effect on the household situation will depend on their initial position vis a vis of the poverty line and the combined effects of changes in income and consumer prices.

Poverty and inequalities situation in the BAU scenario

A table of the state of poverty and inequalities is prepared as a reference for the *business as usual* scenario (BAU) (for the initial and final periods, 2004 and 2023). The rural area is the main focus of poverty (Table 2). Poverty incidence is computed based on Foster-Greer-Thorbecke index. The value of poverty line is given by the one the Senegalese households surveys which is 879 cfa francs in Dakar, 712 cfa francs in the other urban cities and 497.9 cfa francs in rural areas (Senegal, 2001). The Gini index, calculated at the inter-group, is 0.442 in 2004. The effects of accumulation and redistribution, as captured by the dynamics of the economy, contribute to poverty reduction. In contrast, the Gini coefficient rose from 0.442 in 2004 to 0.461 in 2023. Consequently, income distribution has worsened.

Impacts of the accelerated growth strategy

According to AGS, public investment is set to so call priority for each year of the sub-period 2009 -2012[6]. That's this amount of public capital flows that is directly set in the model for the sub-period 2009-2012. This

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[6] The first sub period was 2007-2010

Table 2. Situation of poverty in the period of reference (in %).

Households	2004			2023		
	Incidence	Depth	Severity	Incidence	Depth	Severity
Dakar	30.58	8.32	3.20	2.44	0.38	0.10
ACU	39.05	11.49	4.76	10.87	2.42	0.84
Rural	52.21	15.37	6.27	16.62	3.57	1.16
Senegal	44.05	12.79	5.18	11.83	2.52	0.82

Source: Calculations based on the simulation results.

Table 3. Distribution of investment cluster (in millions FCFA).

Public investments flow	Agriculture and agro-industry	Fisheries-aquaculture	Textile	Post-Communication and information technologies de	Tourism
Year 1	8600	16965	5380	8395	51090
Year 2	8600	14563	6550	35835	87270
Year 3	8600	15618	1500	37335	166170
Year 4	8600	9285	1000	16335	82020

Source : Permanent Secretariat SCA (2007).

means that within this period, public capital is supposed to follow the one planned by policy makers as a part of the Accelerated Growth Strategy for the 2009 -2012 sub-periods. For the other sub-period, the flows of public capital are supposed to be linked to the one of private capital which depends to the market rules. Table 3 shows the public investment distribution within sectors during the sub-period.

The observed changes in the rate of capital accumulation generate effects of reallocation and accumulation, tracked by changes in the price of added value and compensation factors. The accumulation of public capital is assumed to be planned and, therefore, set for the priority sectors in the sub-period 2007-2010. The private capital rate of accumulation depends on market conditions. On the market, labor is traded on the qualified market and not the unqualified one. The offer is specific to each type of work. The unskilled labor demand grows at the same rate as population, while the demand of skilled labor is progressing at the same rate as the school enrollment rate[7].

If capital is specific, skilled labor and unskilled labor is mobile and will move to expanding sectors. Unskilled labor is concentrated mainly in the business of agriculture and agro-industry, trade and repairs, real estate. In the initial period, their share was 55, 17 and 8% in wages paid to unskilled workers. Therefore, the variations in the price of added value in these activities will determine the

evolution of wage rates of unskilled workers. The pay rate of skilled workers will be mainly influenced by the price value of non-market services, real estate and trade and repairs. These sectors contributed respectively 29, 21 and 17% of wages paid to workers. With the exception of non-market sectors, each sector uses two types of capital: private capital and public capital. The bulk of private capital is used by the trade and repairs sector (22%), housing (17%), manufacturing (13%) and tourism (11%). The price of private capital will depend in large part on the price changes of added value in these sectors. The demand for public capital is not determined by market rules but the change of price is assumed to depend on that of the index price. With the implementation of the Accelerated Growth Strategy, the added value price increases in the sectors of trade, repair, real estate, factories in the first half of the period of formal implementation of the SCA and induces a higher return on private capital (Figure 2). It then falls during the second half as a result of the large influx of public investment in the tourism sector which led to a severe drop in performance of private capital. In the post-ACS period, the effect of reallocating capital to the benefit of private sectors such as trade and repair, real estate and manufacturing is to increase the impact of application of this factor. However, in recent periods, the average yield fell again under the effect of the reduction recorded in the price of value added in trade, repair, real estate and factories. These two sectors contribute up to 52% of salaries paid to private capital input.

The sequential dynamic model and the assumptions adopted (specificity of installed capital in the first period) imply that the return of private capital may differ from one

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[7] School enrollment rose from 53.9% in 1995 to 69.3% in 2005, a growth rate averaging 2.6% per year over 10 years (http://www.uis.unesco.org/statsfr/statistics/indicators/i_pages/IndGERNERSec.asp).
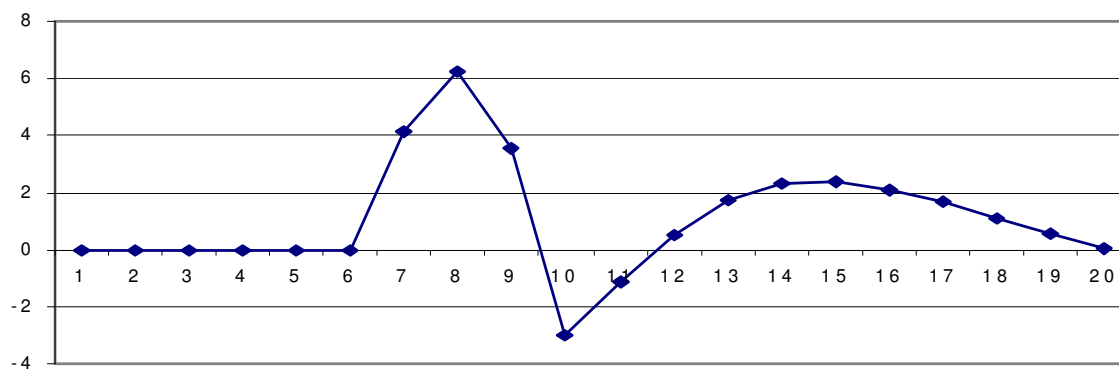
Figure 2. Changes in the rate of return to private capital (in %).
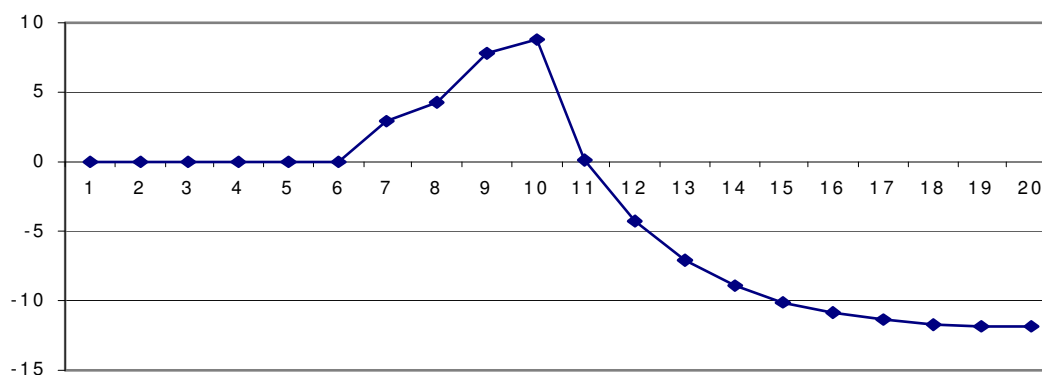Source: simulations.

Figure 3. Changes in the cost of capital (in %).
Source: simulations.

sector to another after shock. The latter has increased in the textile and ICT-teleservices. In fisheries-aquaculture, after a decline in the early period, the return of private has increased. This reflects the increased demand for private capital in the textile and ICT and tele-fisheries-aquaculture sectors in the last period. These increases are driven by the effects of the increase and reallocation of savings available. The availability of cheap capital is explained by changes in the cost of capital reduction after the implementation of the SCA (Figure 3). After the implementation of the SCA, the price of value added in agriculture and agro-industry sectors representing more than half of the wages paid to unskilled labor has increased. This situation is reflected by changes in the wage rates of unskilled labor (Figure 4). This is explained by the increased labor demand from these sectors. The evolution of the wage rate of skilled workers primarily reflects the added value price of non-market services, real estate and trade. Since the implementation of the SCA in non-market services, the added value price has declined. This decrease was offset by the value added price increase in the sectors of real estate and trade.

However, it decreases in these two sectors, following the increase observed during the first years of the SCA implementation. Consequently, the wage rate of skilled workers increases in early period and decreased at the end of the period. Overall, the effects of accumulation and reallocation benefit all sectors except ICT-tele-services and real estate. The added value and demand increase in all other sectors. For postal and ICT-tele-services, the planned investments are below those that would have been achieved in the absence of the SCA (BAU scenario), while in real estate, labor demand fall sharply, following a inflation of labor costs in this sector which concentrates a significant proportion of skilled and unskilled labor. The effects of accumulation and redistribution and availability of cheap capital have a positive impact on GDP. This increases the average annual rate of 5.63%.

Effects on welfare, poverty and income distribution

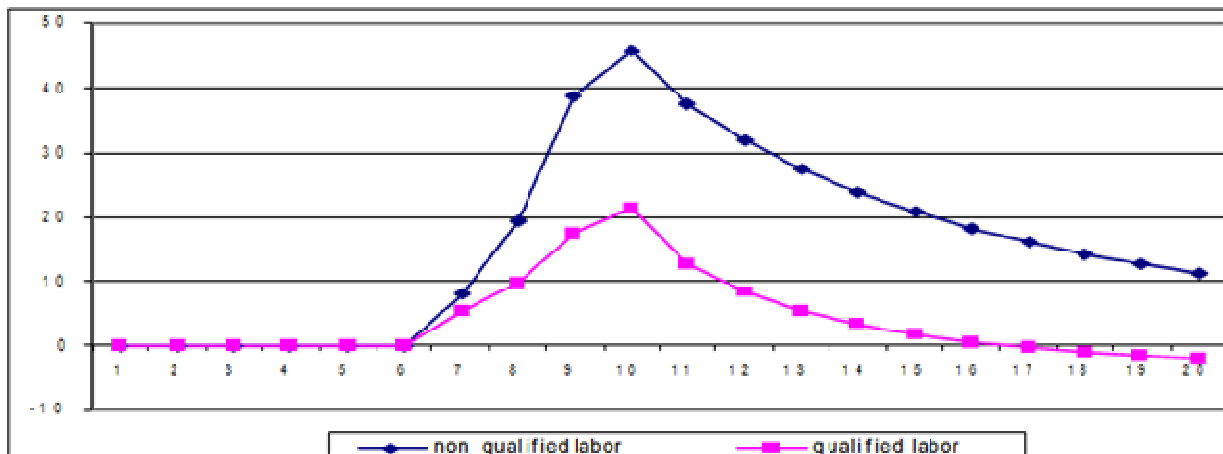The observed changes in the wages affect the

Figure 4. Changes in wage rate (in %).
Source: simulations.

Table 4. Change in nominal income, consumer prices and welfare (percentage change compared to BAU scenario).

Households	2004			2023		
	Nominal Revenue	Consumption price	Welfare (EV)	Nominal revenue	Consumption price	Welfare (EV)
Dakar	0.00	0.00	0.00	15.04	-2.90	18.40
ACU	0.00	0.00	0.00	54.58	0	274.31
Rural	0.00	0.00	0.00	169.23	-0.28	57.63
Senegal	0.00	0.00	0.00	32.01	-8.28	27.44

Source: simulations.

households' income (Table 4). In Dakar, households are relatively better endowed with capital and skilled labor. As for households in other cities, they have relatively more unskilled labor and skilled labor. Nearly half of rural income consists of earnings of unskilled labor. Overall, consumer prices are falling. This decrease is more important among households in Dakar. They also decrease in rural areas, while in other cities, they remain stable. The result of the combination of price and income effects is an increase of measured welfare by equivalent variation of household at the national level (27.44%). Welfare increases among households in Dakar from 8.84%. In contrast, it rose sharply for households in other cities and in rural areas (respectively, 274.31 and 57.63%).

The analysis of poverty shows that the strategy of accelerated growth leads to a significant reduction of poverty. The incidence declined 15% nationally. The largest declines were observed among households in Dakar and in rural areas (Table 5). The Gini index is lowered by 1.12%[8]. The decomposition of poverty variation indicates that growth is the cause of the decline

in the scenario of the Accelerated Growth Strategy and on that of the BAU reference. Indeed, the approach of Datt and Ravallion, as well as that of Shapley, attests to the significant weight of growth in reducing poverty (Table 6). Decomposition, according to the Shapley's approach, proved that, for a decline in poverty incidence of about 34.01% between 2004 and 2023, growth contributed in the case of SCA to a reduction nearly 37.18 points to poverty, while the redistribution component increased poverty by 3.17 points. The positive impact of growth on poverty reduction is relatively more important in the case of the accelerated growth strategy in the BAU scenario, and the negative effect of redistribution is lower. The net effect is a reduction in various indices of poverty, as reflected in Table 5.

Despite the useful lessons that can be drawn from the relative contribution of growth and inequality in poverty change, the growth-redistribution decomposition does not describe the pro-poor or none pro poor growth's strategy content. The pro-poor growth indicators are more suitable for this purpose (Chen and Ravallion, 2001, 2003, Kakwani and Pernia, 2000, and Kakwani and Son, 2002). All measures of the pro-poor growth's impacts show that the growth generated by the SCA is not pro-poor (Table 7).

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[8] We will only focus on the inequality intergroup given the fact that ESAM II does not contain an "income" module

Table 5. Changes in poverty incidence (change in % compared to the BAU scenario).

Households	2004			2023		
	Incidence	Depth	Severity	Incidence	Depth	Severity
Dakar	0.00	0.00	0.00	-26.11	-24.95	-25.37
ACU	0.00	0.00	0.00	-8.89	-12.26	-12.98
Rural areas	0.00	0.00	0.00	-15.85	-20.25	-22.33
Senegal	0.00	0.00	0.00	-15.15	-18.95	-20.58

Source: Calculations based on the simulations.

Table 6. Decomposition of poverty in growth and redistribution components (changes in % in the BAU and SCA scenarios).

BAU	Growth contribution		Redistribution contribution			
	Datt and Ravallion	Shapley	Datt and Ravallion	Shapley	Residue (Datt and Ravallion)	Gap between 2023 and 2004
Incidence	-34.95	-35.47	3.77	3.25	-1.04	-32.22
Depth	-11.02	-11.81	2.34	1.55	-1.59	-10.27
Severity	-4.63	-5.14	1.29	0.78	-1.02	-4.36
SCA						
Incidence	-36.50	-37.18	3.85	3.17	-1.36	-34.01
Depth	-11.36	-12.18	2.25	1.44	-1.63	-10.75
Severity	-4.74	-5.26	1.24	0.73	-1.02	-4.53

Source: Calculations based on the simulations.

Table 7. Pro-poor growth measures.

	BAU	SCA
A. Pro-poor growth index (PPGI)	0.91	0.91
B. Equivalent poverty growth (PEGR)	0.20	0.36
C. Median income growth rate	0.22	0.39
D. Pro-poor growth rate (RPPG)	0.06	0.27

Source: Calculations based on simulations.

7). Indeed, the pro-poor growth index (PPGI) of Kakwani and Pernia (2000) is less than 1. This index is 0.91 in the scenario of the Accelerated Growth Strategy and the reference scenario (BAU). Similarly, the equivalent poverty growth rate measured by the PEGR index defined by Kakwani and Son (2002) is 0.36 and 0.20, respectively, in the scenario of the SCA and BAU. The PEGR index is between 0 and the annual growth rate of the income average is respectively 0.22 and 0.39. Also, the pro-poor growth rate (RPPG) developed by Ravallion and Chen (2003) is, respectively, 0.27 and 0.06 in the scenario of the SCA and BAU. Consequently, the growth generated by the accelerated growth strategy led to a reduction of poverty, but is accompanied by a widening of inequalities. Indeed, as evidenced by the relative contributions of growth and redistribution, poverty is reduced as a result of growth, but inequalities contribute to increasing it.

Conclusion

Under the accelerated growth strategy, Senegal has planned to implement a package of investments in a set of so-called priority sectors. In order to spur a pro-poor growth path, the expected goal is to double the GDP in a decade, and GDP per capita in 15 years. In this work, the author used a model of general equilibrium dynamics to better capture the effects of such a strategy on poverty and income distribution.

The results obtained show that growth path generated by the AGS leads to a poverty reduction. The largest

declines were recorded in the capital and in rural areas. The reduction of poverty is mainly due to the growth effect. Even if growth has reduced poverty, the profile of income distribution accompanying it increases poverty levels. So growth leads to poverty reduction while worsened income distribution contributes to increase the poverty incidence. From the analysis of the growth incidence curve and calculation of various pro-poor growth indices, it is clear that the accelerated growth strategy is not a pro-poor one. As AGS do not satisfy the conditions of a successful pro-poor growth strategy, it is then important for policymakers to look for some alternatives if they care about achievement of at once the MDGs goal which is a reduction by half of the poverty incidence in 2015. It is clear that inequality is harmful to growth as assessed by Persson and Tabellini (1994) whose analysis relies on the new theories of endogenous growth. Growth depends on the accumulation of physical capital, human capital and knowledge. For a developing country like Senegal dealing with weakness, for private capital and foreign direct investment flows to come, it is important to set a minimum level of public goods (infrastructures, investment in education to raise the amount of qualified workers, etc.).

This requires consistent revenues for Government. On one hand, it is obvious that when public levies are low, it gets easier for private agents to appropriate the fruit of their efforts. But on the other hand, the more the society is unequal, the more distributional conflicts are important and this requires that the Government proceed to strong income redistribution. From these two mechanisms, it appears that the more there is inequality, the more growth can be low. While regarding to the content of Senegalese AGS, it appears that one of its weakness in pursuing a successful pro-poor growth path is the low amount of public capital devoted to agro-industrial sector compared to the other sectors. The contribution of rural areas to poverty incidence, especially households operating in agricultural sector, is very high in Senegal. 57% of households and 65% of persons are poor in rural area (Senegal, 2004). Flows of public and private invest-ments are then needed to boost rural areas contribution to GDP and hence enhance income distribution at the national level. It seemed to be the aim of a new program named the Comprehensive Africa Agricultural Deve-lopment Program (CAADP) supported by all donors and implemented in the whole continent within Nepad framework.

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