

RISK OF CORRUPTION FOR ECONOMIC GROWTH AND POVERTY: THE CASE OF A DEVELOPING COUNTRY

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Abstract

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In this article, we attempt to assess the effects of corruption on economic growth, welfare and poverty in Senegal, using the dynamic computable general equilibrium model (CGE). The profile of fiscal governance is firstly built based on data relied to Global integrity, Open budget initiative and Public finance management reports for Senegal. Secondly, we build a CGE model based on the SAM of Senegalese economy. The simulation results show leakage of 10% of public investment as a result of corruption, which would effectively lead to an average loss of 2.6% points of economic growth per year. The welfare of households fall on average by 0.64% point per year. Moreover, the diversion of resources meant for public investment also has the effect of increasing the yearly incidence of poverty by 0.51% point on average, which is equivalent to 61,136 new poor every year.

Keywords: Corruption, Economic Growth, Welfare, Poverty, CGE Model

1. INTRODUCTION

As ranked by Transparency International, New Zealand tops the least corrupt countries in the world with a score of 9.5 on the Corruption Perceptions Index (CPI). It is followed by Finland and Denmark that display a score of 9.4 on the Index (Transparency International, 2011). CPI measures the perception of corruption in the public sector, and in 2011, the index rated 183 countries and territories on a scale of 0 (highly corrupt) to 10 (highly clean), and used data from 17 surveys on factors such as: the implementation of anti-corruption laws, access to information and conflicts of interest. In sub-Saharan Africa, corruption is one of the most pertinent challenges of economic growth. The role assigned to the State in developing strategies to enhance economic backwardness, as well as inadequate resources often create favorable conditions for corruption.

Several situations can increase the likelihood of corruption in Africa. On one hand, the exploitation of natural resources can result in rent-seeking. This occurs when resources are sold at significantly higher prices than their cost and the sale of concessions is accompanied by payments of "kickbacks". In addition, the excessive corruption in Nigeria, Gabon, et cetera, is partly explained due to

the discovery of oil wells. On the other hand, the low salaries of the public service officials could explain much of the trivialization of petty corruption (Klitgaard, 1989). When wage differentials are very high between the private and public sector, the temptation to fill these gaps is high. Moreover, protectionist measures and industrial policy favour the creation of rents and corruption (Krueger, 1974). In these cases, the weakness of the productive class of entrepreneurs explains the relationship between the accumulation of capital, the allocation of public resources to these entrepreneurs, and corruption (Khan, 1996).

In Senegal, a significant attention is given to the reform of the public finance management system in the national development strategy, as seen in the Economic and Social Policy Document (DPES). Despite the reform package, the classification of Senegal was stable between 2000-2007, however, this deteriorated sharply between 2007-2011 with a score of 2.9, which puts it at 112th in 2011. Senegal shows poor performance in the fight against corruption despite the expressed political will. Hence, corruption is an important challenge to our ambitions in economic growth and the fight against poverty.

Most economic research on the causes of corruption are based traditionally on the

contributions of economic information and agency models. A brief overview of the literature on the economic analysis of corruption shows that contrary to the theories explaining corruption (by reconciling the conflicting interests of a "delegating" and "delegated" agent), there is a third agent which is the swindler (Bernheim and Whinston, 1986; Tirole, 1986). The motivation of the agent to be corrupt is based on a cost-benefit analysis. If the value of illegality is greater than the value of honesty, the agent will tend to adopt unlawful behavior (Becker, 1968). This behavior depends on the absence (or existence) of sanctions. However, in the presence of penalties and sanctions, the propensity to be corrupt will tend to fall (Irlenbusch and Renner, 2002). One way to reduce the opportunistic behavior of a corrupt agent would be to offer him a salary that is equivalent to the expected gain associated with corruption (Becket and Stigler, 1974; Besley and McLaren, 1993). Moreover, this premium is difficult to estimate due to the moral dimension of the act of corruption. Also, the empirical validation of the effectiveness of this instrument is still the subject of intense debate (Di Tella and Schargrodsky, 2003; Herzfeld and Weiss, 2003; Rauch and Evans, 2000).

As for one that initiates bribery, it is assumed corrupt when the expected benefit of the act is positive. On the other hand, legal prosecutors could incur costs that are twofold: moral (reputation problem) and real (risk of financial penalties if detected). The confrontation of "corrupting" and "corrupt" agents result in a market of corruption, where the equilibrium price is "to bribe". The "corruption pact" constitutes the illegal agreement that this market structure create new forms of incentives directed towards misuse of authority.

At this micro level, corruption can have important effects on income distribution. For some group of authors, corruption has a negative effect on poverty and inequality (Alonso-Terme, Davoodi and Gupta (2002), Gyimah-Brempong 2002, 2006, Dincer and Gunalp, 2008). According to Gupta, Davoodi and Alonso-Terme (2002), corruption has a negative impact on the income growth of 20% of the poorest people. For these authors, corruption has an adverse effect on the situation of the poor because it increases the inequality of income, education but also in the distribution of land. Gyimah-Brempong (2002) came to the same conclusion for African countries. Gyimah-Brempong et al. (2006) highlight this relationship between corruption and inequality by concluding that a reduction of a standard deviation of corruption reduces the Gini coefficient of the income distribution by 0.05 points, 0.14 points, 0.25 points and 0.33 points in the OECD, Asia, Africa and the Latin American countries. Similarly, analyzing the impact of corruption on income inequality and poverty in the United States, Dincer and Gunalp (2008) have shown that corruption leads to more inequality and poverty. For other authors such as Azfar et al. (2001), Khagram and You (2005), the causality is inversed between corruption and inequality. Hence, the idea here is a

vicious circle. According to them, as the poor cannot control the rich, the later abuse their opportunities by using corruption to maximize their wealth. On the other hand, authors such as Abd Rashid and al. (2010), from their study based on a sample of LDCs, found a two-way causality in Granger's sense between poverty measured by the human poverty index and corruption.

At a macroeconomic level, studies analyzing the effect of corruption mostly pass through its impact on investment and hence, on GDP growth. One of the pioneering works is that of Mauro (1995), which shows a negative correlation between a country's level of corruption and its level of private investment and growth. However, according to Mauro (1997), this relationship between corruption and economic growth via investment is significantly weak and sometimes fragile. Paldam (2002) researches leads to the same result. As for Brunetti and al. (1998), Li and al. (2000), Abed and Davoodi (2000), they found no significant correlation between corruption and growth. On the other hand, analyzing the effects of corruption on growth through public and private investment, Balamounelutz and Ndikumana (2009) find that corruption has a negative and significant effect on investment. For Akçay (2006), corruption is a problem for human development, while for Anoruo and Braha (2005), corruption curbs African economic growth directly by lowering productivity by 0.87% and indirectly by a fall of 4.69% of investment. Gyimah-Brempong et al. (2006) come to the conclusion that a 10% decrease in corruption increases the rate of income growth by about 1.7% in the OECD and Asian countries, 2.6% in the Latin America countries and 2.8% in African countries. Using an endogenous growth model that analyzes the relationship between taxation, corruption and economic growth, Aghion et al. (2016) conclude that reducing corruption provides the greatest potential impact for welfare gain through its impact on the use of tax revenues. With an extension of an endogenous growth model that includes the various spending of the Government, including military spending, Agostino et al. (2016) find a negative effect of corruption and military spending on the development of African economies, but their results also show that corruption interacts with the military burden through indirect effects that amplify its negative effect. On the other hand, they conclude that the political implications of this findings are that the effects of corruption on economic growth are worse in countries with high military burdens.

Exposure, several studies show that the duration of exposure to democracy (Treisman, 2000), the level of economic liberalism (Goel and Nelson, 2005), the degree of press freedom (Ahrend, 2002; Brunetti and Weder, 2003) and intensity of competition among the media (Suphachalasai, 2005) have negative correlation with the level of corruption.

In order to have a good measure and a better understanding of the impact of corruption in Senegal, we focused on specific cases of

embezzlement of public resources allocated for investments. Investment is understood as a flow that replaces used-up capital and / or increase capital stock. There is a multitude of corruption related to revenue governance, fiscal governance, public procurement, internal control weaknesses and external supervision. Our analysis will place emphasis on the effects of corruption related to these specific channels of public investments. We cannot always interpret the phenomenon of corruption as deviations of funds, but also the substantial difference between budgeted amounts and those actually allocated to public investment. Public investment projects sometimes include significant operating costs (for wages, et cetera.), and these investments are a stream of funds that replace capital and / or increase the capital stock¹ (excluding any other form of expenditure). The CPI ranking compiled by Transparency International provides a view of the phenomenon of corruption in each country. However, few statistical data associated with corrupt behavior trace the level of loss of resources allocated for public investment, and measure the effects of these leaks on economic growth, welfare and poverty. The objective of this research is to therefore evaluate the effects of corruption on economic growth, welfare and poverty in Senegal. In this work, we will first build on the profile of the fiscal governance in Senegal. Secondly, we will describe the methodology we utilized. Finally, we will present the results of the simulation.

2. PROFILE OF FISCAL GOVERNANCE IN SENEGAL

The profile of financial governance in Senegal will be drawn using the analytical framework defined by the Prospect of Financial Governance (PGA)². This is an integrated approach that utilizes quantitative data and quantitative analysis for evaluation of financial governance. It covers five areas, each including five governance variables.

The five financial management components are: revenue governance, fiscal governance, procurement, internal control and external supervision. Revenue governance is the process that determines tax revenue policy, as well as management of collection of tax and non-tax revenue (including the fiscal capacity of States and citizens). Fiscal governance represents the political process set out to monitor annual budgets, medium and long-term fiscal frameworks, and the quality of budget execution and reporting. Procurement includes policies and systems in place for acquisition of goods, works and services (including market regulation and supervision for public procurement). Internal control refers to the laws, regulations, procedures, including those safeguarding assets, internal control standards, information and internal audit. External supervision

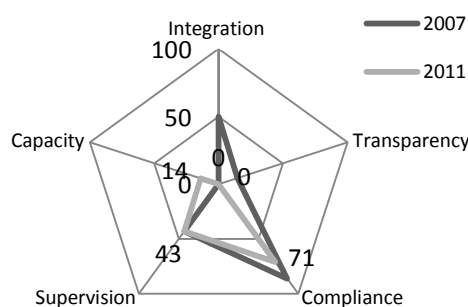
refers to institutional arrangements for conducting independent audits by established audit institutions and parliaments in careful monitoring of actual government spending. Also, external audit includes and the role of civil society and independent bodies in controlling the use of public resources.

On the other hand, the five governance variables are: "capacity", "transparency", "compliance", "supervision" and "integration". "Capacity" reflects the political will and capacity of governments to design and implement public policies to the public interest. "Transparency" is the extent to which the governance process is transparent regarding the sharing of documents and information that the public needs, in order to exercise its role and responsibilities. "Compliance" is the extent to which the government institutions and public officials follow and apply the rules that pertain to financial governance. "Supervision" is the efficiency with which parliament and specific supervisory bodies are able to fulfill their role for the purpose of external audit. "Integration" represents the extent to which stakeholders outside government are able to participate and influence the rules governing financial governance, define program and policies, and guide the implementation.

2.1. Fiscal Governance

Overall, the fiscal governance performance of Senegal is not impressive. The only variable that recorded a qualitative leap was "capacity". "Transparency" and "compliance" recorded a negative progression between 2007 and 2011. The performance of the "integration" variable has not been rated, and the variable, "supervision", has remained stable between 2007 and 2011.

Figure 1. Evolution of performance in fiscal governance



Sources: Cabral et al. (2012).

2.2. Revenue Governance

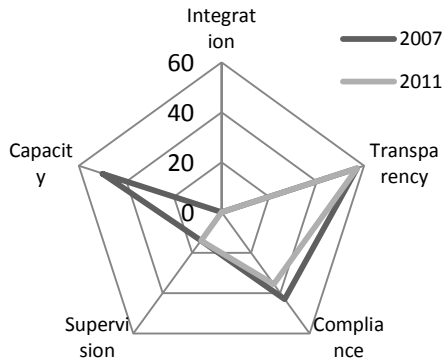
The Senegal performs better in terms of revenue governance of the budget. However, "compliance" deteriorated between 2007 and 2011. With this exception, the other criteria ("integration",

¹ In the broadest sense (physical, intangible, human).

² This is driven jointly by AfDB and ACBF.

"transparency" and "supervision") did not improve, but remained stable.

Figure 2. Performance evolution in revenue governance

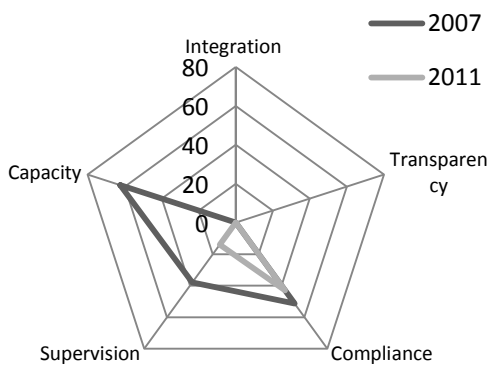


Sources: Cabral et al. (2012)

2.3 Internal Control

Similar to the fiscal governance of the budget, the performance recorded by Senegal are relatively poor internal control. After an assessment of the "supervision" and "compliance" variables, it was noted that Senegal respectively lost 24 and 14 points between 2007 and 2011. In addition, measures should be put in place to develop the "transparency" variable, whose performance remains weak and stable over time.

Figure 3. Evolution of performance in internal control



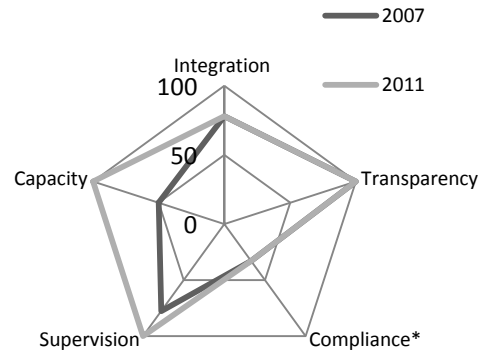
Sources: Cabral et al. (2012)

2.4. Procurement

Procurement is one of the areas in which Senegal displays the best performance. In 2011, Senegal performed well by scoring 100 in "transparency", "supervision" and "capacity". The "integration" component also had a good profile, but the "compliance" variable performed low. Moreover, the

latter was stable overtime. There was also a recorded stability in the "transparency" variable. Generally, Senegal achieved good progress in the variables "supervision" and "capacity".

Figure 4. Evolution of Performance in terms of



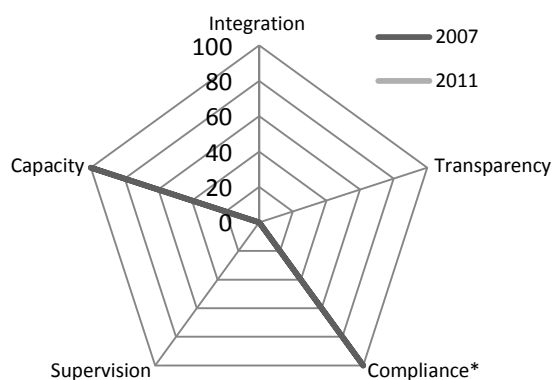
Procurement

Sources: Cabral et al. (2012)

2.5. Supervision

The "compliance" and "capacity" variable show good progress for Senegal in 2007. However, the country has poor performance in "transparency", "supervision" and "integration". Also, no improvement was observed between 2007 and 2011 in these variables, and the scores were consistently low.

Figure 5. Evolution of the performance at the external supervision



Sources: Cabral et al. (2012)

3. METHODOLOGY

Due to lack of data on the volume of public investment lost due to corrupt behavior, our approach is to provide a margin to assess the cost of corruption in terms of economic growth, welfare and poverty³.

In many countries, the general equilibrium models are widely used for analysis of economic policies and external shocks. They are used to assess the impacts of economic policies taking into account the significant interactions (and consequences) within the economy. In the past, several general equilibrium models have been developed and applied in Senegal to analyze a wide range of policies⁴. However, most of these models are static, except for one developed by Dumont and Mesplé-Somps (2001).

The dynamic model was constructed based on the Exter-DS model developed by Annabi, Cockburn and Decaluwé (2004). A set of features have been added, namely: the inclusion of public capital; specification of labour demand function; the introduction of a link between rainfall and the added value of the agricultural sector through total productivity factors; and the integration of an export demand function.

The model is recursive dynamic, meaning that it is solved as a sequence of static equilibria related in time, through the accumulation of capital and the increase of the workforce, and the behavioral equations of endogenous variables. Its dynamic is based on exogenous growth rate assumptions for different variables such as labor supply, public expenditures, transfers, and endogenous savings and investment behaviour of economic agents. One of benefits of the specification of the dynamic model is the ability to generate a medium and long term path. In addition, structural changes may be analyzed over time. This model applies to a small economy in which world prices are given. In the following discussion, we will focus on the specifics of the model.

3.1. Model Specifications

The model 5 integrates five factors of production: labor, private agricultural capital, private non-agricultural capital, public capital and land. Public investment increasing public capital stock each year is broken into several components, namely: human capital, research and development, and capital investment.

The production sector is expressed as a Leontief function combining fixed shares of value

addition and intermediate consumption. However, the added value is expressed differently across various sectors. In the agricultural sector, the added value is a CES function that combines land and a composite factor, as well as incorporates a total productivity factor determined endogenously.

The composite factor is obtained through a combination of CES composite work composed of skilled and unskilled labor, and composite capital consists of private agricultural private and public capital. The composite capital is combined with the composite labour using a CES function. The composite capital is specified using Leontief function which combines fixed shares of public and private capital, under the complementarities between these two types of factors⁶. We distinguish the private agricultural capital from non-agricultural private capital and the performance associated with each type of private capital is different. The composite work is represented by a CES function combining skilled and unskilled labor.

The supply of arable land is equal to the demand for land to which is added the share of underemployed land. The latter is equal to the undeveloped part of the total available land adjusted from fluctuations in the amount of land due to rainfall.

In non-agricultural market sectors, the added value is a constant elasticity function combining labor and public capital. The composite capital is represented by Leontief function, combining fixed shares of the non-agricultural private capital and public capital. In non-market sectors, the added value is assumed to be a constant elasticity function combining a substitution of labour and public capital.

Specific household factors play an important role in the transmission of effects of the shocks on households. Each household is affected by one of many factors, including: income of skilled labor, unskilled labor, agricultural capital, non-agricultural capital, and land, whose value fluctuates based on demand factors. The income from land and farm capital are allocated in full to rural households. A fixed proportion of transfers from the state, the world and other households and dividends are paid by companies, also go to households. The structure of the consumption affected by price changes is also critical in the transmission of the effects of the shock to households. The consumption of each product is valued at the price of the composite good. It is a type of function known as the Stone Geary linear expenditure system. It distinguishes the minimum consumption of that discretion. The specificity of this demand function is that it has a minimum basket consumption. This is the volume of product which a consumer must have if he wants to maintain a minimum standard of living. This volume is fixed short-term but changes depending on the growth rate of the population. However, consumer discretionary is endogenously determined by

³ Economists have, in fact, developed the marginal theory reasoning. This approach is not novel. Cette theory goes back to the theory of marginal utility developed between 1871-1874 by three Economists: the Englishman, WS Jevons (1835-1882); the Austrian, K. Menger (1840-1921) and the French, L. Walras (1834-1910).

⁴ See: Dissou, 2000; Dumont and Mesplé-Somps, 2001; Decaluwé Dissou and Patry, 2001; Diagne, Cabral, Dansokho, Ba, 2003; Boccanfuso, Cabral and Savard, 2005; Cabral, 2005.

⁵ For more information about the model, contact the author.

⁶ As highlighted by the work of Hirschman (1958) carried out on developing countries.

changes in prices and disposable consumer income (Decaluwé Martens and Savard 2001).

The model applies to a small open economy, where world prices are given. In addition, a demand function to export finished products is introduced to take into account the constraints faced by Senegalese producers on the world market.

3.2. Dynamic Model

The private capital⁷ in the tradable sectors (tr) at the end of period (KD_{t+1tr}) is equal at the period to the previous stock (KD_{ttr}), net of fixed capital consumption (or depreciation) of the period to a dep rate, plus the flow of current investment (IND_{ttr}):

$$KD_{tr}^{t+1} = KD_{tr}^t (1 - dep) + IND_{tr}^t \quad (1)$$

The private capital accumulation rule is determined as follows: the rate of sectoral private capital accumulation — the ratio of investment flows (IND) to the capital stock (KD) — is assumed to be an increasing function of benefit-cost ratio of capital, with the latter moving at a decreasing rate:

$$\frac{IND_{tr}^t}{KD_{tr}^t} = f \left[\frac{r_{tr}^t}{c_{tr}^t} \right] \quad (2)$$

This equation determines the way in which new investments are allocated between different sectors destination. This investment function by destination is inspired by the functional forms proposed by Bourguignon, Branson and de Melo (1989) and Jung Thorbecke (2003).

As for the stock of public capital in each sector at the end of period (KD_{pubt+1j}), it is equal to the period of early stock (KD_{pubtj}), net of the fixed capital consumption (or depreciation) of the period at a rate dep rate, plus the flow of public investment allocated to the sector during the period (ING_{tj}):

$$KD_{pubj}^{t+1} = KD_{pubj}^t (1 - dep) + ING_j^t \quad (3)$$

In commercial sectors, public investment destination flow (ING_{tj}) are a fixed part (b) of private investment destination flow (IND_{tj}). This specification reflects the complementarity between these two types of investments in the market sectors. Consequently, the relationship between public capital and private capital in the commercial sector is defined by the following equation:

$$ING_{tr}^t = b * IND_{tr}^t \quad (4)$$

In the non-profit sector, we assume that public investment flows depend on disposable income of

the state (YD_{GOV}^t), and therefore a fixed part ($mu - e_{ntr}$) thereof:

$$ING_{ntr}^t = mu - e_{ntr} * YD_{GOV}^t \quad (5)$$

The total value of investments by destination corresponds to the total investment, and therefore, the total value of investments by source (IT_t):

$$IT_t = pk_t (\sum_j IND_j^t + \sum_j ING_j^t) \quad (6)$$

The average price of capital is a weighted sum of consumer prices. The influential factor is the relative share of the demand for good or service in global investment demand (by origin):

$$pk_t = \sum_i pc_i^t * v_i \quad (7)$$

The user cost of capital in the market sector is the average price of capital pk multiplied by the sum of the interest rate (IR), the depreciation rate (dep) and cost of capital adjustment (ac):

$$uc_t = pk_t * (ir + dep + ac) \quad (8)$$

The unskilled labor supply increased at the same rate as the population. However, the supply of skilled labor is expected to increase at a slower rate than that of unskilled labor⁸.

3.3. Poverty

Changes in the sectoral allocation of resources and price changes have differential impacts on households as consumption patterns and income. Analysis of the incidence of poverty is made using P_α, Foster, Greer and Thorbecke (1984):

$$P_{\alpha} = \frac{1}{n} * \sum_{i=1}^p \left(\frac{z - y_i}{z} \right)^{\alpha} \quad (9)$$

Where z is the poverty line, y_i average actual expense of rank i of the household; α coefficient reflecting the degree of aversion to poverty, n representing the total number of individuals, and p representing the number of poor in the population.

The variable of interest from which is measured the incidence of poverty is the equivalent expenditure per adult. In the reference year, the nominal poverty line established by the National Agency of Statistics and Demography (ANSD) from data IOPS (2005) is estimated at 923.71, 661.76 and 561.22 FCFA / day / adult equivalent or 337154.3, 241543.5 and 204844.5 FCFA / year / household /

⁷ The private capital may consist of either a type of agricultural capital or non-agricultural capital.

⁸ We assume that it evolves in step with enrollments of at least six years of study where growth rate is estimated at 2.6%.

adult equivalent respectively for households in Dakar, the other cities and rural areas.

The effects of the shock on poverty is calculated through a process of micro simulation⁹. A link is established between the model and the survey households through changes in consumer prices and incomes calculated by the model. A new vector of household income is derived from observed changes in nominal income. Similarly, a new poverty line is based on changes in price consumption. The vector of income and the threshold obtained after the simulation can calculate the new indices of poverty which are deducted from changes in the level of poverty for different groups of households.

3.4. Data and Closing Model

A Social Accounting Matrix (SAM) was built for Senegal in 2005 from an input-output table (IOT) and a household survey in the same year. The latter includes eight categories of households (Dakar, other urban centers, the rural groundnut basin, Casamance, eastern Senegal, the river, the Niayes, the silvopastoral zone).

Production activities described by the 2005 social accounting matrix includes 15 production sectors: maize, millet / sorghum, rice, peanuts, cotton, vegetables, fruits, livestock, fisheries, other types of agriculture, oil mills, food industries, other industries, market services and non-market services.

The closure of the model is based on several assumptions. The offer of the composite product (Q) is the sum of intermediate demand (DIT), final consumption of households (C), private investment (INV) and changes in inventories:

$$Q_{tr}^t = DIT_{tr}^t + \sum_h C_{tr,h}^t + INV_{tr}^t + STK_{tr}^t \quad (10)$$

The supply and demand of exports is as follows:

$$EX_{tr}^t = EXD_{tr}^t \quad (11)$$

The sum of the sectoral investments which changes in stocks are added. This is equal to the sum of household savings (SH), firms (SF), the Government (SG), and the rest of the world CAB , valued in local currency:

$$IT^t + \sum_{tr} STK_{tr}^t * PC_{tr}^t = \sum_{INSL} S_{INSL}^t + CAB^t \quad (12)$$

The ratio of the current account and GDP is assumed fixed. This loop is consistent with Senegal's commitments made in the framework of the Economic and Monetary Union in West Africa (UEMOA). This pledge highlights the commitment not to depart from certain convergence criteria,

⁹ The use of this approach is justified by the fact that the Senegalese household survey does not include income informing module factor endowments.

including the ratio between the external balance and GDP. For this procedure, we also restrict the situation where an overflow of capital inflows could finance domestic policies. The exchange rate, changes in inventories and savings rate are fixed. Public expenditures are also assumed fixed in real terms in the first period. Thereafter, they increase at the same rate as the population. It is the same in public savings, transfers - the labor supply grew at the same rate as the population.

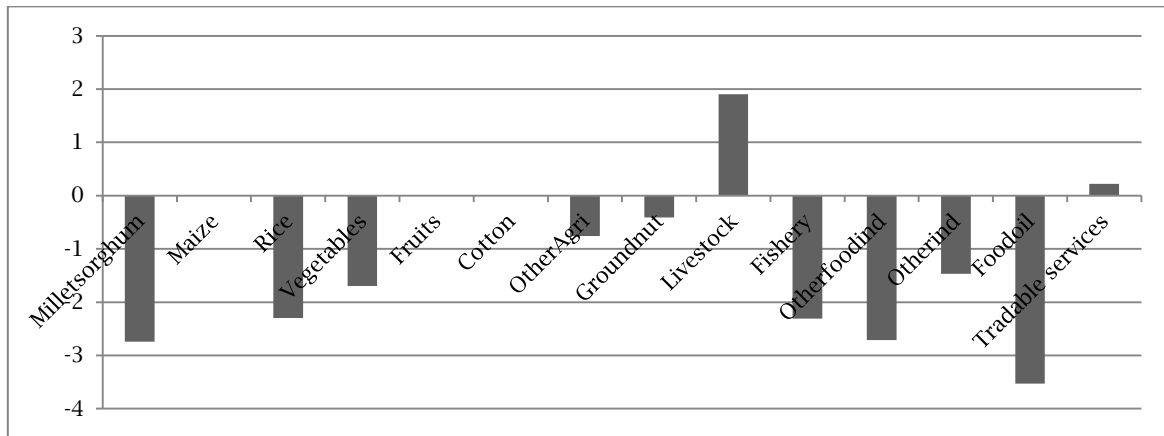
4. SIMULATION AND RESULTS

The simulation, conducted retrospectively, covers a period of eight years (2005-2012). Data on the extent of public resources drain due to corruption are difficult to have but from WikiLeaks and revealed by "Le Monde" (2010), it appears that it goes from the range of 5% in 2000 to 10% in 2007 and has reach 15% in 2010. From the perspective of this paper, we will consider the medium range. So, in the experiment made, it is assumed that 10% of resources devoted to public investment are lost due to corruption behavior¹⁰. What are the effects on economic growth, welfare and poverty?

The results of the simulation conducted firstly show that a leakage of 10% of public investment would effectively lead to a fall in private investment. Indeed, the latter being a supplementary public investment; any reduction of the latter will tend to decrease the volume of private investment. The sectors with a stronger decrease in private investment are the oil mill, other food industries, fisheries, millet/sorghum and rice. However, market services and livestock, benefit from the reallocation of resources, hence the volume of private investment increases.

¹⁰ We can assume that a diversion of public resources will result in the conversion of public savings into private savings, thus, increasing the total investment. This would also have a positive impact on economic activity. However, in real life, the rationality of the officer intending to convert public resources for private use is to guard against detecting the illegality of his act. One of these strategies is to make deposits from tax havens. This behavior then helps to increase the funding capacity of the rest of the world to the detriment of the national economy. The agent can also use safe havens (gold, commodities, etc.). This contributes to increased imports and thus reducing the current account balance, thus accentuating the economic financing needs. Another behavior of the agent is the allocation of these resources for spending on conspicuous consumer goods, which also reduces the balance the current account balance. All of these behaviors hamper the conversion of public savings into private savings.

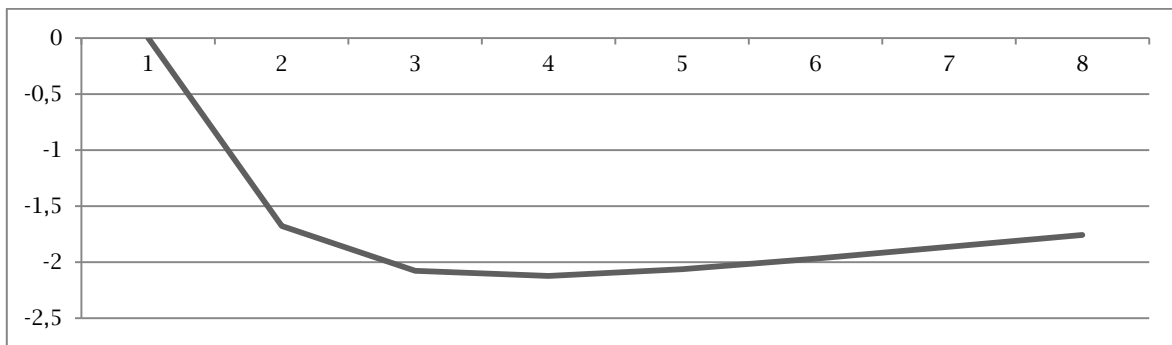
Figure 6. Change in the volume of private investments at the end of the period (in% compared to the bau scenario)



Sources: Simulations

Due to the reflux of public investment, the total investment decreases, despite a slight variation in the end.

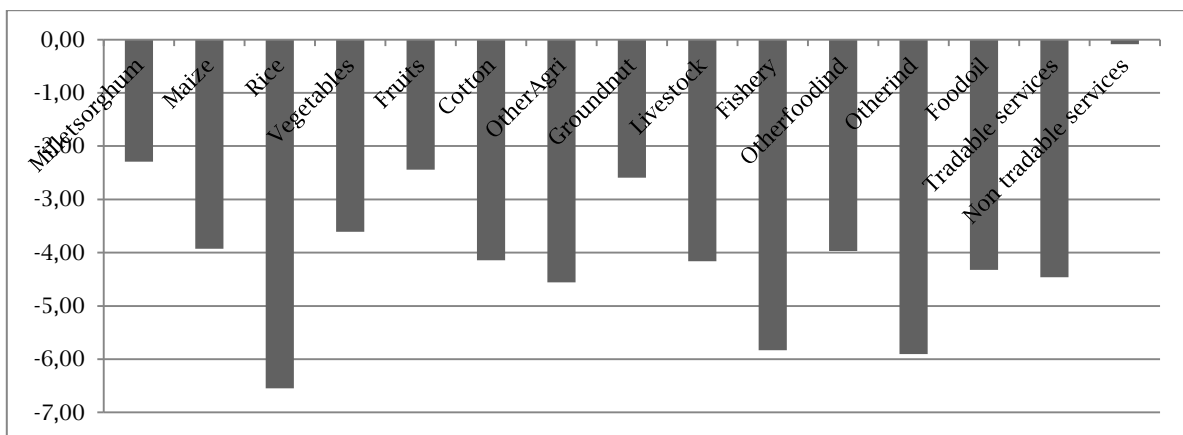
Figure 7. Variation in the volume of total investment (in% compared to the bau scenario)



Sources: Simulations

As a result, the value addition decreased in all sectors. The rice sector, fishing and other industries saw their business shrink sharply.

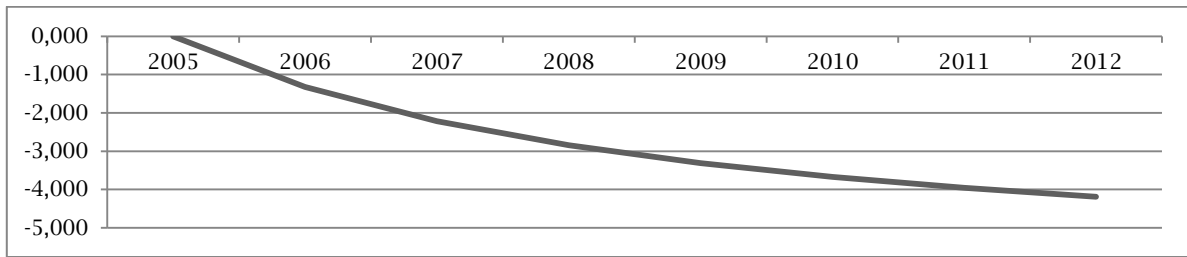
Figure 8. Change in value (in% compared to the bau scenario)



Source: Simulations

GDP contracts and recorded a drop between 1.3 and 4.2 points of growth between 2006 and 2012, which is a loss of 2.6% points of growth per year on average.

Figure 9. Change in GDP (in% compared to the bau scenario)

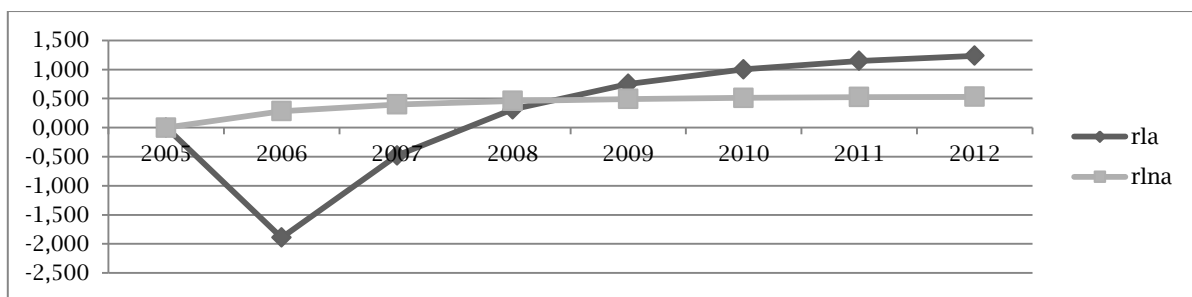


Sources: Simulations.

The capital return profile reflects that of private investments. Agricultural capital decreased in the period recorded, nevertheless, it subsequently increased.

As for the performance of non-agricultural capital, it slightly increases during the period.

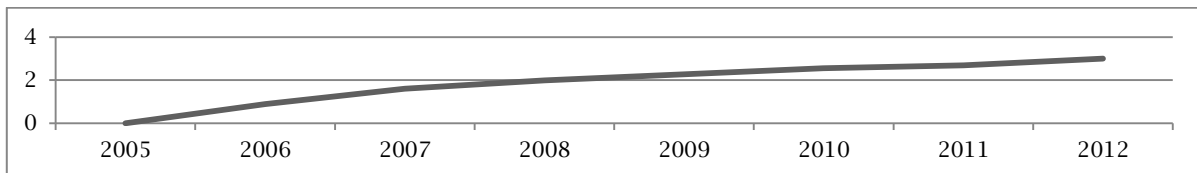
Figure 10. Performance Variation of farm capital and non-farm (in% compared to the scenario bau)



Sources: Simulations.

As for the wage rate, it records over the period increased.

Figure 11. Change in wage rates (in% compared to the bau scenario)

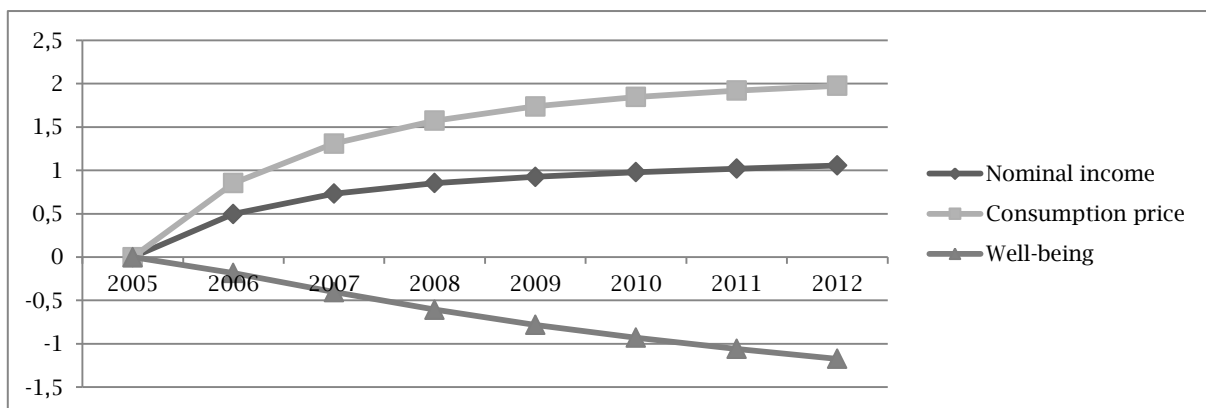


Sources: simulations.

All households are affected. They recorded an increase in their nominal income. However, this increase is also accompanied by a more-than-

proportional increase in the price for consumption. Therefore, the welfare of households on average declined by 0.64% points per year.

Figure 12. Change in nominal income, consumer prices and welfare (in% compared to the bau scenario)

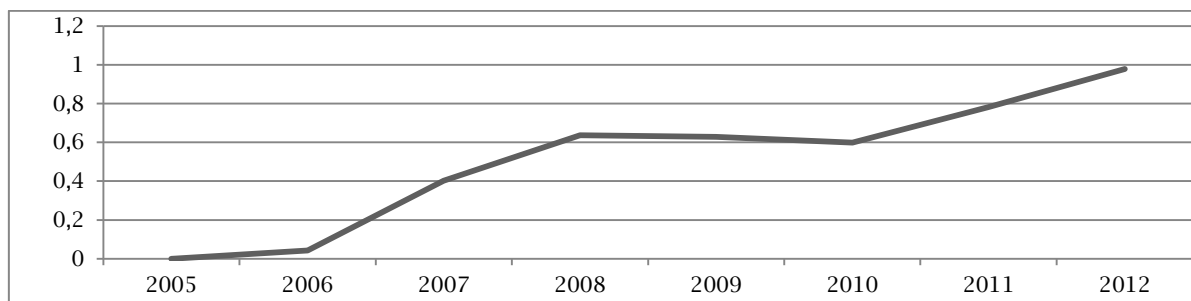


Sources: Simulation

This misuse of resources for public investment also increases the incidence of poverty. The rise in the incidence of poverty varies between 0 and 1% between 2005 and 2012, which is an average increase of 0.51% points on average per year (Chart 13). Therefore, the number of poor people increase

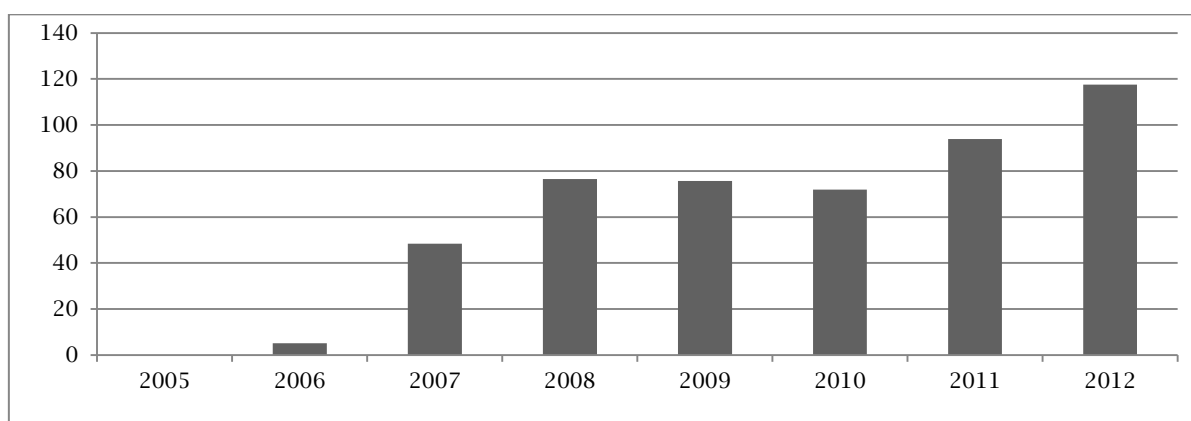
significantly, and this predatory behaviour of embezzling resources allocated to public investment generates close to 120000 in 2012 (Chart 14). On average, it is 61136 individuals that fall under the poverty line every year.

Figure 13. Change in the incidence of poverty (in% compared to the bau scenario)



Sources: Simulations

Figure 14. Change in the number of poor people in relation to the bau scenario (in thousands)



Sources: Simulations.

5. CONCLUSION

In this article, we have built a dynamic computable general equilibrium model which integrates into the capital accumulation module parameter that captures the leak public and private investments attributed to corrupt behavior. This instrument is used to simulate the effects of a hotbed of corruption on economic growth, welfare and Poverty in Senegal. The simulation assumed a leakage of public investment due to corruption. The results obtained show that, overall, a leakage of 10% public investment¹¹ has the effect of generating a significant contraction of economic activity. Nationally, the well-being of individuals deteriorate. This loss of resources for investment also has the effect of significantly increasing the incidence of poverty. As a result, corruption has the effect of substantially increasing the number of poor.

Ultimately, if the most visible effects of corruption are those traditionally characterized by the interactions between the corrupting agent and

the corrupted agent (and gains associated with the arbitration, cost-benefit, of these agents), it is possible to highlight the indirect effects and a very pernicious phenomenon. Indeed, corruption certainly enriches the individuals or groups of individuals involved, but it does bear the whole of society an exorbitant cost in terms of economic growth, welfare and poverty.

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¹¹ This amount is estimated at about 20 billion CFA francs, if one relies on the social accounting matrix of 2005.

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