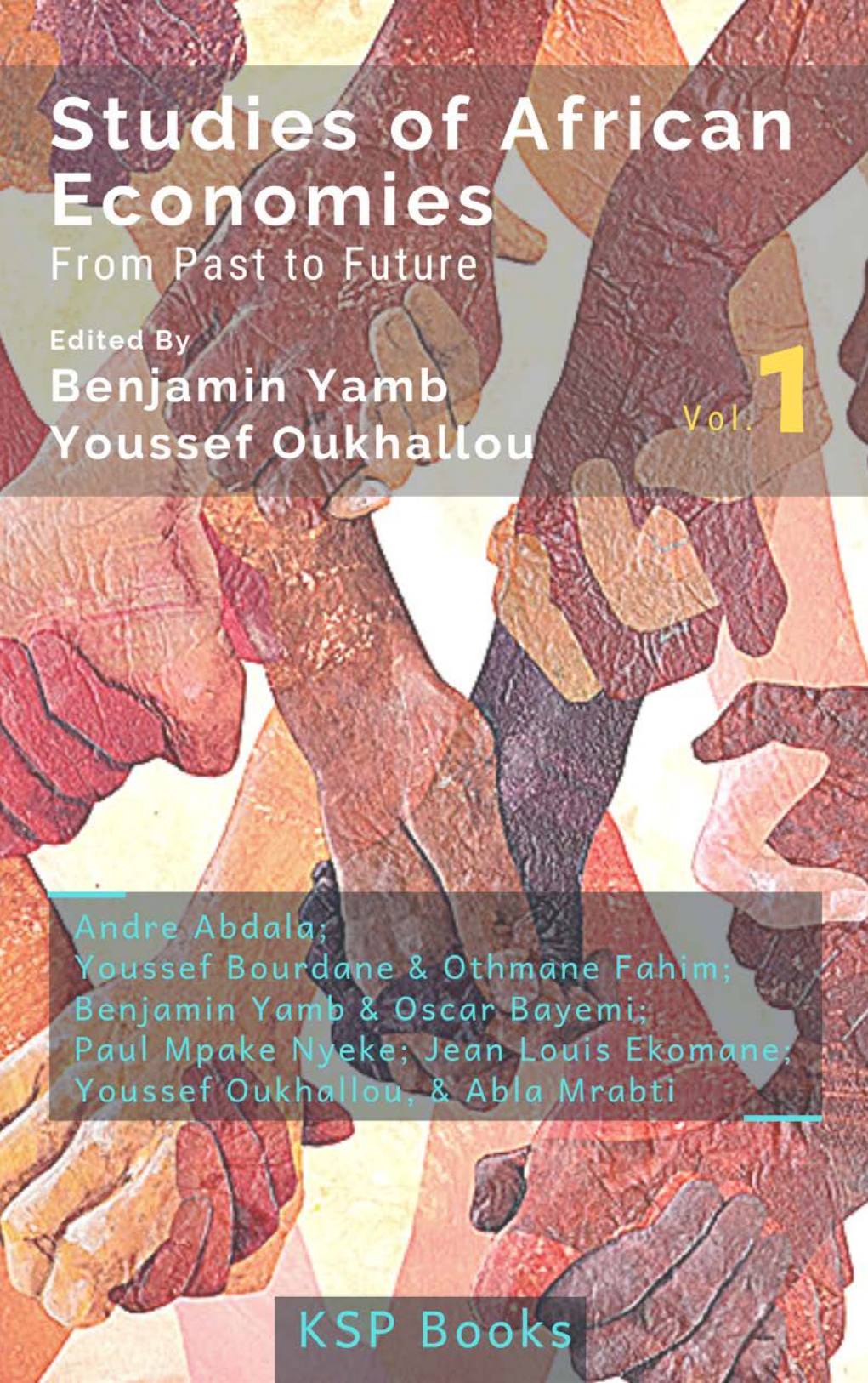
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Youssef Oukhallou
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Editors

Benjamin Yamb
University of Douala, Cameroon
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Studies of African Economies: From Past to Future, Vol.1

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Preface

(Ch.1) This Chapter makes a literary analysis on the factors that impact economic development in Africa, under the approach of the foundations of institutional school of Thorstein Veblen. For reasons for study it follows that European colonial policy corrupts ethnic/cultural ties in Africa, as delimiting boundaries in areas with a diversity of people and, later, with the independence of African countries, European governments lift conditions for a new elite, now African and subjected to a mental structure for European, use the power for the benefit of a specific ethnic group, at the expense of other ethnic groups. Finally, this paper conducts an empirical analysis in panel by OLS and GMM, which points to the impact of corruption in African economic growth.

(Ch.2) The objective of this chapter is to examine the impact of human capital, both quantitative and qualitative, on growth and convergence rates for a sample of African countries over the period 1970-2014. We base our study on a neoclassical growth model augmented by human capital (Solow, 1956), focusing on amplitude variations, signs of estimated coefficients and the speed of convergence of countries towards their stationary states. In addition, the use of panel data estimation procedures helps to fill gaps in cross-sectional estimates. We used the system-GMM

method to estimate the dynamic panel model since it provides unbiased results. The results obtained from the productivity equation highlight several observations. First, while physical and human capital have a positive impact on economic growth, the contribution of the latter to the growth rate is more significant than the former. Second, the estimate of the elasticity of output on physical capital is empirically reasonable for oil-producing and lower-middle-income countries. Finally, the integration of human capital as a factor of production in the augmented Solow model causes changes in the results, particularly in the amplitude of the coefficients. To capture country-specific fixed effects and estimate the pure effect of control variables on growth, we used an LSDV estimate incorporating instrumental variables. We have also compared it to the fixed-effects model, the result obtained differs in amplitude. The variables have the expected sign, but their impact is much less important.

(Ch.3) This Chapter analyzes the main channels of transmission of corruption on public spending on health and education as well as their impact on the well-being of populations. In particular, three transmission channels are put in the forefront, namely the transmission channel through prices, the budgetary resources and finally the transmission channel through the purchase of equipment to the detriment of investment in human capital. The analysis compares the different transmission channels and shows that regardless of the means of transmission chosen, corruption negatively affects the well-being of populations. However, the analysis reveals that the price transmission channel is the one that directly affects households.

(Ch.4) Each century comes along with its ups and downs. The 19th century is well known for its multiple conflicts, starvation, exactions leading to the migration of populations from one country to another, from one continent to another in search of greener pastures and security. This massive flow of migrants has significant consequences at the political, cultural and more importantly at the economic level, both at the beginning and at the end. The instability of the population in the world in general and in the Central African sub region in particular

carries enormous challenges like economic consequences difficult to face today.

(Ch.5) The influence of monetary policy on human development is of great concern to developing countries. The autoregressive vector model (VAR) was used to target the Human Development Index (HDI) from monetary policy indicators, based on Cameroon's data from 1990 to 2015. It appears that monetary policy indicators have an impact on the HDI, showing that there is a relationship between monetary policy and HDI. A decrease in the central bank's main interest rate improves the Human Development Index. Moreover, human development is boosted by an increase in broad money supply M2. A rise in final consumption also enhances the HDI while it is degraded through inflation.

(Ch.6) In this Chapter, we build a New Keynesian reduced-form macroeconomic model for Morocco. The model encompasses three main blocks: an aggregate demand equation (IS curve), a price-setting equation (Phillips curve) and a Taylor-type monetary policy rule. In our model, we consider a significant forward-looking component when explaining inflation dynamics, which enables us to include agent's expectations. The downstream aim of this work is to provide the research community with new possibilities in terms of economic workhorse modelling, particularly for monetary policy analysis purposes.

Editors
B. Yamb & Y. Oukhallou
April 10, 2019

Contents

1 Under-development in Africa: A Veblenian institutional approach

André **Abdala** †

Introduction

This chapter seeks to understand the factors that hinder economic development in the African continent. Many authors carry out an exclusively economic analysis to explain this phenomenon. However, the problem of economic underdevelopment in Africa encompasses many other factors, such as cultural, political, ethnic, and so on, so there is a need for a permissible study of the anthropological, sociological, and even related aspects to human nature.

In this sense, we can cite Hamilton (1919), who asserts that changes in institutional processes are come from changes in human actions and vice-versa, so that they modify institutional processes, and then both changes feedback. Thereby, we explain the social phenomena from the studies carried out by the institutionalist school, which had been developed by Thorstein Veblen since the end of the 19th century, and of which Hamilton (1919) is a part.

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Hamilton (1919) suggests that human action begins the institutional process, and since then, it is a circular, but dynamic, relationship that takes precedence. From this, this research presents an issue: what determines what? The institutional process that determines human action or human action that determines the institutional process?

Thus, in answering this question, it becomes possible to understand the causes of African underdevelopment. Therefore, the view of this work is economic-social, however, does not fail to consider the ethnic-cultural aspects.

Then, section one (1) discusses the main concepts of Veblenian institutionalism from the standpoint of its founder and other authors; Section two (2) elucidates the development of economic society, also under the Veblenian view; Section three (3) examines the causes of economic underdevelopment in Africa; Section four (4) approaches a review of empirical literature; Section five (5) demonstrates a analysis of results in panel, by OLS and GMM methods; and Section six (6) presents the conclusion of this article.

The Veblenian institutionalism

Economics are commonly used to explain the stages of the development of any society or nation. However, many exclusively economic researches lack other elements to make the study of economic development deeper.

Lapouge (1897 *apud* Veblen, 1998) analyzes that anthropology has a more comprehensive or totalizing capacity for the study of the social sciences. Thus, according to Veblen (1998, p.403), *M. G. De Lapouge recently said, Anthropology is destined to revolutionize the political and the social sciences as radically as bacteriology has revolutionized the science of medicine*.

Therefore, the economic sciences need rehabilitation, because without a totalizing approach, that is, an analysis that adds the sociological and anthropological elements, in view of different areas of social and human sciences are interconnected, the economy is incapable of dealing with their questions or answer them fully. The science, under the approach of an evolutionary process, comprises a sequence of unfolding. Therefore, economics cannot be seen only as an economic process, since there is a

sequence of facts that influence or determine other events (Veblen, 1998).

With this, science has a cumulative character, because everything has causes and effects and there is not abrupt transition, that is, as changes are gradual and cumulative effects. Unlike the laws of economics, which propose a natural tendency in the dynamic of economic variables: the institutionalist approach, for example, uses biology to deal with evolutionary character or cumulative causation in economics. And with this, it also sees a difference of the institutionalist school, with respect to history, since the historicist analysis narrates the facts and the phenomena, but does not observe the evolutionary aspect (Veblen, 1998).

Similarly, Hamilton (1919) observes that institutional economics explains the nature and extent of economic order in the midst of economic phenomena, so that it can answer the why of a particular society. And this explanation, by virtue of its comprehensive character, cannot be answered by mathematical formalizations, since, as the author analyzes, the economic order is understood by conventions, habits and ways of thought.

According to Hodgson (1998), Veblen (1998) develops a theory of economic and institutional evolution under the use of a Darwinian analysis. In this analysis of natural selection, which understands the evolutionary aspect, there is a broader approach that involves such areas as psychology, anthropology, and sociology.

Consequently, causality is cumulative, mainly because of the imitation and inertia of human behavior. Thus, human nature has characteristics not only of desires but also of hereditary traits and past experiences in which social traditions and conventions are accumulated and formed (Hodgson, 1998; Veblen, 1998).

Thus, according to Veblen (1998), the economic agent is a being with habits and tendencies inherited by antecedents and by cultural means[2], so that it gives shape to thoughts. And since man

[2] The human being is endowed with habits and instincts. Habits are the behavioral traits inherited from the social, in which the individual interacts and can change. And instincts are behavioral characteristics innate and common to all men and therefore do not change (Hodgson, 2004).

is a teleological being, from his cultural and mental structure, he takes his due actions with a purpose. Therefore, according to the author,

> […] The economic life history of the individual is a cumulative process of adaptation of means to ends that cumulatively change as the process goes on, both the agent and his environment being at any point the outcome of the past process […] (Veblen, 1998, p.411).

According to Veblen (1998), economic action is teleological in the understanding that men always and everywhere seek to do something with a certain purpose. Thus, the life of the economic community corresponds to an activity of the teleological type, that is, in an aggregate of teleological actions of the economic agents.

According to the author, the history of economic life in any society is its human life history insofar as it is shaped by the interests of man in the material means of life. And these economic interests exercise determination in the cultural formation of society, so that conventions and ways of thinking, or habits of thought, as the author affirms, accumulate in view of the evolutionary character of institutions, in which the ways of thinking are gradually modified and that, therefore, previous habits of thought still accompany, even partially, new habits of thought. Consequently, a cumulative process of economic institutions[3] is developed, in which men seek the material means of life, as said by the author, and thus the economic interests generate consequences that hardly retroact in time.

Still according to the author, the historicist analysis alone does not see this cumulative process of change in the cultural structure

[3] According to Hamilton (1919), institutions are social arrangements capable of promoting change. And such arrangements, such as conventions, habits, customs, and ways of thinking, shape the economic order and thus permit to explain the prevailing industrial society. Therefore, a strictly economic or economistic analysis cannot answer because determined the society is in determined economic situation. Only institutional economics can provide the appropriate response, because of its broad character of visualization, in which cumulative phenomena are investigated from the outset.

of a society. Even the purely hedonistic[4] analysis, which many economists use, also needs an appreciation in terms of accumulated thinking habits, since such an analysis does not observe an evolutionary character of society added to individual economic interests.

Similarly, Hodgson (1998) notes that habits preserve the results of previous choices, that is, *a habit is a form of self-sustaining, non reflective behavior that arises in repetitive situations* (Hodgson, 1998, p.178). The author further asserts that habits preserve knowledge, including tacit and custom, so that habits reproduce themselves. Likewise, Albert, Bagolin & Quadros (2008) argue that preferences and choices are formed by past and cultural components of individuals under the influence of customs, laws, ways of thinking and feeling, and values.

Thus, according to Hodgson (1998), institutions have characteristics in common, since they constrain and influence decision-making and are shaped by human action[5]. As a result, the institutional economy sees regularities in the system that is reinforced by positive feedbacks. By this, individual habits are also reinforced by institutions, so that such habits accumulate because of their inertia during the evolutionary process of social relations.

Habits or intellectual routines transform information in knowledge capable of performing other social transformations, which underlie other knowledge. And, as already noted, it is a cumulative process (Hodgson, 1998; Veblen, 1998). Thus, Hodgson (1998) understands that institutional constraints or certain institutional characteristics lead to limitations in an industrial society for investment and productivity, since there are causal relations, such as the national cultural, the political system, between others.

Consequently, in institutions there are selections of habits and routines, in which some prevail and others fall into disuse,

[4] The view that agents seek to maximize well-being.

[5] Institutions have a system of rules of behavior or control that seek to maintain a standard. This means controlling the development of an industrial society depends on a set of conventions and the modalities that comprise it (economic concentration, industrial technique, patents, rights, etc.) (Hamilton, 1919).

explaining why institutionalism is congenitally an evolutionary economy (Hodgson, 1998).

According to Hodgson (1998), in institutional formation, learning is not only the acquisition of information, but also the development of new means and modes of cognition[6], calculation and evaluation. In this way, agents construct new representations of the environment, such as new ways of thinking, and thus new trends.

The speed of maturation of the social environment depends on the level and type of learning. The level indicates the speed[7] of change, indicating how industrial society is developed, and type represents the qualitative aspect of change capable of changing the institutional structure.

The development of economic society

According to Ryback (1998), an adequate psychological, moral and civic base is a determining factor in the economic development of a nation. That is, the more misrepresented is this basis, which comes from the thinking habits of the individuals that make up a society, the lower the level of national development.

Thus, Veblen (1898) discusses that there are two human characteristics or instincts that determine the level of development of a society: the instinct for craftsmanship and the instinct for sport. The instinct for craftsmanship occurs regularly in developed industrial societies and relates to the propensity to work well done and with purpose, as long as it is not an activity that physically overwhelms the man; And the instinct for sport is characterized by emulation and happens in any society, since individuals possess, to varying degrees, according to society, a certain competitive spirit in different activities. However, when there is already relative

[6] Cognition is the process of knowledge acquisition.

[7] The speed of maturation depends on the rigidity of the way of life of society because, according to Veblen (1898), this rigidity determines the degree of sensitivity to the reproduction of new habits or emerging conducts.

instrumental production progress[8], individuals tend to develop aggressive behavior.

Consequently, in societies, not yet devoted to the instinct for craftsmanship, with a relative technical progress prevail the fights and other disputes, whose propensities are of the destructive type. Thus, societies in less advanced stages, or societies whose instincts for craftsmanship are not yet prevalent, once developed certain technical capacities, develop more predatory life modes, where the transformation of raw materials into useful objects is not view with admiration.

Once, honor is the exploration and the strife. Consequently, individuals who transform a raw material do not belong to a higher social stratum and therefore, as industrial activities are not respected. And, thus, work causes spiritual discomfort, that the remedy of order is a cultural subversion[9]. However, when the capital is developing, the social structure suffers change and the spirit, before sportsman, goes in direction to the craftsmanship spirit (Veblen, 1898).

Industrial development generates tasks that end in serving man better. Consequently, the work well done turns appreciated, so that the sporting sense leaves borders to the instinct for craftsmanship, *[...] What unites the unqualified approval is conduct that promotes human life in general, rather than promoting the demeaning or predatory interest of one as of another* (Veblen, 1898, p.192).

[8] According to the author, in still primitive societies, whose material progress is still very rudimentary, a collectivist spirit prevails. However, as the development of tools and productive effectiveness occurs, the emulative and predatory spirit becomes manifest. Thus, the most effective weapons are built and the opportunity to extract benefits from aggressive behavior increases. And this intensifies with the greatest population density, which comes from the highest productive efficiency, so that society moves from an archaic state to a predatory state or barbarism, where the exploitative use of force prevails, and reputation is the combat, not work well done, as in developed societies.

[9] Addressing subversion may at first sight appear a paradox, since the institutional cumulative process is gradual, as Veblen (1998) treats. However, the solution in only one period, in the short term, is the abrupt change.

The way of thinking about crafts is the product of a process of habit change with the development of society. As human actions are guided by their propensities, and thus the level of economic development is shaped by such inclinations. Thus, with development, war and conflict are seen with repulsion, since they do nothing to contribute to the development of society. Therefore, the habits of a peaceful and industrial character gradually form with the improvement of the tools and the technical production (Veblen, 1898).

In the predatory way of life, individualistic feeling prevails[10], to the detriment of the development of society. Any form of different conduct is overcome by the common habit. And the more prolonged and consistent this selective adaptation, the more rigid it becomes a change in the way of thinking, and the more common that behavior becomes. However, once predominant, or an instinct for craft, a selection in the community is geared towards a new economic order (Veblen, 1898).

However, a change of economic order, in the quality of form as the financial companies to accompany the industrial development and create a state of industrial art, does not happen without a common stock of knowledge from previous experiences, so that diffuses, throughout the society. In this way, the lack or low level of common stock of knowledge, since it delays a constitution of the indispensable technology to industrial development, ends up hampering the formation of a business society capable and interested in fomenting industrial advance (Veblen, 2011).

Cyert & March (1963 *apud* Lazaric, 2010), in another approach, but complementary, when dealing with business organization, ponders about the existence of coalition, conflicts and organization. From this, the authors observe that the negotiation is inherent to the organization in order to solve the conflicts. Therefore, individuals seek a coalition. However, when the agreement is not possible, it is an obstacle to economic development. Already

[10]In developed society, too, there is the individualistic feeling. However, the institutional aspect for the material development of society tends to prevail, so that institutions, such as federations and employers' unions, pursue a policy of joint interest, since there is the understanding that the strengthening of a set makes greater The individual progress.

Nelson and Winter (1982 *apud* Lazaric, 2010) affirm that the conflicts must be channeled into the routine. From this approach, the channeling or accommodation of conflicts is directed to habits and, consequently, new ways of thinking become entrenched in the routine of individuals.

Rosenstein-Rodan (1984 *apud* Oliveira, 2013), thus, as Kuznets (1986 *apud* Oliveira, 2013) highlights the importance of non-economic factors (natural, historical, social) in the national development process. According to the latter author, institutions are socially incorporated and the increased stock of knowledge capable of changing the economic structure correlates with material well-being and its competence to carry out transformations. Consequently, Kuznets (1966 *apud* Oliveira, 2013) analyzes that the technological innovations come from institutional innovations.

From a similar perspective, Lewis (1960 *apud* Oliveira, 2013) evaluates the determination of the ways of thinking in the process of economic development. In this way, the author exemplifies the association of wealth with social prestige, that is, an attitude that reveals the prestige of owning goods. If the prestige is for the ownership of land, the consumption is unproductive. And if prestige is linked to commerce and industry, then consumption is of the productive type. Based on this approach the level of development of a nation is differentiated.

According to the author, the desire to consume[11] and the access of a certain set of products influences the development process, as well as the valorization of work, the individual reward for work and freedom. Regarding freedom, the economic aspect, the possibility of social ascension and collective action, in which government is added to individualism, are configured. And this set of values can be expanded and diffused, so that it changes the habits of thought and, consequently, the level of economic development.

[11] The author states that economic, scientific, cultural and media development influence the modification of consumer desires. And that the trade is a determining factor for the development, since it influences in the modification of the habits of consumption. Therefore organized markets are indispensable.

Based on the approaches in this section, it is analyzed that the stock of common knowledge generates a cumulative effect, in a way that gives rise to new knowledge, specializations and technologies, so that the nation that is lagging, in relation the another countries, tends to have a growing gap between knowledge acquisition and industrial development.

That is, the time of acquisition of a knowledge becomes large, so that it takes more time for the development of productive structures, since such knowledge becomes obsolete when compared to the new knowledge of the new developed nations, which are increasingly faster and that, therefore, the productive structures develop with greater speed of time.

However, every development begins with changing habits of thought. Without which, society will not develop anything and may even regress, in terms of economic development.

African economic underdevelopment

Since decolonization, Africa has the largest number of armed conflicts on the globe compared to its population (Döpcke, 2004). And many researchers associate underdevelopment in the African continent with poverty and ethnic fragmentation in the states, as Brito (2008) says with the economic aspect tending to prevail. However, long before the economic indicators, there are other features that explain the current moment in Africa, whether under a sociological approach or under an anthropological bias.

According to Machado (1984), under the analysis of African society, the insertion of a different community in another area causes a culture shock, in such a way that it becomes one of the first factors of armed conflicts.

For centuries, people with more sophisticated techniques and more organized political structures have overlapping less developed peoples, such as African tribal communities in which there is little population density and the technique is underdeveloped (Machado, 1984). Overlapping, over time, among African and European peoples, it is also exemplified among African peoples of different factions or tribes.

According to Machado (1984), cultural differentiation is used as a pretext for colonization, since European society judges its culture

superior to that of Africa. Similarly, Amin (1994, *apud* Barbosa, 2012) analyzes the belief in European / Western development as desired by all societies and nations. This is in a mental structure of provincial character in Europe, in which it diffuses in peripheral regions.

In agreement with Amin (1994 *apud* Barbosa, 2012), the underdeveloped peoples, under the European eye, must go through a unique civilizational trajectory, whose peak is the European way of life. Similarly, Quijano (2000 *apud* Barbosa, 2008) analyzes that the imposition of European / Western culture in African society is related to a paradigm, in which the mental structure of one society is reproduced in another[12]. However, according to Döpcke (1999), the interest in commercial expansion is a relevant factor of European colonization in Africa[13].

European colonization leads to the emergence of African guerrillas in favor of national independence, and many have continued, in modern times, in disputes over power. From this, it is observed that the formation of African nations, in the second half of the twentieth century, has increased many conflicts on the African continent. Therefore, much cultural resurgence, among

[12]The conception of superiority of European / Western culture over other cultures is treated as an ethnocentric, or Eurocentric, view in this case, so that this becomes an ontological question to be answered. That is, in the Veblerian sense, it is an issue that starts from the analysis of the interaction of human behavior with the community (Oliveira, 2013).

[13]According to Campos, Gonçalves & Rieger (2011), during the Second Industrial Revolution (1850-1870), the productivity of labor increased due to scientific advances in industrial production. However, the level of unemployment rises with the installation of new machinery and, as a result, the domestic market suffers from a decline in consumption, and subsequently there is a reduction in the level of investment, despite the fact that production continues to rise. Consequently, the first depression of capitalism (1873-1895) breaks out, in which the competitive level is reduced by the increase of mergers and acquisitions. Thus, due to the need for new markets for surplus production, the European powers discussed at the Berlin Conference (1884-1885) the partition of Africa, which led to a breakdown of cultural identity in the peoples of the African continent. From this, together, with the economic interest introduces a mental structure conforming to the European way of life.

different groups on the continent, must undergo an etiological study[14] (Machado, 1984).

Similarly, Gonçalves (2001) states that European colonial delimitation affects demographic and local equilibrium. Thus, according to Amin (1989 *apud* Branco, 2009), cultural pluralism is an obstacle to the construction of a nation and thus the process of development and democracy[15]. In view of this, Dahl (2000) argues that resolving political conflicts requires negotiation, conciliation and compromise, since political groups represent only specific ethnic groups.

However, such political negotiation to accommodate cultural interests and therefore the construction of nations is corrupted when European states demarcate colonial territories. In this way, with the independence of the African states, political groups come to represent particular ethnic interests, in a despotic way, to the detriment of the common good.

Consistent with this view, Machado (1984) analyzes that the territorial divisions, drawn up by the European states, without respecting the characteristics of the local people, lead to conflicts on the continent, including the principle of sacredness between different ethnic groups in the same territory. Thus, latent antagonisms between different tribes and ethnic groups in the colonial period erupt in order to contest political power with the independence of the colonies. Complementarily, Brito (2008) ponders about the fear of extinction and loss of identity of one group when being superimposed over another. This hampers national unity, which is a factor of extreme importance for the development of the state.

Also, Gonçalves (2001) reflects that in regions of Africa, as in the case of the former Kingdom of Congo, colonial power disarticulates the symbolism of social, political and religious structures. And even colonization distorts the society structure of

[14]The concept of etiology refers to the study to explain the causes of some phenomenon.

[15] The greater the level of freedom allows the appearance of other demands. However, ethnic conflicts hinder the emergence of democracy on the African continent, which is a fundamental factor of development (Martin, 2006; Gonçalves, 2001).

patrilateral relationship and alliances in social organization, in which ethnic ambiguities are accommodated, so that society does not have destructive conflicts[16].

Thus, according to Gonçalves (2001), a formal and autonomous monolithic political system is formed, in relation to the social, that distorts the socio-political relations by subversion of two complementary values that are the sacred power and the symbolic values of the tutelary spirits from the earth.

Gonçalves (2001) even evaluates that in Africa today ethnic sentiments are used for political electoral manipulations. And this creates a repression against the other ethnic groups that are not in the power[17]. According to Amin (1989), this repression exacerbates cultural pluralism and intensifies ethnic differences by combating such differences through repressive methods.

The problem of African underdevelopment can be, in a complementary way, clarified by the presentation of Doumbia (2011), in which the author ponders that the understanding of development has been treated under an ethnocentric vision. According to the author, the concept of development starts from a unilateral and reductive view of the world, from an imaginary of a model, in which African modernization must undergo a transformation of the material and mental structures.

In fact, the author states that a misunderstood development model causes an identity crisis on the African continent, which can lead to political and economic crises. Thus, according to the author, development policies aimed at Africa tend to accentuate the

[16]Prior to the colonization of the Bakongos case in the former Kingdom of Congo, there is a domain for matrilination, but patrilaterial relations harmonize social organization, so that there is a traditional balance between matrilination and the patrilateral line (Gonçalves, 2001).

[17]According to Döpcke (2004), the popular perspective assesses the sharing of Africa, poverty, and political culture not prone to peace as the originators of conflicts on the continent. However, the author considers that wars for colonial liberation, wars of separatism and ethnic unification, wars by territory, wars for racial repression exist throughout the world. And what is common in most wars in Africa involves issues of human need because the African state model, created in decolonization by international consensus, is a culture of absolute exclusion.

situation of poverty, since structural adjustment programs do not integrate the continent into the world market because it is a model based on mimicry. For this reason, Joseph Ki-Zerbo (1992) used the term of endogenous development in the 1970s to explain that *"we do not develop" but "we develop us"* (Doumbia, 2011, p.127).

Regardless of frontier issues, delineated by Europeans, antagonism between different peoples already existed in Africa long before the arrival of the colonizers. Untill can even expect that a gigantic continent will dominate quite different and conflicted peoples. However, emulation between peoples is amplified by the policy of European expansion, since African groups rise to power, to the detriment of others.

The fear of this overlap, coupled with the greed of rebel groups under the protection of a fragile political environment, prevents industrial segments from flourishing on the African continent, so that even an institutional environment conducive to the development of credit and foreign direct investment find an obstacle.

The fragility of political institutions, whether in the promotion of credit, in economic regulation or even in the effective fight against rebel groups, among other factors, also impairs the defense of African interests in agricultural foreign trade.

In this way, with the scrapping of the manufactures and a poverty incapable of even consume products derived from their rural environment, it feeds a misery that adds to the institutional collapse[18]. But this represents one of the consequences of the current institutional environment in Africa that feeds human action.

Therefore, in observing the genesis of the development of African economic society, which still does not yet have, in many regions, an environment conforming to the instinct focused on craftsmanship, it is analyzed that human action precedes the institutional process and, since then, the change of both factors of

[18] Brito (2008) analyzes that poor African countries are hostage to the conflict trap in order to hinder development policies because there is a circular causality between poverty and conflict. However, the author observes that the ethnic division and the conflicts are economic factors, due to the weak productive structure and the economic dependence.

the question of this research influence each other, in such a way that the institutional environment is always feeding back[19].

Review of empirical literature

Hodgson (2006) uses the Ordinary Least Squares (OLS) method to regress between 1989 and 2005 data from 27 former communist countries in the Soviet Union to assess the impact of institutions on economic growth. The author takes as independent variables the indices of economic recession, influence of western Christianity on the national territory, democracy and ethnic fragmentation used by Fearon (2003).

For the application of the economic recession index, the author uses the lowest point of GDP per capita in the 1990s, compared to the per capita GDP of 1989.

The author aims to demonstrate the importance of effective national institutions, the application of non-discriminatory rules and overcoming the negative economic legacy with ethnic divisions in economic growth.

Other variables such as property rights, corruption, economic freedom do not present statistical significance in the model, at the level of 5%. In relation to the economic recession, this one presents statistical insignificance when considering the depth and time of the recession. But when one considers only depth there is significance. With regard to the influence of Western Christianity, since other countries of analysis are influenced by Islam and Russian Orthodox Catholicism, the influence of Protestantism is not significant, whereas in Catholicism there is statistical significance. And, in reference to ethnic fragmentation, which is significant, the opposite occurs when it comes to cultural fragmentation.

[19]Human action, or rather, the action of the aggregate of the agents of society proceeds, in the manner of Veblen (1998), the collective way of thinking. However, once the dynamics of society are determined, collective thinking, human action, and the institutional process determine each other, sequentially, from beginning to end and end to beginning.

As the author does not fail to point out, the occurrence of statistical insignificance is related to imperfect or minor causality indexes.

The influence of western Christianity is the only variable that positively determines GDP, that is, each per cent increase of this regressive variable, the variable response increases by 1,711. Meanwhile, economic recession, democracy and ethnic fragmentation determine respectively in GDP by 0,067, - 0,306 and - 4,47. The positive coefficient of recession refers to the recession of low depth, which determines positively in economic growth.

It is noted that ethnic fragmentation exerts the greatest negative weight in GDP, followed by the variable of democracy and recession.

All variables present statistical significance between 0.1 and 1%. And the adjusted coefficient of determination is 0,822, which is a model well explained by the relation of the exogenous variables to the endogenous variable.

According to Winiecki (2004 *apud* Hodgson, 2006), the institutional legacy of Christianity is influenced by the Enlightenment, a movement that has spread the separation between Church and State, as well as the innovations necessary for the development of the economic order and the defense of individual and, since then, more favorable to trade and entrepreneurship. In countries whose official religion or base is the Western Christian, the separation of church and state tends to occur. And such norms are rooted in social life.

Ethnic fragmentation makes it difficult to insert general rules (Hayek, 1960 *apud* Hodgson, 2006). And so it also hampers a coalition that preserves national interests. According to Weber (1930 *apud* Hodgson, 2006), modern capitalism requires the introduction of general and impersonal rules. Thus, in a modern and innovative economy, social structures are modified. However, under ethnic cleavage these modifications become difficult (Hodgson, 2006).

And democracy requires a sense of national identity and citizenship. However, under ethnic fragmentation, this sense becomes difficult. Ethnic fragmentation in the former communist countries studied makes democracy a negative variable for

economic growth. Democracy allows legitimacy and consensus before the general rules that regulate economic activity. However, its democratic principles must be rooted in the thinking habits of society (Hodgson, 2006).

In democracy, an economically inefficient government can be defeated by voters. But according to Weingast (2005 *apud* Hodgson, 2006), in a democratic regime, when under ethnic diversity, the much needed coalition to general consensus, it becomes difficult, so that an ethnic group can exert the benefits of power itself, at the expense of the other group. In addition, according to Hodgson (2006), ethnic sentiment can be used in electoral manipulations.

In view of this, democracy does not exert a positive growth variable during the period of research of the object countries, since such principles are used for electoral manipulation, in addition to the limited democratic experience of governments (Hodgson, 2006).

Analysis of results

Based on the study by Hodgson (2006), this research performs a panel analysis by the Generalized Method of Moments (GMM), in addition to the OLS, because GMM allows large samples to be eliminated, in addition to the problem of endogeneity, the problem of heteroscedasticity with greater efficiency by minimizing the asymptotic variance among the estimators of the moments method (Cragg, 1983; Wooldridge, 2001).

Data

The time period comprises a 10-year interval between 1993, when the last African nation becomes independent (Eritrea), and 2013 in 21 countries[20]. The estimation data are:

Gross domestic product (%) (GDP): Response variable. Data from the World Bank.

Control of Corruption (CONTROL): Reflects the capture of the state by private interests, that is, the level of corruption of public agents by private sector actors. This variable has a positive

[20]See annex.

correlation with the response variable. Data from the Transparency International.

Christianity (CHRIST): This is the dummy variable. When zero (0) reflects a Christian minority, which in this case is equal to or less than 50%. And when one (1) reflects a Christian majority, that is, greater than 50%. Data obtained by the United Nations and the Barbosa literature (2012).

Democracy (DEMO): Captures the freedom of expression of citizens in participating in the choice of government, as well as the freedom of social media. This variable has a positive correlation with the response variable. Data from Transparency International.

Cultural Fragmentation (CULT): This variable has a negative correlation with the response variable. Data of Fearon (2003).

Ethnic Fragmentation (ETHNI): This variable has a negative correlation with the response variable. Data of Fearon (2003).

Perception of Corruption (PERCEP): This variable represents how much corruption is perceived on the basis of observations of independent and reputable institutions. This variable has a negative correlation with the response variable. Data from Transparency International.

Rules and Laws (RULE): It reflects the public's confidence in the quality of enforcement of contracts, property rights, the police and the courts and also in the likelihood of crimes and acts of violence occurring. This variable has a positive correlation with the response variable. Data from the Transparency International.

Results

The general representation of the estimation models corresponds to equation (1), below. The only explanatory variable with a lag is the GDP because it is the only variable that varies in the time period.

$$GDP = \beta_0 + \beta_1 GDP_{t-1} + \beta_2 CONTROT_t + \beta_3 CHRIST_t + \beta_4 DEMO_t + \beta_5 CULT_t + \beta_6 ETHNI_t + \beta_7 PERCEP_t + \beta_8 RULE_t + \varepsilon_t \quad (1)$$

Table 1. *OLS Results*

Exogenous Variables	OLS			
	Eq.1	Eq.2	Eq.3	Eq.4
C	-17,3694**	-17,3279**	-17,4422**	-16,5363**
	(6,6563)	(6,5582)	(6,4564)	(6,3176)
	[-2,6095]	[-2,6422]	[-2,7015]	[-2,6175]
GDP(-1)	0,4015	0,3989	0,3921	0,3664
	(0,3329)	(0,3279)	(0,3225)	(0,3191)
	[1,2062]	[1,2167]	[1,2160]	[1,1484]
CONTROL	12,2846	12,0180	10,7161	11,6543
	(16,3071)	(16,0187)	(15,0388)	(14,9101)
	[0,7533]	[0,7503]	[0,7126]	[0,7816]
CHRIST	-0,5550			
	(2,8348)			
	[-0,1958]			
DEMO	-8,5771	-8,4658	-9,7671	-7,9004
	(13,5888)	(13,3836)	(12,2788)	(11,9800)
	[-0,6312]	[-0,6326]	[-0,7954]	[-0,6595]
CULT	-7,8606	-6,9745	-7,4236	
	(10,8885)	(9,7620)	(9,4844)	
	[-0,7219]	[-0,7145]	[-0,7827]	
ETHNI	25,4670**	24,6115**	25,0570**	19,5711***
	(11,1803)	(10,1443)	(9,8695)	(6,9112)
	[2,2778]	[2,4261]	[2,5388]	[2,8318]
PERCEP	16,4571	15,4786	14,3646	11,3782
	(29,4423)	(28,6016)	(27,9110)	(27,4999)
	[0,5590]	[0,5412]	[0,5147]	[0,4138]
RULE	-4,5416	-3,6904		
	(14,8153)	(13,9612)		
	[-0,3065]	[-0,2643]		
Adjusted R^2	0,2106	0,2330	0,2533	0,2614
Statistics F	2,3676	2,7789	3,3186	3,9018
Prob F	0,0390	0,0213	0,0108	0,0063
Akaike	7,1018	7,0554	7,0098	6,9795

Notes. () for standard deviation and [] for t statistics. (*) Level of significance of 10%, (**) 5% and (***) 1%. The instrumental variables are GDP(-1), CONTROL, CHRIST, DEMO, CULT, ETHNI, PERCEP and RULE. Source: Own elaboration.

Table 2. *GMM Results*

Exogenous Variables	GMM			
	Eq.1	Eq.2	Eq.3	Eq.4
C	-17,3694**	-17,3279**		
	(6,6563)	(6,5582)		
	[-2,6095]	[-2,6422]		
GDP(-1)	0,4015	0,3989	0,0102	
	(0,3329)	(0,3279)	(0,3105)	
	[1,2062]	[1,2167]	[0,0328]	
CONTROL	12,2846	12,0180	30,0785**	30,3653**
	(16,3071)	(16,0187)	(13,3151)	(12,9609)
	[0,7533]	[0,7503]	[2,2590]	[2,3428]
CHRIST	-0,5550			
	(2,8348)			
	[-0,1958]			
DEMO	-8,5771	-8,4658		
	(13,5888)	(13,3836)		
	[-0,6312]	[-0,6326]		
CULT	-7,8606	-6,9745	-3,3133	
	(10,8885)	(9,7620)	(9,9063)	
	[-0,7219]	[-0,7145]	[-0,3345]	
ETHNI	25,4670**	24,6115**	13,9427***	11,9171**
	(11,1803)	(10,1443)	(7,6536)	(4,5570)
	[2,2778]	[2,4261]	[1,8217]	[2,6151]
PERCEP	16,4571	15,4786	-43,0328**	-43,0619**
	(29,4423)	(28,6016)	(19,5661)	(18,9012)
	[0,5590]	[0,5412]	[-2,1994]	[-2,2783]
RULE	-4,5416	-3,6904		
	(14,8153)	(13,9612)		
	[-0,3065]	[-0,2643]		
AdjustedR^2	0,2106	0,2330	0,1434	0,1848
Statistics J	0,0000	0,0394	6,5917	7,0449
Prob J	-	0,8426	0,1591	0,3167
Instrument rank	9	9	9	9

Notes. () for standard deviation and [] for t statistics. (*) Level of significance of 10%, (**) 5% and (***) 1%. The instrumental variables are GDP(-1), CONTROL, CHRIST, DEMO, CULT, ETHNI, PERCEP and RULE. Source: Own elaboration.

Based on the results of OLS, only ETHNI presents statistical significance, but with an oppositesign to that presented in the literature, since according to this approach, there is a negative correlation between ETNI and GDP.

The variables GDP (-1), CONTROL, CULT and PERCEP show the expected signal, but their respective impacts are not significant. Now the CHRIST dummy variable and the other variables (DEMO and RULE), in addition to being non-significant, have a negative sign, and the impact of CHRIST is in the opposite direction.

The estimates of the model have global significance, according to the Statistics F, and low levels of adjusted coefficient of determination, which vary around 0,21 and 0,26.

In GMM estimates the dummy variable worsens the model results. However, the instrumental variable CHRIST makes the results, in general, better.

Thus, as in the OLS, the ETHNI presents a significant and opposite sign than expected in the literature, which may, in part, be explained by some omitted variable in the model, since the respective coefficients of adjusted determination have low values.

The RULE and DEMO variables are insignificant and have a negative sign. And PIB(-1) and CULT have the expected signal, but without significance. However, the impacts of PERCEP and CONTROL point to the issue of corruption in the African continent, since both variables are significant and show the direction of expected impact.

In both variables related to corruption there is a significant significant impact, which is around, respectively, for PERCEP and CONTROL, -0,43 and 30,0.

With respect to Statistics J, the model has a good specification because it has p-values greater than 10%, that is, it confirms the null hypothesis of correct model specification in$J > 0,1$. However, the adjusted R^2 values have low levels, around 0,18 and 0,23.

Conclusion

The institutionalist approach understands that the institutional process and thus human action is gradual and cumulative, since human action is teleological and that agents have habits under the influence of past experiences.

In effect, agents and therefore the economic society form a level of knowledge stock that, depending on the level of development of the productive technique, the economic society may have an instinct for sport or an instinct for craftsmanship.

In the first instinct, the productive technique, still does not have an industrial level, so that the emulation tends to prevail. And in the second instinct, because of industrial technique, the desire for good work tends to be shaped by the customs of society.

Under such a literary approach, the African economic society is analyzed. Due to differences, prior to colonization and later with a greater degree of conflict, industrial technology does not develop sufficiently, in such a way that the African continent is characterized as the most underdeveloped continent of the planet, in spite of its immense natural wealth.

And this interaction on the continent has to a certain extent been found by empirical analysis because, although ethnic fragmentation has not had the expected impact, the problem of corruption has a negative impact on economic growth, so that it even affects social relations in the region and in their respective development.

However, this whole institutional process is evoked by human action. And since then, the change in the institutional process shapes the change in human action and vice versa, since both changes begin to feedback, so that it makes it quite difficult to break this institutional inertia.

And this is not solved, simply, with economic or economic development policies because it encompasses a set of issues. But how to solve the problem of Africa's underdevelopment is another question because this research is limited only to analyzing the causes.

Appendix

Table 3. *Estimation data*

Countries	GDP 1993	GDP 2003	GDP 2013	ETHNI	CULT	CHRIST	PERCEP	CONT.	RULE	DEMO
Algeria	-2,1000	7,2000	2,8000	0,320	0,237	0	0,360	0,380	0,270	0,180
Botswana	1,9161	4,6259	9,8603	0,351	0,161	1	0,630	0,800	0,680	0,600
Burkina Faso	3,4614	7,8024	3,6493	0,704	0,354	0	0,380	0,440	0,480	0,390
Burundi	-6,2400	-1,2237	4,5941	0,328	0,040	1	0,200	0,120	0,100	0,220
Ghana	3,0121	6,8700	4,7809	0,846	0,388	1	0,480	0,600	0,540	0,630
Guinea Bissau	5,0441	1,2486	2,3000	0,818	0,568	0	0,190	0,140	0,060	0,240
Liberia	3,3306	4,6912	4,4610	0,899	0,644	1	0,370	0,360	0,170	0,400
Libya	-32,975	-30,145	8,7039	0,151	0,127	0	0,180	0,060	0,180	0,030
Malawi	2,0966	9,7849	2,2635	0,829	0,294	1	0,330	0,420	0,510	0,440
Marocco	3,1722	12,9523	7,0145	0,479	0,360	0	0,390	0,530	0,500	0,280
Mauritius	-0,7406	5,9612	4,7253	0,632	0,448	0	0,540	0,730	0,750	0,700
Mauritania	5,0821	3,6569	3,1892	0,625	0,272	0	0,300	0,290	0,220	0,230
Mozambique	5,8736	5,9783	6,0903	0,765	0,285	0	0,310	0,430	0,370	0,450
Niger	-1,5795	4,2398	5,6546	0,637	0,600	0	0,350	0,310	0,330	0,300
Kenya	2,0904	10,3542	5,3944	0,852	0,601	1	0,250	0,190	0,170	0,400
Rwanda	-8,1087	1,4513	4,6845	0,180	0,000	1	0,490	0,710	0,460	0,110
Senegal	1,3008	6,6832	3,4852	0,727	0,402	0	0,430	0,300	0,420	0,360
South Africa	1,2336	2,9491	2,2124	0,880	0,530	1	0,440	0,610	0,580	0,650
Tunisia	2,1898	4,7024	2,3000	0,039	0,033	0	0,400	0,550	0,590	0,100
Uganda	8,3263	6,4733	3,2707	0,930	0,647	1	0,260	0,210	0,420	0,340
Zambia	6,7973	6,9450	6,7135	0,726	0,189	1	0,380	0,330	0,380	0,390

Source: Own elaboration.

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2 Economic growth, human capital & convergence: Panel data analysis for a sample of African countries

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Introduction

The study of the effects of human capital on economic growth has aroused increased interest from economists and policy-makers and has been the subject of extensive research analysis in recent decades. The initial theory of this relationship goes back to the pioneering work of Mincer (1958), Schultz, (1961) and Becker, (1962), which considered human capital as a factor of production, comparable to physical capital. Thus, investing in education, health and training will increase production and thus contribute to economic growth.

The first works, emphasis was placed about the contribution of human capital on the standard of living, as well as global wealth.

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Thereafter, the focus was on its role as a source of economic growth. The works of Schultz, (1960) and Becker, (1962; 1964) contributed significantly to the large gap between human capital accumulation and that of physical capital and opened the way for a systematic study of the role of human capital.

The theory of endogenous growth Lucas, (1988) and Romer, (1990) suggests that human capital is a source of innovation and technological progress, which are determinants of economic growth. The augmented neoclassical growth model of human capital Mankiw *et al.*, (1992), considers that human capital is probably the most important input to the growth process.

The renewed interest in the empirical literature for the debate on growth in Africa is mainly due to the growth performance of some countries in the region and differences in their income. These gaps result from many determinants, including the importance of human capital, which is often advanced in growth models. As such, Young, (2012) and Rodrik, (2014) have focused on the sources of the unexpected acceleration in the growth rate of African economies since the mid-1990s. These same performances put an end to the traditional pessimism towards the continent, given the poor growth experience during the 1980s.

In this sense, the objective of this article is to explain the differences in the effects of human capital on growth for a panel of African countries over the past five decades. By using a neoclassical growth model augmented by human capital, focusing on amplitude variations, signs of estimated coefficients and the speed of convergence of countries towards their steady states. The results obtained will be compared with those of the Solow model.

This paper is organized in the following structure: At first, we will discuss a review of the literature on the relationship between human capital, economic growth and convergence. Then, we willfocus to the theoretical model taken into account and present the specification adopted, the description of the variables and the econometric methodology adopted in the study. Finally, the results obtained will allow us to draw conclusion remarks.

Literature review

Human capital and economic growth

Schultz (1960) closely identified human capital with investment in education and proposed that "*important increases in national income are a consequence of additions to the sock of this form of human capital*". He added that investment in education could explain much of the increase in per capita income in the USA.

Becker (1964) extended the concept of human capital from formal education to include additional sources of human capital accumulation, such as on-the-job training, informal collection of information that improves a worker's productivity and other investments to improve "*emotional and physical health*". Then, he analysed the number of individual investors and the rate of return on this investment. Factors that influence performance include the uncertainty and illiquidity of the investment, as well as capital market imperfections and differences in capabilities and opportunities.

The contributions of Lucas, (1988) and Mankiw *et al.,* (1992) will provide new impetus to the debate on the relationship between economic growth and human capital. At the end of the last century, some works such as those by Caselli, Esquivel & Fernando, (1996) and Pritchett, (2001) have, however, challenged this relationship and resulted in an absence of a link, or even a negative relationship.

Lucas (1988) focuses on the reproducible nature of human capital and the possibility of externalities generated by it. It's natural to assume that the knowledge accumulated by individuals (whether as a result of formal education or not) would have an impact on productivity, not only of the people accumulating knowledge, but also of their colleagues and others.

The results on the relationship between growth and human capital therefore seems to depend on indicators andproxy used to characterize human capital. Wössman (2000) proposed a review of the latter used in the literature:

- Enhanced work in education (e.g. skilled and unskilled work) (Denison, 1967; Jorgenson, 1995);
- The literacy rate Romer, (1990), the average or primary, secondary school enrolment rate Barro, (1991);

- Mankiw *et al.,* (1992) and Levine & Renelt, (1992) or the average number of years of study Barro & Sala-I-Martin, (1995); Barro, (1997); Benhabib & Spiegel, (1994).
- Mincerian human capital theory and Hanushek & Kimko's quality index (2000).

Of particular interest is the study by Hicks, (1979) on 69 countries for the period 1960-1973. He applied econometric tests to initial enrolment rates, initial literacy rates and indicators of life expectancy at the beginning of the period. Hicksstressed that only the impact of life expectancy on the product per capita over the period dominates. In his analysis, Romer, (1989) tried to verify the empirical validation of his earlier theoretical model by regressing the literacy rate on the per capita product growth rate and investment of 94 countries during the period 1960-1985. The educational variable in these models positively affects economic growth but its impact is statistically insignificant.

Mankiw *et al.,* (1992) propose an Augmented Solow model. For them, it's disparities in education, savings and population that can explain differences in per capita income. They also note that poor countries tend to grow faster than rich countries or those with similar technology, capital accumulation rates and population growth, and are expected to converge later than the latter, as predicted by the Solow model.

Benhabib *et al.,* (1994) proposed an approach based on endogenous growth theory. These authors modelled technological progress as a function of the level of human capital. Their results challenge the traditional role of human capital as an isolated factor of production in the development process. They showed that it is the direct effect of education on the ability to innovate that can influence growth in the richest countries, while the catch-up effect occurs in the poorest countries. They concluded that the impact of education on growth is to be determined according tothe level of development of each country.

Following the Mankiw *et al.,* (1992) specification, Islam, (1995) used a panel data approach to take into account the country-specific effects. The author reformulated the regression equation used in the convergence study into a dynamic panel data model with individual effects. Its results indicated that by taking into

account the specific effects, the coefficient of the human capital variable is no longer positive and even becomes negative in some cases. Therefore, human capital no longer has an impact on GDP per worker growth.

Barro's contribution (2001) introduced a new measure of educational quality into the growth model. The author has constructed different indicators according to students' skills in mathematics, science and literature for a sample of 100 countries over the period 1960-1995. He developed an endogenous growth model that allowed him to estimate the role of education, showing that the quality of education is more important than its quantity measured by the average completion rates of secondary and higher education.

Human capital, economic growth and convergence

In the recent literature on growth, two currents of thought can be clearly distinguished. Between 1956 and the mid-1980s, the dominant theory was Solow-Swan's exogenous growth model. According to neoclassical theory, an economy converges to a steady state due to the decrease in the return on investment in physical capital. In this framework, it's assumed that countries are equal in all respects, except for their initial level of capital per capita, and that poor countries have higher marginal capital productivity than rich countries.

As a result, poor countries will grow much faster than rich countries and this process will end with the equalisation of per capita production in these countries. As for convergence, Solow's model suggests that it can only be applied to countries with relatively similar initial positions. Moreover, the convergence hypothesis could work in countries with a similar economic, political and social environment, hence the concept of a convergence club articulated by Baumol, (1986). This has also been known sigma convergence (σ), i.e. that during the growth process, countries' income levels will become more equal and the gap between their GDP per capita levels will gradually narrow. Countries with very different conditions will not converge, unless they have certain economic policy instruments to eliminate this differences.

Within the framework of the endogenous growth model, several types of approaches could be distinguished. These include models with externalities resulting from accumulation linked to capital and knowledge (Romer, 1986), human capital accumulation (Lucas, 1988), as well as an increasing stock of existing products or horizontal differentiation between products. Another contribution added by Abramowitz, (1986), argues that the use of new technologies requires not only technological absorption capacity, but also so-called social capacity, which includes human capital, infrastructure and appropriate institutional frameworks.

According to the theory of endogenous growth, there may be no convergence. The lack of adequate social capacity can be a serious obstacle in this purpose. For example, (Lucas, 1988) showed that under conditions where increasing human capital returns are the main engine of economic growth, the possibility of a brain drain could act as a source of divergent growth between countries. Other authors have stressed that research and development (R&D) and human capital creation, would also lead to increasing inequality between countries and will tend to diverge rather than converge, because poorer countries will have far fewer resources to devote to these areas (Romer, 1986).

Using a large sample of poor and rich countries from Summers & Heston's (1988) international data, (Romer, 1989) further developed the economic convergence test and concluded that absolute convergence no longer holds for a large heterogeneous sample of countries. Specifically, Romer found that there was no significant correlation between initial income levels and subsequent growth rates.

Methodology and Data

Model

The use of panel data techniques eliminates a gap common to the first generation of empirical growth literature that uses cross-sectional datasets (Mankiw *et al.*, 1992; Barro, 1992). It does not take into account the country-specific effects, and assumes that they are not correlated with the explanatory variables. As a result, estimators provide biased results (Caselli, Esquivel & Lefort, 1996). The elimination of the incoherence of an estimator due to the

existence of heterogeneity (i.e. specific effects) does not put an end to the problem of several covariates that cannot be strictly exogenous. This endogeneity bias (Hoeffer, 2002) is a second source of inconsistency in estimators.

To obtain consistent estimates of coefficients, this paper presents the two sources of inconsistency as in (Islam, 1995), (CEL, 1996), (Hoeffler, 2002); we estimate the following equation:

$$ln(\frac{Y}{L})_{it} = ln(A_{i0}) + g_t + \frac{\alpha}{1-\alpha-\beta} ln(S_k)_{it} + \frac{\beta}{1-\alpha-\beta} ln(S_h)_{it} - \frac{\alpha+\beta}{1-\alpha-\beta} ln(n_{it} + g + \delta)$$

In this equation, human capital is introduced by its accumulation rate S_h. We assume that technological progress is uniformly disseminated in the sample countries, i.e., the technology is considered as a public good and is disseminated in different countries at a common and constant rate (g).

Nevertheless, these countries differ in their initial technology level. Thus, this level for each country at a given time is equal to: $ln(A_i) + g_t$ = constant + η_i. The term η_i represents the specific effect. Therefore, and after adding the specific effect and the global shock over time, the productivity equation becomes:

$$ln(\frac{\tilde{Y}}{L})_{it} = constante + \frac{\alpha}{1-\alpha-\beta} ln(S_k)_{it} + \frac{\beta}{1-\alpha-\beta} ln(S_h)_{it} - \frac{\alpha+\beta}{1-\alpha-\beta} ln(n_{it} + g + \delta) + \eta_i + \mu_t + \varepsilon_{it}$$

Following the same reasoning, the convergence equation estimated in the panel data framework is represented as follows:

$$ln(\frac{Y}{L})_{it} - ln(\frac{Y}{L})_{it-1} = cst + \beta ln(\frac{Y}{L})_{it-1} + \frac{\alpha}{1-\alpha-\beta} ln(S_k)_{it} + \frac{\beta}{1-\alpha-\beta} ln(S_h)_{it} - \frac{\alpha+\beta}{1-\alpha-\beta} ln(n_{it} + g + \delta) + \eta_i + \mu_t + \varepsilon_{it}$$

The model also includes specific factors for each period μ_t and for each individual η_i (taking into consideration the effects specific to a period, such as changes in productivity affecting all countries), and an independent and identically distributed error term ε_{it}. Since it's difficult to think of appropriate external instruments (Arellano & Bond, 1991), recommend the GMM estimator to solve the difficulties of empirical growth regressions. Due to the inadequacy of the first difference estimator (Hoeffler, 2002), we use the GMM system estimator developed by Blundell & Bond, (1998). The particularity of this method is that it makes it possible to compensate for different types of bias.

In addition, the GMM system estimator does not require external instruments, but uses lagged levels and differences between two periods as instruments for the current values of endogenous explanatory variables. The procedure simultaneously estimates a system of equations that includes both the first differences and the equation to be estimated in level. Taking into account the first differences eliminates the country-specific fixed effects and solves the problem of the potential omission of the initial level of technology and other country-specific factors, invariant over time, that influence growth. This approach allows us to focus on the impact of explanatory variables on the growth of income per worker and not the other way around.

We perform the two tests associated with the GMM system estimator in a dynamic panel: Arellano & Bond's test for the absence of autocorrelation of second-order errors and Sargan & Hansen's over-identification test to check the quality of the instruments used. In general, the results of the GMM system estimation are sensitive with respect to the treatment of right-hand side variables as predetermined, endogenous or strictly exogenous.

In our model, the only strictly exogenous variables are the time dummies, which are systematically introduced into convergence estimates. The lagged GDP per capita and the human capital stock variable can be considered as predetermined. The investment rate expressed as a percentage of GDP, the population growth rate are considered endogenous.

Data

The variables to be used are real output Y, labour force L, gross investment rate in physical capital (S_k), gross investment rate in human capital (S_h), growth rate of technological progress g, labour force growth rate (n) and capital depreciation rate (δ). We use productivity and convergence equations to identify the factors that drive productivity and convergence speed at the steady state level.

As a measure of productivity, we use real GDP expenditure-side (RGDEPe) to compare relative living standards across countries and over time. Unlike the population growth rate, the technology growth rate is not observed. The population growth rate is calculated from the population series in version PWT 9.0. The term $ln(n + g + \delta)$ is therefore calculated as the logarithm of the population growth rate added to a constant ($g + \delta$) of 0.05 as in (Mankiw *et al.*,1992).

Some authors use variables per worker (Mankiw *et al.*, 1992) and others use variables per capita, (Islam, 1995). However, the results are not sensitive to either of the two choices. In our work, we opt for the second approach because we seek to understand the sources of productivity differences between African economies. This choice is made despite the fact that data on the number of people employed in African countries are not of high quality. The gross investment rate in physical capital is approximated by the variable gross capital formation in the PWT 9.0 database.

Since human capital represents the set of skills, talents and abilities that are added to the human workforce through the process of learning by doing, the health system, formal and informal education or vocational training. We use as a measure of human capital stock, the index proposed by PWT 9.0, taking into account the average number of years of schooling and academic performance according to the Mincerian approach.

Another approach we have chosen to apply is to integrate the qualitative aspect of human capital. Several indicators are proposed in the UNESCO database. The choice was made for the pupil-teacher ratio in primary (ln_sh1) and secondary (ln_sh2) education next to the proxy of the human capital stock measuring the quantitative aspect.

However, the data are available that since the 1970s. This is why estimates of the convergence equation incorporating qualitative variables will be made over the period 1970-2014.It should be noted that the estimation of the above models will be carried out both on the overall sample and on appropriate country subgroups to test the convergence. The two criteria used for the distribution of the countries in the sample are the income level (low; low intermediate; low intermediate; low intermediate; low intermediate; low intermediate; low intermediate; high intermediate) and the oil production.

Results

Estimation of the productivity equation

Estimating the productivity equation, which assumes that countries are in a steady state, allows us to measure the effect of various explanatory variables on the level of GDP per worker. The p-value associated with the statistical F for the estimated equations is significantly different from 0, which confirms the existence of individual heterogeneity in our data. In addition, the Hausman test suggests the adoption of a specification in fixed effects.

Tables 1 & 2 (in appendix) present the results obtained from the standard Solow model and the human capital augmented Solow model. Let's start by discussing those resulting from the estimates of the standard model. The coefficients associated with the two explanatory variables are significant at a 1% confidence level and have the expected sign, with the exception of upper-middle income countries. Also, economic growth is positively affected by the accumulation of physical capital and negatively by population growth. This occurs when population growth influences factors such as the dependency ratio, as well as some economic behaviours in the form of investment and saving. In contrast to what is predicted by the analytical model, the magnitude of these coefficients, for the entire sample, is extremely remote (an impact of nearly 60% for physical capital and 10% for population growth).

In order to estimate the share of physical capital in income, (implied α), we estimated the restricted version of the Solow model. We have imposed that the coefficients associated with both the physical capital investment and the population growth variable

are equal in magnitude but have opposite signs. The results suggest that the value of the production elasticity with respect to physical capital, as shown in Table 3 (in appendix), is empirically plausible for oil-producing and lower-middle income countries. For the other subgroups, however, this value is very low. This is in contradiction with both theory and expectations for underdeveloped countries for which the share of physical capital should be excessively high.

In addition, the estimation of the augmented Solow model confirms that human capital is crucial for economic growth in Africa. In countries where the workforce is more educated and therefore more skilled, production per worker is growing faster. The elasticity of output per worker in relation to human capital is 1.67. This implies that 1% additional human capital, as measured in this work, increases output per worker by 1.67%. This elasticity is, particularly, high for lower middle-income and oil-producing countries. In accordance with the available empirical literature, estimates of the coefficient on physical capital have increased from 0.60 to 0.42 when human capital is introduced.

The impact of human capital is more important than the one of physical capital for the overall sample and all sub-samples. The elasticity of productivity in relation to human capital is on average 4 times higher than that of physical capital. This result explains the low level of human capital accumulation in Africa and therefore its higher productivity under the assumption of diminishing returns.

The introduction of human capital into the productivity equation does not induce a major change in the coefficients signs, with the exception of the sample of low-income countries where the impact of population growth becomes positive. This can be explained by the externalities generated by human capital. Moreover, unlike physical capital, its availability does not decrease with population growth. Nevertheless, when we impose restrictions on coefficients in order to estimate the respective shares of physical and human capital in relation to production. We find that the estimated value of α becomes relatively low and deviates from the value provided by the standard Solow model. However, the estimated elasticity of human capital with respect to output is reasonable, at about 0.22%. This result confirms the low

level of human capital in Africa and its primary importance for long-term economic growth. Finally, it should be noted that for all samples, our estimates suggest that $\alpha + \beta < 1$, justifying the assumption of diminishing returns of reproducible factors of production, key assumption of the neoclassical Solow model.

Estimation of country-specific effects

The LSDV estimator is a good way to understand the country-specific fixed effects. This aspect makes it possible to identify the proportion of individual specific effects that are stable over time (in other words, the unobservable quantities and their impact on the trend of GDP per worker). Since the effect of regressors is influenced by differences between countries, the introduction of instrumental variables for each country makes it possible to estimate the pure effect of explanatory variables (by controlling for unobserved heterogeneity). Each instrumental variable absorbs the country-specific effects. These effects thus reflect socio-economic, institutional, political, environmental.

Table 4 (in appendix) presents the results of the LSDV estimator for the overall sample and all sub-samples. Based on the results, it can be seen that all indicator variables are statically significant negative (this joins the works of Barro 1991, 1997 and Levine & Renelt, 1992). The interest and control variables have the expected sign. The impact of the physical and human capital stock has a positive and significant impact at the 1% threshold (except in low-income countries). While population growth has a negative and significant impact on the overall and positive sample for the sub-samples of low and high middle-income countries. The results of the LSDV estimates are similar to those of the fixed-effect model in that the sign of the coefficients are identical, but diverge in terms of magnitude. However, for the overall sample, the impact of the explanatory variables on the logarithm of GDP per worker is relatively small compared to that of the fixed-effect model.

Estimation of convergence equations

Mincerian variable (quantitative aspect)

So far, we have assumed that the countries are in a stationary state. However, it's likely that the data are generated by unstable

dynamics. As expected in neoclassical growth models, we assume conditional convergence. We link the rate of economic growth to the initial level of output and other determinants of the equilibrium state of each country in the sample. Countries from low income levels are expected to grow faster. The quality of the instruments has been validated using from the Sargan and Hansen over-identification test. In addition, the Arellano and Bond tests show that the errors are not correlated in series, thus justifying the estimation of the convergence equations under the assumption of independence from the initial perturbations.

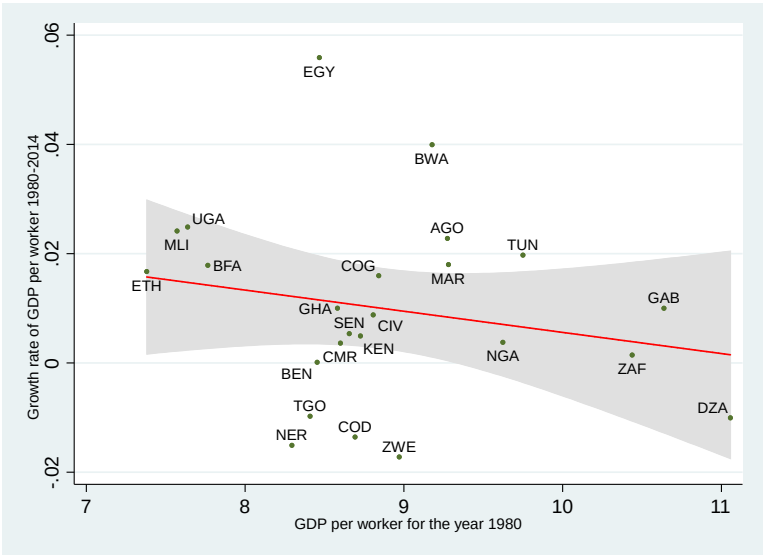

Figure 1. *Correlation between the growth rate of GDP per worker over the period 1980-2014 and GDP per worker for the year 1980.*
Source: Preparedby the authors.

With regard to the results of the dynamic panel model, presented in Tables 5 & 6 (in appendix), the impact of physical capital on the growth of output per worker becomes much smaller. In addition, convergence estimates within our sample of African countries under the Solow model show that the coefficient associated with the lagged dependent variable is negative. This is in line with theoretical prediction and confirms the conditional convergence assumption of the Solow model.

Therefore, we can say that in our sample, the group of the poorest economies are not in a situation of stationary equilibrium and will grow on average faster than the richest economies. Conditional convergence is also accompanied by convergence of clubs, to the extent that the coefficients on the lagged dependent variable, for all subgroups, are negative.

Moreover, the introduction of human capital into Solow's model does not significantly change the results. The coefficient of the lagged dependent variable remains negative. This suggests that the countries in our sample conditionally converge towards their stationary states. The convergence rate is about 2.8% per year. This rate is high, particularly for upper-middle-income countries.It should also be noted that the impact of physical capital on GDP per worker growth is becoming less significant following the introduction of human capital. The impact of the latter capital is positive but very low (close to 0) and not significant.

The insignificance of the impact of human capital on economic growth in the countries in our sample may be due in large part to the nature of the variable considered, the specification, the methods used or the data quality (Benhabib & Spiegel, 1994 and Temple, 1998). Nevertheless, other elements of response can be put forward to justify this observation. For example, (Gurgand, 2005) argues that investment in education can only be profitable for the least developed or developing countries and have a significant impact on their economic growth if there is an acceptable level of transparency and good governance necessary to improve the economic and social environment. Another explanation can be put forward to justify the controversies related to these estimates, particularly in Africa, is the existence of a threshold effect of the human capital stock necessary to allow a real impact on growth.

Student/teacher ratio in primary and secondary education (qualitative aspect)

The results of the estimates of the convergence equations are highlighted in Tables 7 & 8 (in appendix), taking into consideration the qualitative aspect of human capital. The introduction of this variable changes the results in several ways. First, the addition of the variable "Student/Teacher ratio in primary education" gives

poor results.The coefficients of the control variables are close to 0 and are statistically insignificant. Second, the sign of the lagged dependent variable is positive and not significant. We can conclude that there is no convergence process between the countries in our overall sample and most of the sub-samples.

The introduction of the variable "student/teacher ratio in secondary education" somewhat improves the results of the overall sample and those of upper-middle income countries. For the overall sample, the coefficient of the lagged dependent variable becomes negative and statistically significant at the 1% threshold, thus reflecting the existence of a conditional convergence process of African economies towards their stationary states.

Especially since the implicit convergence rate (4.6% per year) is much higher than that recorded in the estimates taking into consideration the quantitative aspect of human capital. However, the coefficient on the education variable remains very low and not significant.

The control variable coefficients for the sub-sample of high-middle income countries are statistically significant at the 1% threshold and have the expected sign. More specifically, the impact of human capital on the growth rate of income per worker becomes more important than that of physical capital. This observation confirms the importance of the education system quality in the growth process of African economies.

Conclusion

The objective of this chapter is to examine the impact of human capital, both quantitatively and qualitatively, on the growth rate and convergence of a sample of African countries over a period 1970-2014. In addition, the use of panel data estimation procedures makes it possible to overcome the shortcomings of cross-sectional estimates. In addition, we used the system GMM method to estimate the dynamic panel model since it is likely to provide unbiased results.

The results obtained from the productivity equation highlight several observations. First, while physical and human capital have a positive impact on economic growth, the contribution of the latter to the growth rate is much greater than that of the former.

Second, the estimate of the elasticity of output with respect to physical capital is empirically reasonable for oil-producing and lower-middle-income countries. Finally, the introduction of human capital as a factor of production in the augmented Solow model leads to changes in results, particularly in the amplitude of the coefficients.

In order to capture the country-specific fixed effects and to estimate the pure effect of the control variables on growth, we proceeded to LSDV estimate incorporating instrumental variables. Comparatively to the fixed effects model, the result obtained differs in amplitude. Indeed, the variables have the expected sign but their impact is much less important. This can be explained by income gaps between African countries resulting from institutional, political, environmental and others factors.

Moreover, the estimation of the convergence equations shows the existence of conditional convergence of African countries towards their respective stationary states. This convergence isn't sensitive to the introduction of human capital. However, it can be seen that the implicit convergence speed is increasing from 2.5% to 2.8% per year. In addition, this speed is high, particularly for high-middle-income countries.

The qualitative aspect of human capital taken into account by "pupil/teacher ratio" proxy modifies the results of the estimates of the convergence equation. On the one hand, the implicit convergence speed, in the overall sample, (4.6% per year) is much higher than that recorded in the estimates with the quantitative aspect of human capital. On the other hand, the impact of human capital on the growth rate of income per worker becomes positive and significant, and that it is higher than that of physical capital. This would explain the low quality of the education system in African countries and its importance in the growth process.

Appendix

Table 1. Results of Solow model – Productivity equation –

VARIABLES	All	Oil	Non-Oil	Low income	Lower middle income	Upper middle income
			Unrestricted model			
Ln_sk	0.591***	0.743***	0.451***	0.102***	0.357***	0.274***
	(0.0438)	(0.0797)	(0.0508)	(0.0422)	(0.0372)	(0.0573)
Ln_pop_g	-0.106***	-0.049	- 0.201***	-0.191***	-0.009	0.057**
	(0.0319)	(0.0897)	(0.0426)	(0.0288)	(0.0435)	(0.0310)
Constant	9.926***	10.580***	9.477***	8.120***	9.764***	10.891***
	(0.0969)	(0.1758)	(0.1258)	(0.0956)	(0.0919)	(0.0811)
Observations	1086	226	860	448	470	168
F-statistic	103.97	61.41	62.72	30.35	46.41	20.11
Prob > F	0.000	0.000	0.000	0,000	0,000	0,000
			Restricted model			
Ln_sk - Ln_pop_g	0.120***	0. 439***	0.0524	-0.112***	0.204***	0.121***
	(0.0273)	(0.0727)	(0.0359)	(0.0262)	(0.0292)	(0. 0215)
Constant	9.202***	10.085***	8.849***	7.757***	9.612***	10.709***
	(0.0813)	(0.1676)	(0.1123)	(0.0776)	(0.0889)	(0.0507)
Observations	1086	226	860	448	470	168
F-statistic	188.49	86.34	123.31	42.30	43.84	8.27
Prob > F	0,000	0,000	0,000	0.000	0.000	0.004
Implied α	0.10	0.30	0.05	-0.1	0.16	0.10

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2. (Fixed -Random). Results of Augmented Solow model – Productivity equation –

VARIABLES	All	Oil	Non-Oil	Low income	Lower middle income	Upper middle income
			Unrestricted model			
Ln_sk	0.422***	0.800***	0.131***	0. 210***	0. 246***	0. 340***
	(0.0569)	(0.1325)	(0.0475)	(0 0267)	(0. 0706)	(0.0464)
Ln_sh	1.663***	1.283***	0.562***	-1.471***	1.109***	0.671***
	(0.1193)	(0.1979)	(0.1001)	(0.3239)	(0.0615)	(0.0885)
Ln_pop_g	-0.105***	-0.311	-0.014	0.258***	-0.163	0.243
	(0.0418)	(0.2679)	(0 0527)	(0.0140)	(0.1284)	(0.1644)
Constant	8.973***	10.473***	8.799***	9.113***	8.992	10.790***
	(0.1950)	(0.2825)	(0.0765)	(0.1026)	(0.1790)	(0.1956)
Observations	1086	226	860	448	470	168
F-test	164.32	35.20	15.24	40.41	46.62	62.16
Prob > F	0,000	0,000	0,000	0,000	0,000	0.003
Hausman test REFE	8.79	63.38	8.99	25.26	2.95	110.54
P-value	0.032	0,000	0.029	0,000	0.399	0,000
			Restricted model			
Ln (sk) – ln (n+g+ δ)	0.027	0. 533***	0.062***	0.221***	0.137***	0.330***
	(0.0395)	(0.1073)	(0.0186)	(0.0208)	(0.0568)	(0.0421)
Ln (sh) – ln (n+g+ δ)	0.276***	0. 675***	0.133***	0.060	0.532***	0.631***
	(0.0270)	(0.1386)	(0.0424)	(0.0419)	(0.0714)	(0.0874)
Constant	8.622***	10.138***	8.751***	9.077***	9.015***	11.295***
	(0.1915)	(0.2653)	(0.0701)	(0.0866)	(0.1788)	(0.0737)
Observations	1086	226	860	448	470	168
F-test	92.81	11.85	22.32	22.74	42.49	7.74
Prob > F	0.000	0.041	0.000	0.001	0.000	0.068
Hausman test RE FE	10.86	26.11	11.53	24.96	2.44	104.18
P-value	0.004	0.000	0.003	0,000	0.295	0,000
Implied α	0,02	0.24	0.18	0.05	0.16	0.09
Implied β	0,21	0.30	0.04	0.11	0.32	0.18

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 3. *α and β implicit in the productivity equation*

	Implied alpha					
	All	Oil	Non-Oil	Lower income	Lower middle income	Upper middle income
Textbook model	0.10	0.30	0.05	-0.1	0.16	0.10
Augmented model	0,02	0.24	0.18	0.05	0.16	0.09
			Implied beta			
Augmented model	0,21	0.30	0.04	0.11	0.32	0.18

Table 4. (LSDV). -*country-specific effect for the aggregate sample and sub-samples -*

VARIABLES	All	Oil	Non-Oil	Lower income	Lower Middle income	Upper Middle income
Ln_sk	0.222***	0.647***	0.131***	0.210***	0.246***	0.340***
	(0.0253)	(0.0808)	(0.0270)	(0.0302)	(0.0462)	(0.0454)
Ln_sh	0.627***	1.358***	0.562***	-1.471***	1.109***	0.671***
	(0.0844)	(0.2672)	(0.0893)	(0.1815)	(0.1407)	(0.0845)
Ln_pop_g	-0.0907**	-0.531	-0.0140	0.258***	-0.163*	0.243**
	(0.0406)	(0.1444)	(0.0408)	(0.0507)	(0.0889)	(0.1222)
Angola	-1.303***	-1.204***				
	(0.0771)	(0.1202)				
Benin	-2.255***					
	(0.0877)					
Botswana	-1.007***		1.408***			-0.374
	(0.123)		(0.1071)			(0.2330)
Burkina Faso	-2.577***		-0.318***	-0.869***		
	(0.0790)		(0.0781)	(0.0845)		
Cameroun	-1.922***		0.306***		-0.720***	
	(0.0785)		(0.0747)		(0.1057)	
Congo	-1.901***				-0.868***	
	(0.107)				(0.1848)	
Ivory Cost	-1.428***		0.729***		-0.120	
	(0.0824)		(0.0791)		(0.1086)	
D.R. of Congo	-2.222***	-1.475***		-0.483***		
	(0.0829)	(0.1663)		(0.1012)		
Egypt	-1.108***	-0.196			0.149	
	(0.0875)	(0.1757)			(0.1247)	
Ethiopia	-2.656***		-0.608***	-1.395***		
	(0.0985)		(0.1095)	(0.1330)		
Gabon	-0.282**		2.084***			0.450*
	(0.123)		(0.1034)			(0.2438)
Ghana	-2.020***		0.226***		-0.894***	
	(0.0793)		(0.0771)		(0.1099)	
Kenya	-1.809***		0.359***		-0.607***	
	(0.0796)		(0.0834)		(0.1065)	
Mali	-2.433***		-0.223***	-0.626***		
	(0.0820)		(0.0759)	(0.0782)		
Morocco	-0.912***		1.321***		0.347***	
	(0.0752)		(0.0773)		(0.0900)	
Niger	-2.485***		-0.238***	-0.797***		
	(0.0781)		(0.0789)	(0.0861)		
Nigeria	-1.358***	-0.063	0.688***		0.044	
	(0.104)	(0.2651)	(0.1206)		(0.1695)	
Senegal	-1.505***		0.674***	0.489***		
	(0.0857)		(0.0761)	(0.0737)		
South Africa	-0.423***		1.804***			-0.444***
	(0.0779)		(0.0832)			(0.0619)
Togo	-2.532***		-0.256***	0.161**		
	(0.0969)		(0.0827)	(0.0844)		
Tunisia	-0.757***		1.549***		0.366***	
	(0.0884)		(0.0766)		(0.1404)	
Uganda	-2.550***		-0.341***	-0.405***		

	(0.0756)		(0.0800)	(0.0760)		
Zimbabwe	-1.934***		0.341***	1.108***		
	(0.0957)		(0.0858)	(0.0996)		
Constant	10.63***	10.51***	8.31***	9.461***	9.20***	10.90***
	(0.0793)	(0.2234)	(0.1070)	(0.1407)	(0.1404)	(0.0978)
Observations	1,086	240	860	448	470	168
R-squared	0.866	0.754	0.878	0.666	0.597	0.731

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 5. (GMM system). *Results of Solow model – Convergence equation –*

VARIABLES	All	Oil	Non-Oil	Low income	Lower middle income	Upper middle income
Unrestricted model						
$(Y/L)_{t-1}$	-0.025***	-0.007	-0.028***	-0.027***	-0.006	-0.084***
	(0.0134)	(0.0206)	(0.0115)	(0.0085)	(0.0096)	(0.0326)
Ln_sk	0.035***	-0.063***	0.032***	0.005	0.007	0.029
	(0.0160)	(0.0314)	(0.0135)	(0.0068)	(0.0101)	(0.0277)
Ln_pop_g	-0.003	0.053**	-0.005	0.006	0.006	-0.006
	(0.0179)	(0.0288)	(0.0171)	(0.0057)	(0.0068)	(0.0119)
Constant	0.305**	-0.026	0.319***	0.240***	0.095	0.931***
	(0.1309)	(0.2182)	(0.1088)	(0.0706)	(0.0951)	(0.3651)
Observations	1080	226	855	445	469	166
Sargan test	168.96	137.69	241.95	472.59	402.36	139.31
	(P=0.000)	(P=0.006)	(P=0.000)	(P=0.087)	(P=0.000)	(P=0.010)
AR (1)	-13.02	-6.17	-11.69	-8.60	-8.70	-5.41
	(Pr > z = 0.007	(Pr > z = 0.000)	(Pr > z = 0.000)	(Pr > z = 0.000)	(Pr > z = 0.000)	(Pr > z = 0.000)
AR (2)	0.28	0.20	0.70	-0.35	0.53	0.41
	(Pr > z = 0.782	(Pr > z = 0.839)	(Pr > z = 0.486)	(Pr > z = 0.725)	(Pr > z = 0.600)	(Pr > z = 0.681)
Restricted model						
$(Y/L)_{t-1}$	-0.0161	-0.021	-0.0191***	-0.0276***	-0.006	-0.067***
	(0.0110)	(0.0200)	(0.0093)	(0.0081)	(0.0090)	(0.0090)
Ln_sk - Ln_pop_g	0.016***	-0.0004	0.016***	0.005***	0.006	0.001
	(0.0070)	(0.0209)	(0.0064)	(0.0042)	(0.0063)	(0.0094)
Constant	0.201***	0.216	0.224***	0.243***	0.093	0.725***
	(0.1011)	(0.1986)	(0.0845)	(0.0651)	(0.0858)	(0.3140)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Time dummy variables are systematically included but not exposed.

Table 6. (GMM system). *Results of Augmented Solow model-Convergence equation-*

VARIABLES	All	Oil	Non-Oil	Low income	Lower middle income	Upper middle income
			Unrestricted model			
$(Y/L)_{t-1}$	-0.028***	-0.019	-0.0740***	-0.029***	-0.009	-0.096***
	(0.0144)	(0.0216)	(0.0175)	(0.0090)	(0.0098)	(0.0365)
Ln_sk	0.027***	-0.051	0.032***	0.004	0.005	0.033
	(0.0136)	(0.0321)	(0.0132)	(0.0069)	(0.0101)	(0.0280)
Ln_sh	0.039	0.182**	0.107***	0.011	0.035	0.031
	(0.0251)	(0.1049)	(0.0316)	(0.0210)	(0.0227)	(0.0444)
Ln_pop_g	-0.003	-0.043	-0.055***	0.005	0.004	-0.002
	(0.0159)	(0.0628)	(0.0223)	(0.0059)	(0.0069)	(0.0132)
Constant	0.296 ***	0.035	0.631***	0.250***	0.102	1.044***
	(0.1299)	(0.2209)	(0.1406)	(0.0726)	(0.0971)	(0.3971)
Observations	1080	226	855	445	469	166
Implied λ	0.028	0.019	0.074	0.029	0.009	0.096
Sargan test	149.78	135.55	240.94	473.21	401.82	139.94
	(P= 0.001)	(P=0.007)	(P=0.000)	(P=0.078)	(P=0.000)	(P=0.008)
AR (1)	-12.22	-6.17	-11.40	-8.50	-8.70	-5.44
	(Pr > z = 0.002)	(Pr > z = 0.000)	(Pr > z = 0.011)	(Pr > z = 0.002)	(Pr > z = 0.000)	(Pr > z = 0.000)
AR (2)	0.29	0.18	0.69	-0.35	0.53	0.40
	(Pr > z = 0.774)	(Pr > z = 0.860)	(Pr > z = 0.492)	(Pr > z = 0.724)	(Pr > z = 0.593)	(Pr > z =0.691)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Time dummy variables are systematically included but not exposed.

Table 7. (GMM system). *Results of Augmented Solow model –Convergence equation–*

VARIABLES	All	Oil	Non-Oil	Low income	Lower middle income	Upper middle income
			Unrestricted model			
$(Y/L)_{t-1}$	0.010	0.017	-0.0006	-0.015*	-0.005	-0.038
	(0.0162)	(0.0197)	(0.0131)	(0.0089)	(0.0125)	(0.0536)
Ln_sk	0.016	-0.021	0.017	0.005	0.015	0.0001
	(0.0148)	(0.0383)	(0.0139)	(0.0068)	(0.0127)	(0.0370)
Ln_sh1	0.032	-0.141*	0.020	0.0388**	-0.002	-0.076
	(0.0481)	(0.0833)	(0.0414)	(0.0211)	(0.0256)	(0.0742)
Ln_pop_g	0.041***	0.025	0.013	0.018***	0.008	-0.037
	(0.0136)	(0.0379)	(0.0143)	(0.0063)	(0.0083)	(0.0235)
Constant	-0.125	0.308	-0.009	0.011	0.115	0.623
	(0.2957)	(0.4292)	(0.2416)	(0.1093)	(0.1810)	(0.6585)
Observations	798	144	654	358	329	111
Sargan test	185.33	144.20	167.41	385.42	397.13	60.61
	(P= 0.000)	(P=0.066)	(P=0.004)	(P=0.045)	(P=0.000)	(P=0.031)
AR (1)	-8.94	-4.04	-9.04	-6.93	-9.61	-3.78
	(Pr > z = 0.000)	(Pr > z = 0.000)	(Pr > z = 0.000	(Pr > z = 0.000)	(Pr > z = 0.000	(Pr > z = 0.000
AR (2)	-0.13	0.28	-0.54	-0.51	-0.04	0.26
	(Pr > z = 0.894)	(Pr > z = 0.780)	(Pr > z = 0.588	(Pr > z = 0.609)	(Pr > z = 0.968	(Pr > z =0.791

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Time dummy variables are systematically included but not exposed.

Table 8. (GMM system). *Results of Augmented Solow model– Convergence equation–*

VARIABLES	All	Oil	Non-Oil	Low income	Lower middle income	Upper middl income
			Unrestricted model			
$(Y/L)_{t-1}$	-0.046***	-0.041**	-0.002	-0.007	-0.021*	0.157***
	(0.0149)	(0.0194)	(0.0103)	(0.0149)	(0.0128)	(0.0289)
Ln_sk	0.050***	-0.009	0.004	0.0009	-0.010	0.088***
	(0.0193)	(0.0317)	(0.0146)	(0.0114)	(0.0182)	(0.0289)
Ln_sh2	0.025	0.008	-0.013	-0.022	-0.028	0.151***
	(0.0428)	(0.0595)	(0.0434)	(0.0253)	(0.0323)	(0.0170)
Ln_pop_g	0.001	0.004	0.017	0.023**	0.016*	-0.113***
	(0.0158)	(0.0338)	(0.0128)	(0.0092)	(0.0087)	(0.0147)
Constant	0.453**	0.373	0.099	0.163	0.294	-2.141***
	(0.2198)	(0.2652)	(0.1779)	(0.1509)	(0.1795)	(0.3440)
Observations	462	102	360	174	216	72
Sargan test	150.57	131.76	143.72	145.82	299.89	501.42
	(P= 0.041)	(P=0.004)	(P=0.087)	(P=0.088)	(P=0.000)	(P=0.000)
AR (1)	-5.26	-2.73	-6.75	-4.09	.	-2.26
	(Pr > z = 0.000	(Pr > z = 0.006)	(Pr > z = 0.000)	(Pr > z = 0.000)		Pr > z = 0.024
AR (2)	0.95	0.66	0.87	0.66	1.04	0.17
	(Pr > z = 0.343	(Pr > z = 0.509)	(Pr > z = 0.385)	(Pr > z = 0.507)	(Pr > z = 0.299)	(Pr > z =0.866

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Time dummy variables are systematically included but not exposed.

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3 Highlighting the main channels of transmission of corruption on public spending on health and education in Cameroon

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Introduction

Health, like education, is fundamental rights of every individual and drivers of personal, economic and social development, perceived in many countries worldwide as indispensable for a better future. Education and health equally provide tools needed by many to sustain their livelihoods, so as to live in dignity and contribute to the advancement of society (Transparency International, 2013). They thus have a considerable impact on individuals' labour productivity. As such, they constitute an important part of the United Nations Millennium Development Goals, which aim to halve poverty by 2025. Unfortunately, the 2006 and 2013 Transparency International's

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global reports on corruption in health and education respectively, show that the achievement of these objectives within the time frame is seriously hampered by corruption's prevalence in these two sectors.

Corruption may surely occurs in every country in the world. However, the consequences of poor health and education are dramatically affecting developing economies' populations already under-resourced. Gupta, Davoodi, & Tiongson (2002) found that countries with high corruption rates routinely experience higher infant mortality than others, and that school drop-out rates are five times higher in countries where corruption is high than in those where it is low. Francis Huang (2008) found, in a sample of 50 countries, that the higher the corruption perception rates in a country, the lower the educational performance. And it is always the poorest in society who suffer the most because they cannot afford to pay for health care (Transparency International, 2006) or private education (Transparency International, 2013), or even less for bribes.

To cope with this scourge, several empirical studies have been carried out over the last three decades by the World Bank, Transparency International and various universities. They include macro and microeconomic surveys.

At the macroeconomic level and with few exceptions, the existing literature has three common features: First, it is based on transnational analyzes. Secondly, it exploits data on corruption's perception indices and, finally, it explains corruption as driven from the country's policy and its institutional environment. Although this literature provides much in sights on corruption's determinants, it remains quite limited. In fact, it explores Transparency International's corruption indices, those of the Political Risk Services / International Country Risk Guide (PRS/ICRG) and those of the World Wide Governance Indicator (WWGI) of the World Bank resulting from surveys on investors who travel around the world, but who are not in contact with hospitals' caregivers or even high schools' and colleges' teachers in those countries. In fact, this literature does not inform us about the microeconomic corrupt exchanges between caregivers and patients, or between teachers and students' parents. Yet, the

quantitative measurement of corruption at the microeconomic level is quite difficult, but not impossible.

At the microeconomic level, literature identifies three types of data collection approaches: surveys on service providers, on firms and on expenditure tracking. The first type is increasingly used to examine the efficiency of spending, incentives and corruption with front-line service providers. The quantitative service delivery survey is a variation of provider surveys, which systematically focuses on the collection of quantitative data. For instance, a survey of service providers conducted in health clinics in Bangladesh to find out whether health professionals were present at their workstations (Chaudhury & Hammer, 2003), revealed that absenteeism of health staff stood at 35%. Renikka & Smith (2004) found a similar average absence rate in health facilities in Uganda (37%), India and Indonesia (40%).

As concerns the second investigation type, and given corruption's secret nature (Shleifer & Vishny, 1993), the generally accepted view lies on that it is impossible to collect reliable quantitative information on corruption from corporate managers, a viewpoint disagreed by Kaufman (1997). For the latter, corporate managers discuss on corruption with a remarkable frankness if reliable investigation methods and techniques are used for their interviews. It is all about setting upa clear and appropriate data collection strategy to encourage them to present their views on the issue.

According to the third surveys' type, resources allocated by the government to public institutions (schools and hospitals) are part of a legal institutional framework. These resources usually go through several strata of the governmental bureaucracy before reaching the public institutions' managers in charge of their proper use. For decision-makers, it is important to know if the allocated resources have reached the irtarget destinations. Administrative reports and registers prepared by government's officials at different levels are official information sources which allow decision-makers to know if these resources have reached their appropriate targets. Unfortunately, information obtained from these sources is often inadequate. Public Expenditure Tracking Surveys (PETS) are thus essential, as they can trace the flow of

allocated resources from the highest hierarchy to the final recipients in charge of their use. They provide us with a clear visibility on different levels where leaks of funds occur and their magnitude.

The first Public Expenditure Tracking Survey was carried out in Uganda in 1996 when the government found that despite the tripling of funds allocated to primary education, the level of enrolments remained constant. The assumption was that these funds did not reach their destinations, that is, the targeted schools. The purpose of the survey was thus to measure leaks in school funding. More specifically, the survey consisted of collecting data over five years (1991 to 1995) on expenditure (not forgetting in-kind transfers), services and characteristics of 250 public primary schools, 18 local governments (districts) and 03 central government's ministries. It appears that only 13% of grants per student from the central government reached the school, and 87% were misused by local public servants (districts) for purposes unrelated to education. Moreover, there was no evidence of an increase in spending in another sector (Jeppson, 2001). Most schools were granted nothing. Based on annual data, it appears that 73% of schools received less than 5%, while only 10% received more than 10% of the expected funds (Renikka & Svenson, 2004a). As a result of this first survey, many other countries as Ghana, Zambia, Tanzania and Cameroon experienced the same issue.

In Ghana, the PETS was conducted in 2000 to analyze the flow of funds that the Ministry of Finance makes available to basic services (public primary schools and hospitals). In this country, salary expenditure procedures are different from non-salary expenditure. In the Ministry of Finance, salary expenditures are recorded in the form of cedis (Ghanaian currency), and directly allocated to public agents. In contrast, the non-salary expenditures, also recorded in cedis in this Ministry, are rather distributed to local governments and public institutions in terms of equipment, without indication of the corresponding monetary value. This opposition of registration systems confers less responsibilities on local offices, and gives little opportunity for basic services to meet their resource allocation needs. The results of this survey show that in health and education, only 20% and 50% of non-monetary

expenditures respectively are conveyed to basic services. It is therefore clear that leakage has occurred in the spending circuit between the central government and basic services (Ye & Canagarajah, 2002). However, we do not know at which levels these leaks take place and who benefits from the phenomenon.

The Expenditure Tracking Survey in Zambia took place in 2001. In this country, funds allocated to educational institutions are identified in two forms: funds to be distributed on the basis of a sharing rule, and those to be discretionarily distributed. The first form represents 30% of all funds. As a result, discretionary funds are significantly higher (70%). The survey revealed that 90% of schools received funds based on a sharing rule, while those discretionarily allocated were not conveyed to schools. Discretionary funds would have been misused at the provincial and district levels (Das *et al.*, 2004). The results of the surveys we have just presented are important because they reveal in many developing countries, that funds allocated by central governments to basic health and educational services (public hospitals and schools) via local governments do not often reach their destinations. Leaks of funds are occurring in the expenditure circuit. However, these findings are limited insofar as they do not inform us about the various channels through which these leaks occur.

In some investigations (World Bank, 2001; Reinikka & Svenson, 2003) on corruption in health and educational sectors, authors certainly identify corruption transmission channels in public expenditures. In particular, two are distinguished: the non-wage and wage flows. In the same vein, Reinikka & Smith (2004) identify the same two corruption sub-channels. The former are less exposed to leaks than the latter. In fact, State agents usually have a good knowledge of their salary level. Each seeks to ensure that he/she actually receives the salary he/she is entitled to. However, salary funds can suffer from other types of abuse as leakage on the payroll, for instance, through the phenomenon of fictitious employees, that is, individuals who receive salaries without being State agents. As a matter of fact, these wages are illegally collected by other people. In contrast, non-wage flows are more vulnerable to leakage. In Tanzania for instance, the PETS shows in 1998, that

57% of non-wage funds allocated to primary schools had not reached their destinations. Unfortunately, we do not know the different sub-channels through which these funds are leaked, this materialized in our study by the State agents at different responsibility levels. The extent of leaks by sub-channel is also unknown. Finally, sub-channels should also be classified according to their ability to promote leaks and the reasons for this classification highlighted.

The above-mentioned PETS studies are important because they generally give us the magnitude of the misuse of funds by State agents in line with a particular channel, notably, that of the non-wage flows. However, they remain limited insofar as they ignore the different sub-channels through which these funds are conveyed, and this being materialized in this investigation by the State agents at different levels of responsibility. The purpose of this work is therefore to fill this gap, using data from the PETS, conducted by the World Bank in Cameroon in 2010. Thus, the purpose of this study is twofold:

At first, it highlights not only the different sub-channels through which leaks are realized, but also, the extent to which they are done. Secondly, itenables to prioritize and explain the various transmission sub-channels according to the leaks' magnitude degree and thus, to propose appropriate measures to fight against the plague. The second part briefly presents the functioning of health and educational systems in Cameroon. The analysis of the traceability of non-wage flows from the start to the end is highlighted in part three. The fourth part deals with the ranking and analysis of different transmission sub-channels according to the leaks' extent degree, as well as the budget lines most affected by the issue. The last part proposes measures to fight against the scourge and provides a conclusion to the study.

Health and educational sectors in Cameroon: Institutional and practical framework for service delivery

The practice of providing services in public health facilities

In Cameroon, health services are offered to people through the public, private and traditional sub-sectors. The public sub-sector, taken into account in this work, is the most important because not only is it the greatest provider of these services, but also, it regulates all health-related activities. To satisfy the population, public health facilities, constituted essentially - in descending significant order - of Reference Hospitals (RH), District Hospitals (DH), District Medical Centers (DMC) and Integrated Health Centers (IHC), need equipped basic infrastructures, human resources, medicines as well as budgetary resources.

Unfortunately, this sub-sector does not have enough human and material resources to cope with the demand for care. In terms of staff for instance, public hospitals in Douala have an average of eight doctors for a population of 159,211 inhabitants, or 19,901 inhabitants for a doctor (PETS, 2009). The World Health Organisation's (WHO) standard is one doctor per 10,000 inhabitants. Compared to this standard, each medical doctor is expected to receive on average, a surplus of 4,211 patients. They are overworked. Moreover, in the early 1990s, civil servants 'salaries, including those of health workers, were reduced by more than 50%. Meantime, the wage increases of 5%, 15% and 5% did not allowed these staff to regain their former purchasing power. These impoverished employees turned to corrupt practices to try to improve their living conditions.

Thus, following the Bamako initiative (1987)[3], the government adopted a new policy based on the decentralization of services' supply, the focus on primary health care and the participation of beneficiary communities in financing and management of public health facilities, given the virtual absence of health insurance. Since

[3]The Bamako initiative is the result of the summit that WHO and UNICEF, in collaboration with African countries, organized in Bamako in 1987.

then, households [4] had to officially pay for services they are provided in public hospitals. To these official payments are added some irregularities.

Infrastructure and equipment in health facilities

Inventory of basic infrastructures

Basic infrastructures include, among others, medical analysis laboratories, surgical rooms, consultation rooms, propharmacy and mortuary.

Table 1. *Percentage of health facilities with basic infrastructures*

	Electricity	Water	Mortuary	Medical Laboratory	Consultation Room	Surgical room	Propharmac
Douala	100	87.5	18.8	100	100	625.	87.5
Yaounde	87.5	50.0	23.1	87.5	100	50	75
Adamaoua	46.2	30.8	18.8	76.9	100	38.5	92.3
Center	87.5	31.3	6.7	81.3	100	56.3	93.8
East	53.3	7.1	15.4	60	93.3	26.7	93.3
Far North	38,5	27.3	21.4	69.2	92.3	23.1	92.3
Littoral	71.4	53.8		71.4	100	35.7	100
North	41.7	25	13.3	75	100	25	91.7
North-West	80	80	6.7	93.3	100	26.7	100
West	73.3	53.3	23.1	86.7	100	33.3	100
South	69.2	25		61.5	100	38.5	100
South-West	85.7	76.9	12.8	100	85.7	57.1	100
Overall	70.1	46.8	13%	80.5	97.6	39.6	94.5
Setting up environment							
Urban	90	70.9	17.5	95	97.5	52.5	92.5
Rural	50.6	21.8	8.4	66.3	97.6	26.5	96.5

Source: National Institute of Statistics/PET2, 2010.

This table shows that on average, 8 out of 10 health facilities have medical analytical laboratories, two out of five have surgical rooms, 13% a mortuary, 95% a Propharmacy and 46.8% water. It appears that many health facilities do not have, among others, water, a surgical room and a mortuary. The imbalance also appears when moving from one region to another. In Douala for instance, 87.5% of health facilities have water, while only 7.1% in the East

[4]This policy surely has the advantage of increasing the resources required for the functioning of these hospitals. But, it has the disadvantage of ousting poor households from the public health service market.

are provided with it. In general, urban structures are better supplied than the rural. However, it is not enough to have basic infrastructure, they also need to be equipped.

Medical equipment

Medical equipment includes a delivery box, a vaccination team, a surgical table, a surgical box, a delivery table, a functional microscope and hospital beds.

Table 2. *Percentage of health facilities with medical equipment.*

	Delivery Box	Vaccination Team	Surgical Table	Surgical Box	Delivery Table	Functional Microscope	Hospital beds	Freezer
Douala	93.8	100	50	50	93.8	100	100	100
Yaounde	75	87.5	37.5	62.5	87.5	100	87.5	87.5
Adamaoua	75	84.6	41.7	58.3	92.3	84.6	100	83.3
Center	75	87.5	43.8	56.3	93.8	93.8	93.8	87.5
East	66.7	80	28.6	21.4	66.7	73.3	86.7	53.3
Far North	84.6	76.9	18.2	36.4	92.3	100	100	84.6
Littoral	57.1	92.9	28.6	21.4	92.9	78.6	100	85.7
North	91.7	83.3	25	33.3	83.3	83.3	83.3	75
North-West	73.3	93.3	40	40	86.7	100	93.3	100
West	66.7	93.3	30.8	46.2	93.3	86.7	100	86.7
South	69.2	84.6	44.4	44.4	84.6	61.5	92.3	76.9
South-West	78.6	92.9	50	64.3	92.9	100	100	100
Overall	75.5	88.4	37	44.2	88.4	88.4	95.1	85.3
Setting up environment								
Urban	78.5	87.5	44.2	51.9	91.3	96.3	97.5	89.9
Rural	72.3	89.2	28.9	35.5	85.5	80.7	92.8	80.7

Source: National Institute of Statistics /PETS 2, 2010.

This table reveals that about 75.5% of health facilities have delivery boxes, 88.4% of vaccination teams, 88.4% of delivery tables and 95.1% of hospital beds. Major deficits in equipment are recorded in the surgical field. Indeed, 63% of these health units do not have surgical tables and 55.8% operate without a surgical box.

Some equipments are unequally distributed when moving from one region to another. In the South-West for instance, 64.3% have surgical boxes, compared to only 21.4% in the Littoral and in the East. As concerns basic infrastructures and generally speaking, health facilities in cities are better equipped than those in rural areas, except for vaccination teams where 87.5% of rural health units are equipped against 89.2% in urban areas.

It is important to provide officials who manage public health facilities with budgetary resources to allow them work and also expand their reception capacity.

Deficit of medicines and nursing staff

In Cameroon, the role of the National Center for Essential Drugs Supply (NCEDS) is to ensure the regularity of the supply of quality medicines at lower costs in intermediate supply structures and public health facilities' propharmacies and drugstores. The NCEDS[5] has set up a system which allows each drugstore and propharmacy to stock up on essential drugs. However, despite this essential drugs supply mechanism, there are stock-outs of almost all drugs in health units. This shortage can last from 3 to 19 days. Faced with this situation, users are bound to turn to private drugstores. But prices set by the latter are so high that only wealthy households could afford them. Poor people prefer to buy poor quality medicines from street vendors.

As far as medical and paramedical staff of health facilities are concerned, medical coverage for specialist doctors is close to 2 on average for a District Hospital (DH), nearly one for a District Medical Center (DMC) and almost zero for an Integrated Health Center (IHC). As concerns medical coverage for generalist medical doctors, it is almost identical to that of specialist doctors for district hospitals. A small number of IHC have part-time generalist medical doctors. For non-specialist nurses, this coverage stands at 27 for DH, 10 for DMC and 3 for IHC.

[5]Has put in place a system which allows drugstores and propharmacies to stock essential drugs to satisfy users. The availability of essential consumables is apprehended through the presence in stock of thirteen essential drugs and consumables, permanently in a health facility to make effective the minimum package of activities. These include malaria treatments (coatem, quinine and paracetamol), antibiotics (amoxicillin capsules, cotrimoxazole, rifampicin and metronidazole), contraceptives (Lofemenal and Intrauterine device), some vaccines (anti-measles and DTP / DPT) and HIV prevention (morning-after treatment). Seven out of ten health facilities are provided with these drugs, apart from Rifampicin, intrauterine devices and the morning-after treatment (HIV/AIDS).

The consequence of medical doctors' insufficiency is that six out of ten patients could not meet a doctor during consultation. The vast majority is received by the chief nurse. Patients are more consulted by doctors in private health units.

In addition, the majority of health staff are not motivated because of the lack of visibility in their professional status, their career profile and the lack of decent wages. In particular, like most Cameroonian civil servants, in the early 1990s, health care workers experienced a drastic drop of more than 50% in their salaries. Since then, they have turned to corrupt practices to regain some of their lost wages.

Institutional and political framework of education in Cameroon

Organization of educational policy

Cameroon's formal educational system consists of two subsystems: the English and the French. Each has five levels of education: preschool (kindergarten), primary, post-primary, secondary and higher[6]. The English subsystem is mainly based in the North-West and South-West regions. As for the French, it is more established in the Center, South, Littoral, West, Adamaoua, East, North and North-West. The duality of the system creates structural constraints which often complicate the development of education. For instance, primary education lasts six years in the French subsystem and seven in the English. The first cycle of secondary education lasts four years for the French-speaking and five for the English-speaking, and the second cycle for three years for the first and two for the second.

Higher education is provided in State universities as well as in some private institutions. In Cameroon, education aims at generally train the child for his intellectual, physical, civic and moral development, and his harmonious integration into society. The State must therefore play a leading role in ensuring that Education fulfils its mission of transmitting moral values and behaviour. However, if corruption becomes the norm in primary,

[6]Higher education is common to both subsystems.

secondary, and university schools, education can no longer fulfil this transmission function (Poisson, 2010). Thus, to fulfil this mission, the State makes use of budgetary resources.

School coverage

At the primary and secondary levels, Cameroon has many schools. If we stick to the year 2010, we see that primary education is provided in 14,255 schools including 10,665 in the French subsystem and 3,590 in the English. In the first case, there are 2,770,542 pupils and 732,094 in the second. Public secondary education is provided in 532 secondary schools, 424 high schools and 109 bilingual high schools and colleges. The number of pupils stands at 1,284,000, supervised by approximately 16,280 teachers. Public and technical secondary education is provided in 79 technical high schools, 170 colleges and three teacher training colleges. There are 119,000 pupils supervised by 8,700 teachers. In the private sector, there are 520 general and technical colleges, and 370 technical colleges. There are 1,400,000 students supervised by 7,500 teachers (National Commission, 2008). However, observable regional disparities at the primary level are hidden by this overview of educational coverage.

Table 3. *Primary pupils' enrollment by subsystem and region in 2010*

Sub system	English-speaking			French-speaking			Overall		
Region	Boys	Girls	Overall	Boys	Girls	Overall	Boys	Girls	Overall
Cameroon	373,119	358,975	732,094	1,515,047	1,255,495	2,770, 542	1,895,541	1,614,85	3,510,396
Adamaoua	4,024	3,459	7,483	99,558	74,051	173,609	103,327	77,513	180,840
Center	22,632	23,659	45,991	279	267,580	547,059	302,140	290,937	593,077
East	2,437	2,477	4,914	104,447	89,659	194,106	106,823	92,115	198,938
Far North	2,069	1,850	3,919	368,428	254,389	622,817	370,365	256,300	626,665
Littoral	25,410	25,738	51,148	158,383	152,509	310,892	183,732	178,614	362,346
North	2,268	1,798	4,066	210,528	143,572	354,100	212,700	145,339	358,039
North-West	186,324	174,916	361,240	3,396	3,551	6,947	189,717	178,480	368,197
West	14,556	13,768	28,324	226,644	210,471	437,115	248,573	224,256	472,829
South	1,323	1,292	2,615	60,866	56,581	117,447	62,179	57,861	120,040
South-West	112,076	110,318	222,394	3,318	3,132	6,450	115,985	113,440	229,425

Source: Strategic Document for Education (2011).

This table tells us about school coverage on two or three points: First, it certifies that the English subsystem is present in each region. But, it is strongly implanted in South-West and North-West. In fact, 79.7% of students enrolled in the English subsystem

attend schools in these two regions (30.37% and 49.34% respectively). Across the country, we realize that in both subsystems, girls are less numerous than boys. However, this distribution in terms of gender is not the same in all regions. For instance, in 2010 in the English subsystem in Littoral, the number of girls stood at 25,738 and that of boys at 25,410. In the French subsystem, the number of boys is higher than that of girls except in the North-West region. In the English subsystem, the number of boys is higher than that of girls except in the Littoral and East. It should be interesting to compare the schooling in Cameroon in 2010 with that of the years 2002/2003 and 2003/2004 from the following table.

Table 4. *Primary gross enrollment ratio (%) by gender and region, 2002/2003 and 2003/2004.*

Regions	2002/2003				2002/2004			
	Boys	Girls	Overall	Parity Index	Boys	Girls	Overall	Parity Index
Adamaoua	108.8	83.6	86.7	0.77	113.83	80.87	97.26	0.71
Center	128.3	120.3	124.3	0.94	114.48	112.24	113.37	0.98
East	101.5	97.1	99.5	0.96	109.62	97.58	103.72	0.89
Far North	102.4	64	83.5	0.62	193.06	70.7	99.01	0.63
Littoral	111.2	102.9	106.9	0.93	93.37	89.18	91.27	0.96
North	135.9	78.8	107.2	0.58	117.28	74.94	96.66	0.64
North-West	87.5	88.7	188.1	1.01	96.27	90.54	93.43	0.94
West	117.9	132.1	124.4	1.12	129.65	119.26	124.41	0.92
South	115.6	122.3	118.7	1.06	105.49	105.32	105.42	1.00
South-West	92.8	98.9	95.7	1.07	85.17	79.22	88.15	0.93
Overall	109	97.2	104.9	0.89	108.14	92.05	100.14	0.85

Source: Ministry of Basic Education's school map, 2002/2003 and 2003/2004.

In view of the 2002/2003 and 2003/2004 school years, the primary school' senrolment rate for girls is lower than that of the boys, ranging from 12 to 16 points. However, this phenomenon is more pronounced in the North, Far North and Adamaoua regions where the parity indices are 0.63, 0.64 and 0.71 in 2003/2004 respectively. In these regions, there are less than two girls for every three boys in school. Cultural influences (early marriage of young girls and some beliefs) would be the possible causes of this situation. In all regions, teaching and administrative staff are needed to carry out the educational task.

Table 5. *Average staffper secondary school by region and setting up environment (urban or rural).*

Region	Full-time staff				Part-time staff		
	Administrative Teaching staff	Administrative Non-teaching staff	Teaching staff non-administrative	Overall	Teaching staff	Non-teaching staff	Overall
Douala	7	10	48	64	20	6	26
Yaounde	16	11	82	109	25	7	32
Adamaoua	6	1	13	19	12	2	14
Center	5	5	28	38	17	3	20
East	8	3	13	21	17	1	18
Far North	6	2	13	20	20	3	23
Littoral	5	2	18	22	17	2	19
North	4	4	14	23	15	5	20
North-West	5	4	29	38	9	4	13
West	5	5	37	47	17	4	21
South	5	4	22	31	13	2	15
South-West	10	2	27	40	9	3	12
Urban	8	6	35	48	18	4	22
Rural	4	2	12	40	10	2	12
Overall	7	5	29		16	4	20

Source: PETS Cameroon, 2010.

The average number of staff per secondary school in Cameroon stands at 59, that is, 40 full-time and 19 part-time workers. Among the full-time staff, 7 are both in administration and teaching, 5 only are administrative and 29 are teachers exclusively.

Unlike other regions, the Littoral, East, North, Far North and Adamaoua have a number of full-time staff well below the national average.

Since the introduction of free public education and the abolition of school fees at the primary level, the State has instituted "the minimum[7] package'' to meet the needs in teaching materials in primary schools. In fact, it is an endowment of didactic material corresponding to the minimum needs of each school, sent at the beginning of the school year. In 2008/2009, despite the efforts made by public authorities to ensure that this minimum package reaches its destination, 4.5% of public primary schools across the country declare not to have received it, of which 5.6% in urban areas compared to 3.4% in the rural. The survey also gives an idea of the

[7]In its structure, the minimum package essentially consists of items as (i) office supplies for the teaching staff, (ii) teaching materials for teachers, (iii) teaching and learning materials for students' assessment, (iv) sports and leisure equipment and, finally, (v) a small drugstore.

main difficulties encountered in removing the minimum package, and this depending on each region.

Analysis of the traceability of corruption transmission sub-channels on health and educational expenditures

This section analyzes the flow of public funds and material resources from the government and other donors, from the administrative hierarchy to the authorizing officers of health facilities and schools, through the results of the second Public Expenditure Tracking Survey (PETS2), as well as the beneficiaries' satisfaction in the Education and Health sectors in Cameroon. In other words, the study aimed at providing the Cameroonian government and partners involved in education and health with information needed to objectively assess the performance of public expenditure in these sectors. But before presenting the results of this survey, it is important to briefly describe the methodology.

Methodology of the Public Expenditure Tracking Survey (PETS2)

The Public Expenditure Tracking Survey analyzes the flow of resources across different parts of the governmental bureaucracy, so as to determine how many public resources (human, financial, or in-kind) allocated from the senior administration are conveyed, and how they reach each destination. This is a method of locating and quantifying funds' leaks. To achieve this goal, data must to be collected at various levels, including front-line service providers (schools, teachers, hospital, and doctors), local authorities (political authorities and civil servants) and central government's authorities (financial fields, staff, etc.). By comparing the information collected from these different sources, the study team can track the traceability of funds' flows from the top administration down to the lowest level, in such a way to know where resources have been misused or lost.

This method recognizes that an interviewed agent may be incited to make false statements. Such behaviour results from that the information provided and collected for instance from a public institution, may be decisive for the allocation of funds. In cases

where resources are illegally used (bribe collection for instance), the agent involved (interviewed) will probably not frankly report it. The PETS's strategy has two characteristics: data collection firstly consists of combining information from several sources and secondly, determining which sources and respondents have an interest in giving true or false statements. This data collection strategy allows a cross-validation of information obtained (Reinikka & Smith, 2004). It was applied in Cameroon's health and educational fields in 2010 by the World Bank, and its findings are analysed below.

Traceability of public expenditure and highlights on transmission sub-channels in health sector

The Public Expenditure Tracking Survey carried out by the National Institute of Statistics in 2010, highlights difficulties faced by managers of public health facilities in executing their budget. These include the withdrawal of spending authorizations, the agreement with stakeholders in the expenditure circuit, the respect of their budget expenditure proposals by their hierarchies, the dependence of various stakeholders in the expenditure chain leading to the loss of resources.

Non-wage funds are intended for investment and running of public institutions. Investment funds in education and health sectors target schools' and hospitals' building and their equipment. Operating funds aim to ensure the availability of water, electricity and the like. Each year, the government allocates non-wage flows to all regions, departments and districts of the country, for the building and functioning of schools and hospitals. However, it is important to first know, from the highest administration to the final recipient, how these funds are conveyed, and State agents in charge. Secondly, what are the public services carried out through non-wage flows that successive governments made available to regions, departments and districts in Cameroon? The practice of offering services will be presented depending on health or education.

Description of the normal transmission of non-salary flows from the highest administration to public hospitals and schools

In Cameroon, the highest administration which allocates non-wage flows to all public institutions, including health and educational services, is the Ministry of Finance. Resources allocated by this Ministry to public hospitals and primary or secondary schools are generally in the form of "cards", that is, a credit that the Ministry makes available to a State agent, responsible for the execution of an expenditure provided in the State budget. For instance, a "card" of one hundred thousand CFAF may be used for the purchase of teaching materials in a secondary school of a Cameroonian district. The director of the college is the one authorized to engage this credit, that is, to execute the said expenditure. The problem lies in how these "cards" are routed. In fact, the Ministry of Finance designs all cards, sends them to each region, department and district with representatives, namely, the financial controllers of the region and department, and the Sub-divisional Officer (SDO) of the department. Indeed, there is no financial controller in Cameroonian districts. At this level, the SDO replaces the financial controller by receiving all the cards allocated to public institutions located in a district. The role of the SDO here is to distribute the "cards" according to their final destinations (The director of the district hospital, the director of the secondary school and the principal of the district high school must each, remove their cards from the SDO). In a department, the various heads of public institutions rather withdraw theirs from the financial controller of the department. Similarly, at the regional level, government officials at the head of institutions withdraw theirs from the financial controller of the region, representing the Minister of Finance. There are two types of expenses to be distinguished in relation to these "cards": those which require the approval of the Tender Committee, and those that the head of the public institution executes by choosing a service provider himself. The description of the routing of "cards" from the higher administration to the final recipient shows that the financial controller, the SDO and the institution's leader who may be the school's or hospital's director, each has important roles in the management of non-salary flows.

The stakeholders' role

The Sub-divisional Officer at the departmental level or the governor at the regional level is the chairman of the Tender Committee in his administrative district. He therefore has a hand in the management of "cards" which expenses require authorization from the Tender Committee. As the executive head of the borough, the SDO manages all the officials in his administrative division (including colleges' and hospitals' managers). As such, he appreciates the work of each chief executive of a public institution within his borough. This appreciation is presented in the form of a mark out of twenty. Thus, he is the superior of every civil servant working in his department. He is commonly called the " land chief ". These civil servants owe him a lot of respect.

The role of the financial controller is crucial in targeting non-salary flows. It consists not only in conveying ''cards'' to the final recipients, but also, in carrying out inspection missions in public institutions as hospitals and high schools. He appreciates how non-wage flows are managed and follows up managers in charge of expenses' execution in how they manage their "cards". He may oppose this execution if deemed not in line with regulations.

The role of a public institution's, hospital's or secondary school's manager is crucial. In fact, as concerns cards not managed by the Tender Committee, he has the power to choose service providers in the institution he manages. Populations wish to have, at the head of these institutions (colleges, health centers and hospitals), officials whose concern is to serve users.

Budget preparation and availability of budget information

The PETS reveals that about 33% of officials, namely regional health delegates, reported having participated in the preparation of their budget. As concerns health facilities, managers of DMCs and IHCs are the least associated with the preparation of their budget (26% and 31% respectively). Regardless of the setting up environment and the budget type, at most one out of four structures' managers is informed of the budget allocation before the arrival of resources as indicated in the table below:

Table 6. *Percentage of managers involved in budget preparation in 2009*

Structure Type	Structure level	Urban	Rural	Overall
	Regional Delegation of Public Health (RDPH)	66.7		66.7
Decentralized services	District Health Service (DHS)	54.3		54.3
	District Hospital (DH)	69.6	26.7	52.6
Health facilities	District Medical Center (DMC)	22.2	30.8	25.8
	Integrated Health Center (IHC)	28.2	32.7	30.9

Source: National Institute of Statistics/PETS2, 2010

In the same vein, and with regard to the decentralized intermediate health services, 88.9% of regional delegates provided detailed information on their running budget, against 71.4% for investment. For this budget type, the situation is even more deplorable in Public Health Service (PHS) where nearly 56% of managers are not aware of the amount of their investment budget. With regard to health facilities, as we move from the highest to the lowest category, managers have less information on both the functioning and investment budgets. In addition, given that much investment in health facilities is managed at the highest level, information on investment budget is very poorly available to these managers. This situation is well illustrated in the table below:

Table 7. *Proportion of health structures' managers informed about their 2009 budget*

	Structure	Functioning			Investment		
		Collected	Finance Act	Collectedand Finance Act	Collected	Journal of Projects	Collected and Journal of Projects
Decentralized Services	RDPH	88.9	100.0	88.9	71.4	100.0	71.4
	DHS	97.0	100.0	91.0	27.3	44.4	12.1
Health facility	DH	80.8	100.0	80.8	73.1	57.9	42.3
	DMC	70.8	71.4	41.7	66.7	14.3	8.3
	IHC	62.3	80.3	59.0	54.1	9.8	3.3

Source: National Institute of Statistics/PETS2, 2010.

Management of public resources

There is a mismatch between the resources received and those recorded in the Finance Act / Journal of Projects. Indeed, according to PETS2, and except the IHCs, at least half of other health structures' managers report that the amount of resources received from the administration did not correspond to that registered in

the Finance Act and /or in health facilities' Journal of Projects as shown in the table below:

Table 8. *Proportion of authorizing officers who reported having received from the administration an amount of resources corresponding to that recorded in the Finance Actin 2009*

Structure Type	Level	Urban	Rural	Overall
Decentralized	RDPH	55.6	-	55.6
Services	DHS	54.3	-	54.3
	DH	56.0	-	56.0
Health facility	DMC	70.0	40.0	55.0
	IHC	35.0	39.5	37.9

Source: National Institute of Statistics/PETS2, 2010.

Expenditure authorizations for one out of three structures are withdrawn by people other than the appointed managers. Indeed, the survey reveals that in health facilities, nearly 4 out of 10 managers declare that expenditure authorizations intended for their structures have not been withdrawn by themselves. This proportion is higher in urban than in rural areas except for district hospitals. In addition, 20% of managers are not aware of the identity of the person who withdrew their authorizations.

The budget execution rate

The PETS reveals, except for health facilities in the South region and the decentralized services in the South-West that in general, the implementation rate of the operating budget is close to 100%. However, this rate for investment budget remains low throughout the national territory. As one moves from one step to the next, the investment budget's execution rate has considerably in creased. For health facilities for instance, it ranges from 50% for IHCs to 60% for DHCs and 90% for DH.

In addition and irrespective of the budget line, the resources lost by the decentralized intermediate health services are mainly attributable to the financial controllers. In general, the most affected lines are "purchase of common equipments" and "purchase of supplies".

Thus, for the majority of health facilities in rural areas and because their expenditure authorizations are withdrawn by a third party, may worth a counterpart. In urban as well as in rural areas,

the most subject lines to the loss of resources in health facilities are *"purchase of drugs", "office supplies" and "computer equipments»* respectively. However, while the implementation rate of the operating budget is satisfactory, that of investment remains very low as it barely reaches 60% at the national level.

In sum, a significant proportion of budgetary resources (35 to 40%), is lost to support various stakeholders identified as links in the expenditure circuit, or the unidentified (actors in political life) as illustrated in the table below:

Table 9. *Percentage of resources declared lost by managers of decentralized health services to support stakeholders in the expenditure circuit*

Stakeholders / Budget line	Hierarchy and administrative authorities	Finance controls	Stock Account	Tender Committee	Structure's Specific Services
Purchase of supplies (1)	19.9	23.3	10.5	4.0	42.3
Purchase of common equipments (2)	7.0	48.0	4.0	7.7	33.2
Purchases of small equipments (3)	18.7	41.1	6.2	9.7	24.2
Fuel and lubricants (4)	18.3	28.3	7.0	8.4	38.0
Vehicles' maintenance and repair (5)	21.2	35.5	5.9	0.0	37.5
Mission allowances (6)	7.0	35.1	4.2	0.0	53.8

Source: National Institute of Statistics/PETS2, 2010.

Similarly, the table below highlights the percentage of health facilities' managers who lost resources to support stakeholders in the expenditure circuit:

Table 10. *Percentage of health facilities' managers who lost resources to support stakeholders in the expenditure circuit*

Stakeholders / Budget line	Hierarchy and administrative authorities	Finance controls	Stock Account	Tender Committee	Health Facility's Specific Services
	A	B	C	D	E
Purchase of drugs (1)	32.0	9.7	18.8	27.2	12.4
Office supplies(2)	37.8	11.0	4.4	29.7	17.1
Computer Equipments (3)	40.4	10.2	3.2	1.0	45.1
Office maintenance(4)	27.9	9.0	3.3	45.5	14.2
Fuel (5)	69.9	5.4	0.9	0.1	23.6
Staff bonuses (6)	35.4	1.4	1.4	57.4	4.4

Source: National Institute of Statistics/PETS2, 2010.

In view of these findings, it is clear that some health facilities' managers are obliged to pay bribes to stakeholders in the expenditure circuit to access their expenditure authorizations. In both urban and rural areas, the budget lines most subject to resources' loss are "purchase of drugs", "office supplies" and "computer equipments" respectively, as synthesized in the following table:

Table 11. *Percentage of health facilities' managers who have lost resources to support stakeholders in the expenditure circuit according to their setting up environment*

Stakeholders / Budget line	Hierarchy and administrative authorities			Finance Services			Stock Account		
	Urban	Rural	Overall	Urban	Rural	Overall	Urban	Rural	Overall
Medical purchase	35.6	27.3	32	15	2.6	9.7	17.8	20.1	18.8
Office supplies	41.2	36.3	37.8	25.4	4.2	11	6.8	3.3	4.4
Computer equipments	11.2	65.9	40.4	15.2	5.9	10.2	4.3	2.2	3.2
Fuel	12	78.8	69.9	26.7	2.6	5.4	1.4	0.9	0.9
Staff bonuses		35.4	35.4		1.4	1.4		1.4	1.4
Office maintenance	0.8	34.3	27.9	31.7	3.7	9.0	14.4	0.7	3.3

Source: National Institute of Statistics/PETS2, 2010.

In sum, budget execution is still fraught with difficulties, as health units and intermediate decentralized health departments' managers have the same hindrances in executing their functioning and investment budgets. These include: (i) insufficient and inadequate credits; (ii) administrative delays; iii) payment inconveniences; iv) the delay in receiving the cards. Another difficulty and not the least relates to credits made available by the hierarchy to managers of public health facilities.

Traceability of public expenditure and highlights on transmission sub-channels in the educational field

As in the health sector, we highlight the traceability of public expenditure in the educational sector. In other words, it concerns the flow of public funds and material resources from the government and other donors through the administrative hierarchy to the authorizing officers in schools.

Preparation and budget information

In preparing the budget, it is recommended that the main managers of educational structures be regularly associated to better appreciate their real needs and facilitate the management of their available financial resources. The PETS reveals that many managers were not involved in the budget preparation of their structures. There are 33.6% in secondary schools and almost 74% in primary schools as illustrated in the table below:

Table 12. *Percentage of managers who reported having been involved in preparing their budget in 2009*

Ministry	Structure Level	Setting up environment		Overall
		Urban	Rural	
Ministry of Secondary Education	Regional Delegation	50.0		50.0
	Departmental delegation	39.3		39.3
	Secondary school	68.0	63.5	66.4
Ministry of Basic Education	Regional Delegation	70.0		70.0
	Departmental delegation	63.3		63.3
	District Inspection of Basic Education(IAEB)/Training College of General Education Teachers (ENIEG)	32.8	23.8	30.4
	Primary School	27.5	24	26.1

Source: National Institute of Statistics/PETS2, 2010.

Regardless of the type of budget and the level of the educational structure, less than 28% of managers were informed of the budget allocation of their structures before their arrival. Paradoxically, structures' managers in rural areas are better informed than those in the urban. The PETS revealed that due to the absence or the bad preservation of accounting records, information on the budget and its use is not exhaustive, and this did not facilitate comparisons between the information collected and that recorded in official documents being the Finance Act (details on the functioning budget) and the Journal of Projects (details on investment budget). The study finally shows that when it exists, archiving essentially depends on the organizing skills of the person in charge.

Management of budgetary resources and loss of resources recorded in the expenditure circuit

Budgetary resources are mainly provided to structures in the form of spending authorizations ("cards") in local financial control services. Budget managerial effectiveness in educational structures as elsewhere highly depends on resources 'availability, their implementation's deadlines and especially, losses that can be recorded at intermediate levels to support stakeholders in the circuit. Thus, our analysis will be focussed on this variant. Losses (in percentage) recorded during the execution of the functioning budget line and according to the type of executor are presented and summarized in tables below.

As concerns the loss of resources, it is actually noted that some schools and decentralized services have lost significant resources in their operating budget (40 percent) to support the interventions of officials in the circuit. This phenomenon is even more noticeable in rural than urban areas. Thus, to take care of stakeholders in this circuit, secondary schools managers record more losses in their budget than those of the decentralized services. In general, the highest losses in the expenditure circuit are noted in budget lines for the purchase of common equipments, computer and office materials, the maintenance and repair of vehicles and the purchase of other common supplies. The structure's own services come second in resources' deviation. The most affected lines are mission allowances and seminars, training and internships.

Thus, because of many stakeholders, a significant fraction of budgetary resources are lost in the expenditure circuit.

Finally, the survey revealed that in the decentralized structures, the main difficulties encountered in the operating and investment budgets' execution are the "insufficiency/weakness of credits allocated" (49%), the "administrative slowness" (25%) and the "lack of cash" in the treasury (22%). Are also cited among the top ten reasons, the "excess in payment procedures" and "the percentage asked by suppliers", but in lower proportions.

In schools, the delay in receiving expenditure authorizations (58%) and the insufficiency/weakness of credits allocated (nearly 30%) are also raised.

Table 13. *Percentage of decentralized intermediary services that recorded losses in a functioning budget line by environment and stakeholder type*

Stakeholder type / Budget Line	Hierarchy and administrative authorities	Financial Control	Stock Account	Tender committee	Specific services
	A	B	C	D	E
Purchase of supplies and small maintenance(1)	5.7	14.7	8.7	3.9	5.8
Purchase of common computer and office equipments(2)	2.9	11.1	3.9	4.8	2.9
Purchase of other common supplies(3)	2.9	9.4	3.9	3.9	1.9
Purchase of fuel and lubricants for motor vehicles(4)	5.9	9.9	4.0	2.0	2.0
Maintenance and repair of common vehicles(5)	3.0	7.1	3.1	2.0	3.1
Internal Mission allowances(6)	8.4	11.3	4.8	2.9	10.3
Seminars, training and internship(7)	4.9	5.0	3.0	1.0	8.7

Source: National Institute of Statistics/PETS2, 2010.

Table 14. *Percentage of resources lost by intermediate decentralized services during implementation by operating budget line, environment and stakeholdertype*

Stakeholder type / Budget Line	Hierarchy and administrative authorities	Financial Control	Stock Account	Tender committee	Specific services
	A	B	C	D	E
Purchase of supplies and small maintenance (1)	4.6	33.4	13.1	27.2	21.7
Purchase of common computer and office equipment (2)	2.8	54.1	1.2	30.6	11.4
Purchase of other common supplies (3)	2.1	40.8	16.3	32.4	8.4
Purchase of fuel and lubricants for motor vehicles (4)	9.0	20.2	1.1	46.6	23.2
Maintenance and repair of common vehicles (5)	2.0	46.6	2.7	7.1	41.7
Internal mission allowances(6)	10.5	12.8	2.6	27.4	46.6
Seminars, training and internship(7)	6.7	2.5	0.2	0.2	90.4

Source: National Institute of Statistics/PETS2, 2010.

Table 15. *Percentage of high schools that reported losses in one operating budget line by community and type of worker*

Stakeholder type / Budget Line	Hierarchy and administrative authorities	Financial Control	Stock Account	Tender committee	Specific services
	A	B	C	D	E
Purchase of supplies and small office maintenance (1)	9.8	15.4	9.1	3.0	13.3
Purchase of common computer and office equipments(2)	4.3	8.5	5.6	3.7	7.5
Purchase of small equipments and technical supplies specific to the function (3)	3.1	5.7	5.7	3.2	9.5
Fuel and lubricants for motor vehicles(4)	12.0	14.5	8.0	3.7	13.5
Maintenance and repair of common vehicles, purchase of spare parts and tires(5)	6.1	10.4	4.9	3.1	11.0
Internal mission allowances (6)	9.7	11.0	6.2	2.5	15.4

Source: National Institute of Statistics/PETS2, 2010.

Table 16. *Percentage of resources lost by secondary schools in line-based execution of the operating budget and by environment and stakeholder type*

Stakeholder type / Budget Line	Hierarchy and administrative authorities	Financial Control	Stock Account	Tender committee	Specific services
	A	B	C	D	E
Purchase of supplies and small office maintenance (1)	9.6	30.8	3.8	2.8	53.0
Purchase of common computer and office equipments (2)	41.3	16.7	6.5	7.4	47.3
Purchase of small equipments and technical supplies specific to the function (3)	7.5	23.4	5.9	5.5	59.5
Fuel and lubricants for motor vehicles (4)	40.5	14.0	6.5	4.7	47.1
Maintenance and repair of common vehicles, purchase of spare parts and tires (5)	30.7	16.0	2.1	3.1	61.1
Internal mission allowances (6)	50.6	13.0	10.1	15.6	34.4

Source: National Institute of Statistics/PETS2, 2010.

Identification and explanation of sub-channels in the loss of budgetary resources

The tables below present identify and prioritize the sub-channels through which budgetary resources are distracted in the expenditure circuit of education and health sectors on the one hand, and the most affected budget lines by funds' loss on the other. The loss is put in vanguard on two levels: the intermediate decentralized services on the one hand, and secondary schools and health facilities on the other.

In educational sector

The schools' decentralized services

Table 17. *Percentage of decentralized intermediary services that recorded losses in one operating budget line according to the stakeholder type*

	A	B	C	D	E	Average
1	5.7	14.7	8.7	3.9	5.8	7.76
2	2.9	11.1	3.9	4.8	2.9	5.12
3	2.9	9.4	3.9	3.9	1.9	4.40
4	5.9	9.9	4	2	2	4.76
5	3	7.1	3.1	2	3.1	3.66
6	8.4	11.3	4.8	2.9	10.3	7.54
7	4.9	5	3	1	8.7	4.52
Average	4.81	9.79	4.49	2.93	4.96	
Rank	3	1	4	5	2	

Source: Our estimates based on PETS2 data.

It can be seen from the table above that on average, nearly 10% of intermediate decentralized services report losses to financial controllers and almost 5% in structures specific to these services. The most affected budget lines on average are internal mission allowances and the purchase of supplies and small office maintenance.

Table 18. *Percentage of resources lost by intermediate decentralized services during implementation by operating budget line, environment and stakeholder type*

	A	B	C	D	E	Average
1	4.6	33.4	13.1	27.2	21.7	20.00
2	2.8	54.1	1.2	30.6	11.4	20.02
3	2.1	40.8	16.3	32.4	8.4	20.00
4	9	20.2	1.1	46.6	23,2	20.02
5	2	46.6	2.7	7.1	41.7	20.02
6	10.5	12.8	2.6	27.4	46.6	19.98
7	6.7	2.5	0.2	0.2	90.4	20.00
Average	5.39	30.06	5.31	24.50	34.77	
Rank	4	2	5	3	1	

Source: Our estimates based on PETS2 data.

Similarly, with regard to resources lost by these services, the above table identifies two main channels through which they are misused: services specific to these structures (35%) and financial control (30%) and in this case, we find that almost all budget lines are affected at the same level, but with a greater extend for that devoted to Seminars, trainings and internships.

Secondary schools

Table 19. *Percentage of secondary schools that reported losses in one operating budget line by stakeholder type*

	A	B	C	D	E	Average
1	9.8	15.4	9.1	3	13.3	10.12
2	4.3	8.5	5.6	3.7	7.5	5.92
3	3.1	5.7	5.7	3.2	9.5	5.44
4	12	14.5	8	3.7	13.5	10.34
5	6.1	10.4	4.9	3.1	11	7.10
6	9.7	11	6.2	2.5	15.4	8.96
Average	8.47	8.71	8.62	8.83	11.39	
Rank	5	3	4	2	1	

Source: Our estimates based on PETS2 data.

The percentage of secondary schools with losses in an operating budget line is on average almost identical according to the type of stakeholder, with a more pronounced extent for institution-specific services (11%). Budget lines for the purchase of supplies and small

office maintenance, motor vehicles' fuel and lubricants and internal mission allowances are the most affected.

Table 20. *Percentage of resources lost by secondary schools during their functioning by operating budget line and stakeholder type*

	A	B	C	D	E	Average
1	9.6	30.8	3.8	2.8	53	20.00
2	41.3	16.7	6.5	7.4	47.3	23.84
3	7.5	23.4	5.9	5.5	59.5	20.36
4	40.5	14	6.5	4.7	47.1	22.56
5	30.7	16	2.1	3.1	61.1	22.60
6	50.6	13	10.1	15.6	34.4	24.74
Average	30.03	18.98	5.82	6.52	50.40	
Rank	2	3	5	4	1	

Source: Our estimates based on PETS2 data.

In terms of resources lost by institutions, the main leakage channels are materialized by leaks in services specific to schools and the hierarchy and administrative authorities, with average losses of about 50% and 30% respectively. On average, the most affected budget lines are the internal mission allowances, the purchase of common equipments, computer and office materials, the maintenance and repair of vehicles, the purchase of spare parts and pneumatic tires, fuel and lubricants for motor vehicles, the purchase of small equipments and technical supplies specific to the function and finally, the purchase of supplies and small office maintenance.

In Health sector

The decentralized Health services

On average, losses recorded by the decentralized health services' managers to take care of actors in the expenditure circuit mainly come from services specific to a health facility (38%) and the financial control (35%). All budget lines are almost equally affected.

Table 21. *Percentage of resources declared lost by the decentralized health services' managers to support stakeholders in the expenditure circuit*

	A	B	C	D	E	Average
1	19.9	23.3	10.5	4	42.3	20.00
2	7	48	4	7.7	33.2	19.98
3	18.7	41.1	6.2	9.7	24.2	19.98
4	18.3	28.3	7	8.4	38	20.00
5	21.2	35.5	5.9	0	37.5	20.02
6	7	35.1	4.2	0	53.8	20.02
Average	15.35	35.22	6.30	4.97	38.17	
Rank	3	2	4	5	1	

Source: Our estimates based on PETS2 data

Health facilities

Table 22. *Percentage of health facilities' managers who lost resources to support stakeholders in the expenditure circuit*

	A	B	C	D	E	Average
1	32	9.7	18.8	27.2	12.4	20.02
2	37.8	11	4.4	29.7	17.1	20.00
3	40.4	10.2	3.2	1	45.1	19.98
4	27.9	9	3.3	45.5	14.2	19.98
5	69.9	5.4	0.9	0.1	23.6	19.98
6	35.4	1.4	1.4	57.4	4.4	20.00
Average	40.57	7.78	5.33	26.82	19.47	
Rank	1	4	5	2	3	

Source: Our estimates based on PETS2 data

On average, about 41% of health facilities' managers report having lost resources to take care of stakeholders in the expenditure circuit at the hierarchical and administrative levels. The Tender Committee (27%) and health facility-specific services (19%) are also loss of resources' channels identified by managers to take charge of these stakeholders, all budget lines being affected in the same proportions.

The most favourable Sub-channels to non-wage leaks.

Sub-channels through which the loss of non-wage flows occurs can be classified according to whether they are decentralized services or health facilities which offer front-line services (hospitals for health sector and schools for education). In both cases, sub-

channels represented by the financial control, services specific to structures (hospitals or schools) as well as the hierarchy and administrative authorities, each occupy the first, second or third rank in the one or the other classification.

The financial control sub-channel is the second contributor to funds' loss in the decentralized educational services, the second in the decentralized health services and the third in secondary institutions.

The hierarchy and administrative authority sub-channel ranks first among actors behind funds 'loss in the decentralized health services, among stakeholders at the origin of funds 'loss in secondary schools, and among actors of the same issue in the deconcent rated educational services.

Finally, the public institution services' sub-channel ranks first among actors behind funds' loss in secondary schools' spending circuit, among actors behind this issue in the expenditures circuit of the decentralized health services and that of the decentralized educational services.

The question we are trying to answer is why leaks mainly occur through these three sub-channels.

Analysis and explanation as concerns losses in non-salary flows

As mentioned earlier, the role of the financial controller is to inspect public institutions to ensure that the available resources are well managed by their promoters. Following the inspection of a public institution, the financial controller sends a report in line with the managerial state of the institution tothe senior management of the Ministry of Finance. When the manager of a public hospital or a high school commits managerial errors, it is up to the controller to report to the hierarchy the evidence of mistakes committed. On the other hand, the financial controller can also hide information about this mismanagement, thus helping the head of the institution to avoid sanctions.

Ultimately, he has a discretionary power over the disclosure of the managerial misconduct. He can either reveal or hide the deviant behaviour of State agents in charge of the management of a public hospital or a high school. Consequently, the latter are

encouraged to support them during their multiple inspections, especially when the institution's manager has committed managerial errors and wishes them not to be disclosed.

Similarly, the role of the hierarchy or the administrative authorities in conveying non-wage flows is of paramount importance. Sub-divisional officers are not among officials of the Ministry of Finance whose role is to convey "cards" from the highest hierarchy to the final recipients. They should not directly intervene in the management of these "cards". However, in the absence of financial controllers in districts, the Ministry of Finance entrusts them with the task of distributing "cards" to various public institutions settled in districts. By delegating this task to the Sub-divisional Officer, the Ministry of Finance grants him a discretionary power in their management. Indeed, it is possible that their access is illegally conditioned by the offer of a value portion of the "card" to the Sub-divisional Officer. The latter may refuse to give out the "card" in time to those who do not offer him an illegal counterpart. In reality, public institutions' managers are often not informed of the value and the number of "cards" to them allocated. Therefore, the Sub-divisional Officer can only offer them some of the "cards" and resources to them assigned. The "land chief" (Sub-divisional Officer) may abuse his power as a representative of the executive in his administrative district, by performing some expenses in place of the hospital's manager.

However, even when people are informed that authorities have extorted part of funds earmarked for the building of a part of the hospital (for instance, the building of a wall), they are resigned in view of the high cost of a possible complaint (Hirschman, 1970).

Moreover, due to that the Sub-divisional Officer appreciates the work of each State agent in charge of the management of a school or hospital and assigns him a score out of twenty, he owes him much respect. Indeed, a bad grade can lead to a disciplinary transfer and even serious penalties. The hospital's director can lose his position of responsibility. Therefore, all public servants owe him respect. He can abuse this power by refusing to give out a "card" to whom it is entitled.

Heads of public institutions as hospitals and schools are civil servants to whom non-wage flows are intended. The role of these

managers is to withdraw them from financial controllers and execute the expense planned by the higher hierarchy. Given the information asymmetry between this hierarchy and the person in charge of executing the expenditure, it is possible that the latter directs this expense for his own interest. The one executing the expenditure has a discretionary power in the handling of funds thereto related.

Apart from expenses executed by a provider chosen by the Tender Committee, the institution's manager has the power to freely choose a provider to execute his expenses. He can therefore agree with the latter so that expenses made are to his own advantage and not to that of the institution. The discretionary power of this manager partly explains the level of leakage due to abuse by directors of public institutions (schools and hospitals).

Conclusion and recommendations

The purpose of this study was, within the framework of education and health sectors in Cameroon, to identify the sub-channels which favour the loss of non-wage funds, to classify them according to their capacity to produce this loss and finally to highlight their magnitude. At the end of this investigation, it appears that financial controllers, hierarchical administrative authorities and public service account managers are State agents who most favour the loss of non-wage flows in public schools and health institutions. For instance, in health's decentralized services, these leaks amount to 38.17% due to authorizing officers, 35.22% because of financial controllers and 15.35% as concerns the hierarchical administrative authorities. In educational decentralized services, they amount to 34.77% due to authorizing officers, 30.06% because of financial controllers and 5.39% with regard to administrative hierarchical authorities. Possessing a high discretionary power in the expenditure circuit stands as the first explanatory factor enabling to understand why these three types of State agents are those from whom the loss of non-wage flows originated.

With regard to education and health institutions' specific services, each public hospital or school's director is delegated by the Minister of Finance, the power to carry out most expenditures

in his institution's budget (hospital or school). The Minister coordinates and controls the administrative acts of each director through the authority he exercises over him. One of the explanatory factors for corrupt opportunities is the information asymmetry which featured this delegation of power. The phenomenon is due to conflicts of interest between the director (the agent) and the Minister of Finance (the principal), and to the information asymmetry in favour of the agent which grants him a high degree of discretion in his behaviour. Therefore, it is easy for the latter to use it to acquire favours from third parties (providers of goods and services) whose gains and losses depend on him. For instance, for the authorizing officer to choose a company as a service provider, the latter must offer him a bribe.

The financial controller draws his discretionary power from the supervisory power he exercises over the budget authorizing officer. The latter is aware that the former may reveal or conceal his corrupt acts linked to his function of expenses' executor. The Budget Authorizing Officer is therefore bound to support him during his actual control activities, in particular when he is persuaded to have carried out corrupt practices, and that the Financial Controller may allow him to avoid sanctions by concealing his deviant behaviour.

The Sub-divisional Officer, representing the hierarchical administrative authority, draws his discretionary power by that he replaces the absent financial controller in his district. He receives "cards" destined to public hospitals and high schools located in his administrative sphere. He can manipulate the administrative environment in such a way as to give out "cards" only to the budget organizers who offer him a bribe. In this perspective, the authorizing officer is found in a situation where he has to negotiate with the Sub-divisional Officer to get the "card" for his school.

Faced with these leaks of non-wage flows, we propose two types of measures. The first deals with the disclosure of information and the second with the reduction of the discretionary power of State agents.

In the first case, the idea is to make available to the authorizing officers of education, health institutions and users, information on how non-wage flows are conveyed. This includes informing the

potential beneficiary populations of when a "card" is allocated by the Ministry of Finance and when it should reach its destination, the Sub-divisional Officer, the financial controller or the authorizing officer by delegation. The aim is to ensure that the beneficiaries of non-wage flows can claim their rights, that is, the execution of expenses related to their "cards». However, this measure is somewhat limited for at least two reasons: First, mobilizing the scattered victims remains difficult face to a well-organized group who profits from illegally sold rents. From Olson's (1997) logic, it is explained by that the mobilization's cost of victims seems greater than the profit they expect in case of victory. It is therefore rational to remain passive, especially when the denunciatory victims risk retaliation in an undemocratic environment. Victims are also often of a lower social status than actors of corrupt transactions and thus, they suffer an additional handicap (Cartier-Bresson, 2008, p.67). Secondly, this measure does not hold because of the legal or judicial system's fragility which does not fulfil its functions. The lack of legal effectiveness may stem from a general perception of the lack of legal legitimacy, the inadequacy of procedures being too complex or too costly for victims, the lack of financial resources in the judicial system, the lack of independence of justice and its own corruption.

The second measure consists in reducing the discretionary power of all those who most favour the loss of non-wage flows. The Sub-divisional Officers' discretion power can be reduced by appointing a financial controller in each district. The "cards" sent to districts will, from that moment, be received and distributed by the district's financial controller.

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4 Migration flows in the World in the 19th century: The case study of Central Africa: Types, reasons, challenges and economic consequences both at the beginning and at the end

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Introduction

The UNICEF Report on refugees entitled "Uprooted", of September 9, (2009), presents figures of the refugee crisis and migrants around the world. Considered from the first decadences of the twentieth century, when the establishment of the first aid agencies and the first legal texts as a temporary phenomenon, the issue of immigration since then has continued to appear as a sustainable socio-political and economic reality, with diversified causes. It is today envisaged on a much more global scale. In a broader sense, the question of immigration today concerns almost all the peoples of the world, since after the wars, the migrant, the conflicts seek places, havens of peace, security no matter the distance. On a different perspective, the voluntary migrant goes where he can be well paid, well educated. Most of the migrants in the world are mainly women and children (aged 10-45). They are mainly in camps, located principally in Africa,

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Asia, North America and Europe. Before this phenomenon, this solution was often preferred by the host countries as it facilitated security and an organization of an immediate repatriation.

Moreover, it offered a visibility likely to attract international aid. The International Organization of Migration estimated that the total number of migrants in the world in 2005 was ninety million, which represented 3% of the world's population.

Today, this rising figure puts into perspective the global importance of migration flows in the world. In 2005, the European Union registered 25 million foreigners (5.5% of the total population), settled mainly in Germany, France, Spain, the United Kingdom and Italy. In Africa, this phenomenon is growing because of famine, conflict, instability that leads to forced migration. Voluntary migrations being gradually scare in African countries where famine, draught and dictatorship are very common.

The impact of immigration in Europe being particularly appreciated about the number of foreigners who have acquired the nationality of the host country, renewing ipso facto the national population. In the European Union, more than eight (08) million of foreigners got their nationality between 1991 and 2005 (OECD, 2007). These social phenomena take a resonance because they are the subject of a political or media treatment where immigration is always presented as a problem or a threat with what the world contains today as terrorists with massive adhesions to terrorist groups. Above all, be it the entry of new migrants, the regularization of illegal migrants, the integration of new groups of immigrants, refugees, political and media discourses make immigrants the source of insecurity.

In our imagination, migration to Europe is still paramount, yet for decades there has been one intra-African.

This intra-African migration takes several routes. A first that lapped around the Ivory Coast at the time of the "Ivorian miracle" where this country needed the hand to exploit its agricultural wealth, attracting people from Mali, Burkina Faso, Guinea Conakry or Senegal. The second route was built around Nigeria with the discovery of its oil deposits in the Delta region, which drained the rush of people from Ghana, Benin. The third route was built around Senegal, former capital of the France East Africa

(AOF), attracting the people of Cape Verde, Guinea Bissau for historical reasons. Another opened in South African the way with the abundance and discovery of its gold, diamond, mines attract nationals from Zimbabwe, Mozambique and the last route is that of Central and West Africa. In addition to intra-African migration, there is first rural internal migration, also called rural exodus, and border migration. In 1994 Wilkinson wrote about "the Great Lakes (Central Africa) will have been one of the most serious and complex crises of our Epoch "(Wilkinson, R. in HCR, 1997) when a human tide of more than one million Rwandan refugees storms the small town of Goma in RCD, the day after the assassination of Rwandan presidents Juvenal Habyarimana and Burundian Cyprien Ntaryamina, another "city" of slits occupied exclusively by these migrants, erected on the outskirts of Goma.

In addition, migrants from Central Africa are experiencing tragedies in their host countries. Some are often driven back to or repatriated to their home countries in conditions that break ridicule or Barbary. For example, in Congo, migrants from the DRC are considered plague (B. Lututala Mumpasi, University of Kinshasa); it's better to kill a Congolese (DRC) than a snake, say the people of this country brother to the DRC. We will discuss here the importance of internal migration in Central Africa and its interrelations with international migration.

We should highlight in this paper, the volume of exchanges between the countries of the sub-region and all the related issues, the socio-economic situation.

The African continent in general and the Central African sub-region are greatly concerned by this situation, which on average makes million each year, including deaths in deserts and oceans. This alarming situation has prompted us in this article to highlight the types and reasons of migration, the stakes and finally the economic consequences at the beginning as well as at the end of the process.

Figure1. *The growth rate of CEMAC as indicated by BEAC*
Source: Cameroon24.NET, adapted from Mbog Achille

Types and reasons of migrations

The sociology of immigration traditionally highlights two problems: the problem of migration and that of the settlement of immigrants. The research on migration focuses mainly on the reasons or causes of migration flows, modalities, differentiated logics and their impact on the countries where the immigrant comes from, the transit country and the host country (Simon, 1995). In this case, we should make a distinction between voluntary migration (search for well-being) and forced migration (need of security and living space). The second aspect focuses on what is commonly called integration, namely the settlement of immigrants, their acculturation and their acquisition of a social, economic or even political position in the host country because no return is envisaged.

There are two types here: internal migration and external migration. But the study of migration in Central Africa is difficult to achieve for several reasons. The first is the scarcity of statistical data and studies with national and sub-regional coverage. Most studies have been done based on census data. Yet, as a man of

science, censuses on migration show limits (Loutete-Dangui & Libali, 2004). They mainly allow to study from the questions on the place of birth and the current residence, of migrants, duration of life, including the foreigners in the country (the immigrants), and the nationals who have settled abroad (emigrants) but also the related exchanges between the different regions; even the characteristics of some migrants. In one example out of a hundred, censuses are those that make it possible to study migrant characteristics, places of residence and migration paths, to mention only this aspect.

The socio-demographic data collection operations, namely the Demographic and Health Surveys (DHS), the 1-2-3 surveys, have little or no interest in migrations, as if they had no link with the problems that interest these institutions.

Faced with all these shortcomings, some samples of localized surveys were conducted on specific areas:

Findings made in Cameroon concerning specific areas of migration

-The survey of demographic pressure and rural exodus in North and West Cameroon (by the institution of training and demographic research (IFORD, 1982-1983);

-The Return Migration Survey (LIFORD-CEPED)

-The survey on school migration (Tunnou);

-The qualitative survey on the possible return of Malian migrants to Cameroon

- The survey of health professionals (WHO, 2004) Congo

- The qualitative survey of migrant life stories in Paris (Mac Gaffey & Bazaenguissa, 2000)

-The survey of 200 Congolese migrants in France (Douma, 2003) DRC

The migration survey in the family context MICOFA (Lutullala, 1984)

- The survey on migration to secondary cities: case of Inkir and kikwit (Mutuala, 1987; 1988)

-The survey on the Congolese diaspora (Lutullala, 1984)

-The survey of Congolese migrants in Paris (Lutullala, 1984)

-The survey on internal migration and demographic behavior of women) Kinshasa (Zamwangana, 2002)

-The migration survey in the city of Matadi (Nappa, 2005)

-The survey on international migration in the DRC from Kinshasa (Mangali, 2007) Chad

-The Chad migration survey

-The migration and urbanization survey in Chad (EMUT) (Chadian Ministry of Planning, 1998).

In Cameroon, some surveys are carried out in rural areas, while elsewhere, in the DRC and Chad, for example, they are conducted in the capitals and secondary cities, and these surveys also show the same limits as those observed for censuses to study migrations in Central Africa in all its facts.

Data from countries such as Gabon and Angola are elusive. In spite of this scarcity of data, we can also note the absence of a regional structure capable of taking care of comparative regional or national studies.

Research carried out on migrations is dominated by debates on the categories used. The term "migrant" is widely used in the United States of America where settlement immigration is part of the myth of the nation's constitution. In Europe, the word "immigrant" is more common. It enables to highlight two references. The first is legal and refers to the foreign status of the immigrant. The second is sociological and targets its socially inferior status. The same principle organizes the American and European designations of immigrants. In Africa, the term "migrant" is replaced by "refugee." This phenomenon is becoming more common in Africa because of famine, drought, war, and internal or interstate conflicts. Organizations in charge in Africa, such as the High Commission for Refugees (UNHCR), estimate in million the number of victims that are displaced people in their reports.

When we take for example the migration corridors of the Central African Republic and Cameroon, we note that although Cameroon has ratified several treaties and conventions, notably the 1951 Convention relating to refugees (signed on 23 October 1961), the 1967 Protocol related to the status of refugees (Cameroon adhered to it on 19 September 1967), the United Nations

Convention (OAU) of September 1969 governing the specific aspects of refugee's problems in Africa. In addition, since July 2005, Cameroon has adopted a law defining the legal framework for the protection of refugees, which entered into force in November 2011. The conflicts in Chad lasted more than thirty (30) years and Cameroon found herself hosting these Chadian "immigrants" who today live with the populations of Northern Cameroon and this is a good mix of *savoir vivre*. Cameroon therefore remains a haven of peace in the Central African sub-region.

Economic challenges

Much research work has been done on the social and economic condition of immigration. The theoretical frameworks for analyzing international migration (Massey, 1999) are many if we take into consideration the multiple privileged approaches and disciplines involved. It is therefore possible to divide these theories into two large sets (Massey *et al*., 1993): Those that propose models explaining the growth of migration and those that try to understand why migratory flows persist. They base their analysis on the social structures where individuals can be classified according to the adapted theoretical framework (Brettel & Hollfield, 2000). The theories presented are often used as a framework for analyzing the different migration models that are envisaged: forced migrations (resulting from conflicts, wars), voluntary migrations (search for better living conditions, etc.) and transnational migrations of globalization.

Neoclassical economic theories are of two categories. Regarding the macroeconomic approach (Harris & Todaro, 1970), international migrations are due to spatial differences between reserves and labour demands. Countries with a higher labor endowment than capital have a labor market with low wages. On the other hand, countries where the capital labor ratio is in favor of capital have a labour market with high wages. This difference in wages gets low-wage workers to move to countries with high salaries. As a result, countries' labor reserves shrink, and wages rise while labor reserves in rich countries rise and wages fall. This conception has largely determined the public policies. This was

echoed in France and former French President Nicolas Sarkozy spoke of "chosen immigration" in one of his speeches.

For him, if we are not useful for the French society, it is useless to immigrate to France. To control migration flows, governments must act on the labor market.

In microeconomic perspectives (Broyas, 1989), it is thought that the basic unit is the individual, and it is what justifies the rational choice as the model of explanation. A rational individual decides to migrate because the cost / benefit calculation leads him to expect a positive value, in financial terms, from migration in terms of voluntary migration. This calculation is made between the knowledge of the qualification that one possesses and what one expects in terms of wages, a calculation valid both for the poorly qualified people and those highly graduated.

To say it all, voluntary migration flows are just the sum of individual projects. The new approach to the economics of migration as advocated by (Stark, 1991) provides a variation on microeconomic design. It does not make the individual the unit of reference, he thinks that the decision to migrate results from a family consensus. Here, we hope not only to maximize the gains, but also to reduce the risks. In this perspective, social protection mechanisms and social policies are perceived as risk reduction factors, even if these services are not accessible to all immigrants.

We can therefore think that among the structuralist approaches is the theory of the world system, of Marxist inspiration. For them, migrations are the result of structural changes in the expression of economic markets and the development of excessive capitalism, in which the political authorities also play a major role. Wallerstein (1974) places international migration in a long historical cycle, that of the global market that has spread since the sixteenth century. The entry of capitalist economic relations into non-capitalist peripheral societies has created a mobile population ready to emigrate. Forced migrations are the result of wars, conflicts and the search for security. In the Central African sub-region, they are frequent because of conflicts, exactions as in Rwanda, Chad, and Central African Republic. Cameroon therefore becomes a land of pre-selection for migration or "refugees". Taking the example of the Central African Republic, the entry of her refugees in Cameroon is

in million. Here is the summary table that the UNCHR report presents.

Table 1. *The distribution of Central African migrants at the borders of Cameroon*

REGIONS	Names	Distance from the border	Registered or Preregistered	Transferred on the sites	Arrived spontaneously on the sites	Number left at the entry
ADAMAOUA	Ngoui	2 Km	7724	4402	442	2880
	GdatouaGodole	5 Km	873	319	15	539
	Yamba	1 Km	4098	1440	64	2594
	Alhamdou	2 Km	912	322	18	572
	Diel	0 Km	1765	1470	261	34
	Damissa	2 Km	62	15	01	46
	Kombolaka	15 Km	123	123	02	02
	No information		3470	378	0	3192
	Sub-total		19127	8469	803	9055
NORTH	Mbaimboum	07 Km	2525	58	48	2419
	Ourobouley	200 Km	566	03	03	560
	Guigui	100 Km				
	Sub-total		3091	61	51	2979
EAST	Garoua-Boulai	0 Km	23690	14591		9099
	Kentzou	07 Km	22723	12036		10687
	Mboy	03 Km	758	588		170
	Gari-gombo	07 Km	568	0		568
	Libongo	0 Km	1355	734		621
	Bela	0 Km	1842	904		938
	Gribi	15 Km	63	37		26
	Gbiti	02 Km	26953	23748		3205
	Bombe Bakari	0 Km	1369	1060		
	Bombe Pana	0 Km				
	Nasir	01 Km				
	Tocktoyo	0 Km	1050	1050		
	No information		828	4175		3347
	Sub-total		81199	58923	0	21967
	TOTAL		103417	67453	854	34801

Source: UNCHR Cameroon of July 27, 2014.

The structuration theory by Gradens, Goss & Lindquist (1995) proposes a complementary approach to that of networks by suggesting the concept of "migratory institution" exceeding the opposition between individual motivations and structural causalities. The latter consists in the articulation between agents (individuals, associations) who have an interest or even specific roles in an environment other than theirs, because they are in search of security and well-being. It thus exists an institutionalization of migration that results to the combination between individual actions such as the search for security and

social structures. These forced displacements are the source of enormous economic problems in both departure and arrival areas.

Sub-regional migrations therefore produce effects that are somewhat unexpected. The search for security in the arrival areas often leads the host governments to take other measures than those already established.

The countries concerned are: Angola, Cameroon, Congo, Gabon, Central African Republic (CAR), DRC, and Chad. To these we add the countries of the Great Lakes (Rwanda and Burundi) because of the migratory space they occupy in Central Africa. These countries belong to three historical-political groups; the former French colonies, (Congo, Gabon, and Central Africa Republic) plus Cameroon, Belgium for the DRC and to a lesser extent Rwanda and Burundi, Portugal for Angola. This has the immediate impact on the migratory history of each sub-set and on the direction of the international migratory flows in terms of area in Central Africa, the DRC holds the golden palm with a space of (2,345,000 Km^2) yet the Gabon example has only 267,000 Km^2. The region is characterized by very unequal densities: some countries have low densities with large expanse of land but not exploited, others have none and overpopulated. These imbalances expose migrants to conflicts in the environment of destination, especially for earthy access. It should be noted that some people describe migration as demographic exits (Pourtier, nd.). In 2004, the DRC had a population of 60,000,000 inhabitants; Gabon 1,000,000 in habitants. Table 2shows the area, countries and the populations of Central Africa.

Table 2. *Country Areas (km^2) and Populations (in million)*

Countries	Superficies (Km^2)	Population (in million)
Gabon	267000	1,4
Congo	342000	4,0
Cameroon	475442	16,4
Rwanda	26340	8,7
Angola	1,2000000	15,4
RDC	2,3000000	60,8
Burundi	27830	7,8
Chad	1,3000000	9,7
RCA	623000	4,2

Source: CEA (2004).

Geographically, this part of Africa is crossed by the equator, where abundant rainfall prevails except in Chad.

The vegetation consists of a vast forest area, savannahs and mountains along the Congo Basin. The equatorial forest is dense and vast, covering 85% of the surface area of countries such as Gabon, 60% of Congo and 50% of the DRC, a good part of Cameroon and the Central Africa Republic, except Chad, which is considered as a Sahelian country. A total of 1.8 million km^2 are covered by the equatorial forest, making this forest the second largest tropical forest after the Amazon. Regarding hydrography, Central Africa is immersed in water. The Congo Basin has 3,700,000 km^2 and concentrates the most important water resource in coastal Africa. Thanks to its flow of 40,000 m^3/ sec, the Congo River has made it possible for the construction of largest hydro-electric dams in the world (the Inga dam in the DRC) which supplies countries such as: DRC, Congo, some South African countries: Zambia, Zimbabwe. These water resources are also a global issue, insofar as they are the subject of "courting" from neighboring or distant countries. Some years ago, French President N. Sarkozy wanted to create the Mediterranean Union, but this offer was refused in replacement to the Libyan guided project that came into being. This is enough to show what the water will represent in the coming years.

For a long time, Central Africa was more like a geological scandal because of the wide variety of minerals found there. Congo and Gabon produce oil on a global scale. They were joined by Chad, while the DRC is well known for its deposits of copper, gold, uranium, manganese, bauxite, diamond, coltan and exploitation of its Moanda oil have not yet started. The Central Africa Republic also has significant mineral deposits. These mineral resources constitute a third economic and political stake in Central Africa. Unfortunately, they were at the root of the conflicts that led to migration in the sub-region, particularly in the DRC, Central Africa Republic and Chad.

Issues

Mining and oil issues have an impact on the political context of the countries of this region. The exploitation of mining deposits

and other wealth leads to the destabilization of the world's political regimes, not considering the interests of the local population rulers. The result is frustration with the population which aggravates the impoverishment of classes for access to power, which leads to the banishment of certain ethnic groups, hence mass migration or even rural exodus. Central Africa is the scene of these conflicts with several episodes of military coups, assassinations of heads of states, the bloodiest dictatorships as in the DRC (32 years of Mobutu) and Central Africa Republic with the coronation of Bokassa as emperor. The democratic process unleashed in these countries started with the "free elections" of 1988-1990 in the DRC, then the national sovereign conferences (CNS) and finally, after the "diktat" of the international community there were the presidential and legislative elections that have mixed success.

Three countries in the region have HDIs that reflect high human development, Gabon, Congo and Cameroon. Angola should be in this group because of its oil and especially thanks to the end of the war between Dos Santos and Savimbi. It is in this country that we see the arrival of Africans and even Westerners (Portuguese) who have good wages and do not want to leave again. These are the most attractive countries to immigration. In 2003, 15% of immigrants (slightly more than 150,000), mostly of African origin, were educated in Gabon. It would probably be the country of immigration in Central Africa.

In Central Africa Republic, there were 11,003 immigrants against 11,458 emigrants in the 2003 census, a payoff of -455 which suggests contacting a country to get truth information of emigration. Migrants observed come from the DRC (51%), Sudan (18%), Chad (17%), Cameroon (5%), Congo (3%), France (0.6), Lebanon (0.3%) (UNHCR, 2004).

Angola because of its numerous deposits and its oil, witnesses a net migration rate of 3.55% in the 2005 census. It is considered as the potential country of immigration. This means that Central Africa is a real center of migration for its people.

The different aspects of this type of migration can only be the rural exodus towards the big secondary or middle cities, the

migrations back to the village or the secondary cities, the forced migrations (conflicts, war)

The high media coverage of international migration, especially the heroism of African migrants (example of Mamadou Gassama in France who risked his life to save a young French who try at all costs to arrive in the countries of the North, tends to relegate to the background internal migrations and, above all, their stakes, and yet international migration is less frequent than internal migration: the CAR has found that international migration represents only 3% of all migration recorded in 2003).

In addition, internal migration is at the root of a profound redeployment of populations across national territories, and there, these host regions become places where major tragedies occur. It is also a place by excellence of socio - economic inequalities about the development of the countries of the regions concerned, as well as most often starting points of the sociopolitical crises it is one of the characteristics of the Central Africa which is at the origin of the internal migrations.

An examination of net migration indicates that the most affluent regions are also the most attractive, while those who are poor are more repulsive. This suggests that migrations are made mainly to flee poverty in rural areas of origin and hopes to have a better life in the host cities of affluent. In Cameroon, for example, the proportions of migrants are 20.5%, 18.9% and 13% in the Western regions, Central, Littoral and Far-North regions, while the poorest regions, such as Adamaoua, retain only (3.9%) of migrants. The situation is similar in the DRC where the regions of Katanga, Lower Congo and East Kasai had positive migratory balances and migrant proportions in the 1984 census. The highest recorded stood at: 39.4% for Kinshasa, 10% for Eastern Kasai and 7% for Katanga. Impacts of the poles of development policies and the concentration of investments in the city of Kinshasa is evident, the region of Katanga for its minerals and that of Kasai for diamonds (Lutulala, *et al.*, 2007). These three regions have the lowest poverty rates 41.6% for Kinshasa, 69, 1% for Katanga and 62.3% for Eastern Kasai. In contrast, the poorest regions, namely the Equator (poverty index = 93.6%) and Bandundu (89.1%) (DRC, 2006), have the lowest proportions of migrants, 2.3 and 2.6% respectively.

In CAR, Bangui the Capital hosts 58% of all national migrants and 59% of all international migrants. The situation is similar in the Congo: Brazzaville hosts since the 1984 census 47% of all migrants in the country, including 35% from rural areas and 7% from neighboring countries including the DRC (Toto, 1990).

Forced migration

The history of the countries of Central Africa, as it is the case of other African countries, indicates that these countries have experienced important forced migrations; economic reasons; religious and ethnic (Makwala, 1999). The economic reasons concern the works of development of the colonies: portage, constructions of buildings, roads and railway, mining and agricultural establishment of the industries more recently (last 3 decades) with the discovery of oil field in Gabon, in Chad, Congo, this phenomenon has become more pronounced. Regarding the religious phenomenon, the case of the DRC in Central Africa would be a palpable example because of the repression of the politico-religious movement unleashed by the prophet Simon Kimbangu and forced displacement of ancestries and their families from the regions of Bas-Congo to other regions of the colony: the equator, the Bandundu, the Kasai and Katanga.

Unlike forced migrations that are performed under constraints; the displacements of the populations themselves to shelter themselves from wars and socio-political troubles decide to go away in a recurring, cyclical way; these events and; because of massive displacement of populations. In the DRC, an estimated 3.4 million were displaced by war. This number progressively evolves to 400,000 in December; then 700,000 in July 1999; and 3.4 million in December 2003 (UNDP-DRC, 2003). Almost all the other countries of Central Africa, except for Gabon and Cameroon in the past (but today because of the Anglophone crisis where there are a lot of internally displaced people and at the border) have experienced these massive displacements.

Angola obtains independent in 1975, after an armed struggle between Savimbi's UNITA, MPLA of Dos Santos and the FLNA, the country thus knew repeatedly military violent clashes, despite the signing of several military agreements ceasefire agreements,

the peace plan, the organization in 1992 of legislative elections, the arms embargo, the promulgation of amnesty laws, the constitution of a government of one national elimination of food aid, demobilization and integration of rebels in the national army do not stop the hemorrhoid of Angolan emigration.

The same situation happened in Congo between Pascal Lissouba and Sassou Nguesso (Ninja and Cobra). In 1997, the civil war was revived, it opposed the Government Army to the militia of the former President Sassou these caused thousands of IDPs and refugees in the DRC, the region of Katanga, Bas-Congo and Kasai in the 1984 census, the Eastern population had positive migratory balances and these proportions of the highest migrants: 39.6% for Kinshasa, 10% for Eastern Kasai and 7% for Katanga. Political impact of the poles was noticed, thus development and concentration of investments in the city of Kinshasa, the region of Katanga for its various ores and that of Eastern Kasai for diamonds (Lutulala, *et al.*, 2007).

In Central Africa Republic, political instability from David Dacko in 1960 through Jean Bedel Bokassa in 1965 then emperor on December 4, 1974 after Kolonban Ange Felix Patasse in 1993 and overthrown by Bozize in the 1980. The number of displaced increased towards Cameroon and other countries. First, the host regions where the pauperization is screaming and then to the secondary cities and large metropolises we cannot talk about migration in Central Africa that we find the largest number of refugees in the world. Refugees are also displaced populations, but the difference is that they are refused in other countries. They are often supported by agencies such as UNHCR (United Nations High Commissioner for Refugees) and many others. This does not detract from the suffering they endure.

In the Great lakes, including the DRC and to a lesser extent the Congo, these countries are strongly marked by migratory issues in this sub-region, the migratory issue being considered here according to Lutulala as a cyclical time bomb. Indeed, migrations in this sub-region are upstream and downstream of socio-political crises. These have been for several decades promoting migration. It is a real way of life for people in the sub-regions that are difficult

or impossible to prevent today if governments remain unstable and are not democratic.

Forced migrations therefore have an economic, political but also socio-cultural stake at the departure as well as at the arrival.

The economic consequences of migrations at the departure and at the arrival point voluntary migration

The socio-political situation is precarious in Central Africa, among the voluntary migrations that are in search of the well-being, we note the phenomenon of "brain drain" and of deskilling refers here to the exercise of jobs at a discount despite the degree or level of training: in France, doctoral thesis aggregates teach in high schools, doctors who are taxis drivers and what do I know. As for the brain drain, we can situate it at two levels. In the first place, people who leave who have already acquired professional skills during their school training and do not benefit from their training in the countries of origin. In the second stage, there are former students who do not return to their home countries after their training. We often quote the case of Cameroonian and Congolese doctors who are in several countries (Africa, Europe, and America) and Congolese who are more and more numerous in South Africa. It is the same with Cameroonian and Congolese footballers. Regarding the non-return of students, here too we observe that hundreds or even thousands of former students from Central Africa did not return to their countries at the end of their studies.

Here is table 3, illustrating former students of Central Africa holding doctoral degrees in the USA and who have returned to their home countries.

Table 3. *Countries of origin of number of doctors remaining in the USA and those from Africa and elsewhere*

Countries of origin	Numbers of Doctors	Remaining in USA	In their countries of origin	In Africa	Elsewhere
Chad	2	0	2	-	-
Congo	5	2	0	3	-
Angola	1	1	0	-	-
Cameroon	62	37	20	3	2
RDC	33	15	15	3	-
Mali*	17	4	13	-	-
Nigeria	261	161	88	8	4

(*) for comparative purposes

Sources: Zelaza (1998) cited by Ndulu (2004).

In general, migrations whether forced or voluntary, are seen in terms of development.

Positive consequences in host countries for voluntary migrations

First and foremost, in departure countries, change is made from three factors in the process of economic migrations. We can name among others:

There is capital flight from country of origin to country of destination, as such the receiving country benefits transfer of funds from migrants entering their country. Beside this, the migrants take care of their education, their nutrition in their area of residence.

- ❖ The receiving country benefit from transfer of technology that in many ways boosts the know-how brought in by migrants.
- ❖ Other development skills are gained by receiving country brought in by migrants.

This is to say that, in host countries, those who work contribute to the development of the region. They occupy positions in councils, cantons. In France, the former French president spoke of "chosen immigration", those who make France to be proud and those who were useful to France. Notwithstanding, migrants constitutes cheap labor force and accepts any job offer by host country. In this case the host country selection or recruit brilliant migrants, who compete with the native of the host country.

The negative consequences in the countries of departure for voluntary migration

In the countries of departure, the place is being emptied; the men supposed to be worthy go away.

Generally, the development of a country is based on youth and if young people choose to migrate, the expected effects are minimal and therefore the real development is no longer possible.

In the host countries, the problem is viewed under the security prism. When it is the stowaways, they represent a threat to the host country (robbery, murders, small trades ...). Even when non-governmental organizations (NGOs) take shape, this host government acts for children's education, health and many others.

Briefly, when we talk about development, there is profit at the arrival as well as at the departure. Small jobs are often reserved for foreigners, as it is the case of Malians in Cameroon. Since the Cameroonian state does not have any shoemaking apprenticeship school, Malians are a god-sent for the host community. Yet, if this role were attributed to a native, the diffuse responsibility would invade him. Similarly, northerners digging pits, catch basins, gutters, a Bassa or a Bamiléké in Cameroon would not, but the migrant would, because he must fight hard to survive and think of his family members he left in his country.

The positive consequences of forced migrations

Migration is not easy. In Article 4 of Human Rights, anyone who feels threatened is entitled to protection. You leave your country of origin which is the epicenter of conflicts, exactions to have your life saved. Generally, we leave to save a life and not seek better living conditions.

The host country is in an embarrassing situation as at the international level, you cannot refuse, it is an international right and the State supports the charges while waiting for the help of the international community. This is an additional burden and the High Commission for Refugees (UNHCR) always comes in after the host country. It is an unplanned migration, which relates to the search for security.

This forced displacement for the sake of security has some advantages

- The employment factor for nationals (Non-Governmental Organizations employ nationals).

-Non-Governmental Organizations participate in the development of the country. They participate in the tracing of inward roads, they create water points, hospitals that are useful to "refugees" or "migrants" and this generates employment for the natives and develops the areas.

In a nutshell, the migrant is not always the appropriate person in the host land because he carries along all that is insecurity, promiscuity. For example, the camp of Calais in France before its denial. Syrians everywhere today are experiencing a double speed asylum law. This is in violation of Article 4 of Human Rights.

In some European countries, they are refused entry on the pretext of the notion of insecurity and terrorism. Non-governmental organizations (NGOs) also play a spying role, impoverishment of the host countries. In the refugee's camp, people lack even firewood, as it is the case at the Minawao camp in Cameroon, a small village with less than 2000 inhabitants. Today, there are more than 12,000 inhabitants. This leads to epidemics, pandemics, promiscuity, banditry, assaults, meanwhile; UNHCR and NGOs do their best to make life easier for distressed populations.

The advent of sub-regional migrants led to employment at the discount. The little shoemaker in Cameroon, for example, is living with a job today, it is difficult to make ends meet, the phenomenon of migration has given rise to local shoemakers who go door to door and it is the exclusivity of the Malians, Central Africans who pay neither taxes nor duties. Others on the other hand excel at the aggressions, bandits and others are carrier of diseases and having no qualification its ready to do everything and at low price.

For internal migration, we are still living today, taking the example of Cameroon, the crisis in the English-speaking regions where the natives of its regions have taken refuge either in the interior of the country (Mbanga, Loum, Douala, Nkongsamba, etc.). Border villages in neighboring countries such as Nigeria that want only to live in peace by fleeing atrocities, or frequent and

small trades are exercised for survival this generates recurring conflicts between indigenous and newcomers the example of the Cameroon Development Cooperation (CDC), Cameroon Sugar Company (SOSUCAM) in Cameroon are everywhere Chadians fleeing the war at home settled in Mbandjock and work in the canneries and CDC the workers came from the North-West and South-West regions and even far North of the country (Chad, Nigeria)

Conclusion

For more than a century, the European and American populations have been deeply renewed thanks to the migration flows and this situation is on the increase to the detriment of Africa which is being emptied. More than ever before, international migrations are part of globalization. These are both causes and effects and do not obey to any mechanical logic and attraction. Migrations are too complex to be explained by a single theory (Arango, 2000; Green, 2002). Currently with the contribution of some researchers, social networks are a major source of permanent immigration. Social relations in space support migrations over a long period of time and at what price? In a nutshell, where there are immigrants, others will come. The complexity of migration flows is at the base of the accrued difficulty of states to control.

Migration in Central Africa is characterized as it is everywhere else, about migration factors; the profiles of the migrants, the orientations and the flows. But, one notes certain peculiarities as the fact that in this region. Migration is not a marginal or commonplace fact. On the contrary, they are carried out by a large proportion of the population. Moreover, they are upstream and downstream of the socio-political changes that have been taking place in the region since colonization, including wars, socio-political troubles and economic crises. No reliable indicators and, in this case, making decisions difficult, but we note that migrations are vectors of the socio-demographic dynamics of urbanization and the spatial redistribution of populations. These are the most profound changes that African countries are experiencing. Rural migrants will inflate the number of unemployed in the city, the frustrated, marginalized and the poor. Consequences there are

proliferation of small trades to survive: cobblers traveling who do the work of proximity; pit diggers; itinerant traders…

The criminalization of immigration, immigration as a crime, is published in representations reinforced by the media. The restrictive policy leads to the formation of territorial and national transit areas, in which the mobility of migrants can be blocked. Apart from the economic and social causes, the development of a permanent immigration is also due to the important changes in information and communication techniques that tend to reduce distances and accelerate the disenchantment of social relations redefining the proximity and distance relationships in communities. "Real" relationships of neighbourhoods and "virtual" relationships of new technologies: Migrations, whether forced or voluntary, are unreliable and require a great deal of thought from the people concerned and the governments. This involves the cessation of conflicts, exactions, poverty and underdevelopment.

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5 Monetary policy and human development index: Is there a relationship in Africa?

Jean Louis **Ekomane** †

Introduction

Is there a relationship between monetary policy and Human Development Index (HDI)? This issue, which falls within the monetary macroeconomics' field with implications for development economy, is of great concern to both analysts and policy makers in developing countries. The aim is to determine the direction and the strength of the link between monetary policy's decisions and social well-being. In other words, it's important to detect a possible relationship between monetary policy and the developmental level represented by Human Development Index (HDI). Monetary policy is represented here by two indicators: the key interest rate of the Central Bank (TDi) and the annual variation rate of broad money supply M2 (VM2). The evidence is made through a macroeconomic approach, based on time series observations, using an Autoregressive Vector (VAR) modeling. It integrates, however, the microeconomic analysis of well-being.

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Data used come from the World Bank and the United Nations Development Program (UNDP). The application is made on data from Cameroon, a developing country in Central Africa, ranked 153rd out of 186 nations in the annual ranking of the United Nations Development Program (UNDP), according to this HDI.

Improving people's living conditions remains a major challenge for poor countries where many live with less than a dollar per day. For several decades, sub-Saharan African countries have been at the bottom of the world ranking of countries according to their HDI (UNDP, 2016). Difficult access to finance is often considered as one of the main causes of this lagging development (UN, 2005). To meet this challenge, States generally have two types of economic policies: the cyclical (monetary, fiscal) policy and the structural (industrial, agricultural, infrastructural, etc.) policy. Monetary policy has the ability to influence the financing conditions of the economy. It thus contributes in improving social well-being (Romer, 1999), hence the interest in this context. It is therefore necessary to determine the nature of the link between monetary policy's variables and HDI which is the most commonly used development's indicator. Specifically speaking, can monetary policy influence human development as represented by the HDI?

Theoretically, monetary policy has four objectives: economic growth, full employment, price stability and external equilibrium (Kaldor, 1958). It leads to either an increase or a decrease in the quantity of money circulating in the economy. In the first case, the monetary policy is said to be expansionist. In the second case it is restrictive. However, beyond its triple role as an intermediary of exchanges, account unit and value reserve, money affects investments' productivity and households' purchasing power (Pigou, 2002; Modigliani, 1971). Its effects are spread to the real economy through several transmission channels (Boivin *et al.*, 2010; Mishkin, 1996). In old theoretical models, economic development was measured by the product per capita. It was considered as the result of a production combination (capital, labor, technological innovation) or socio-cultural factors.

Admittedly, economic development is not a direct target of monetary policy. However, the ultimate goal of any economic policy is optimal social welfare (Tinbergen, 1972). It is guided by

the search for "*maximum happiness for the greatest number*" according to Bentham (1780). Targeting such a level of social well-being involves taking ethical considerations into account in measuring economic development, through a synthetic index as the HDI (Sen, 1984, 1976). The measurement of economic development has thus been refined with the choice of the HDI resulting from Sen[2] (1999, 1979) and adopted by the UNDP since 1990.

Recent empirical work in monetary macroeconomics has not specifically focused on HDI as a direct target of monetary policy, but rather on inflation and, to a lesser extent, on GDP's growth. Of course, most central banks nowadays focus on the inflation target to the detriment of the social target. But, the 2007-2010 international financial crisis sparked a monetary policy revolution, with the entry into force of unconventional[3] measures aimed at increasing liquidity in the economy (Stiglitz, 2013). These new policies reflect the relevance and necessity of public intervention to correct inequalities from market imperfections.

To boost growth and development in sub-Saharan Africa, the IMF (2014) recommends reforming the monetary policy's framework. In the Economic and Monetary Community of Central Africa (CEMAC) in particular, experts recommend two measures: 1) reformulate the BEAC's monetary policy to make it more efficient; 2) Ensure the efficiency of banking intermediation in monetary policy transmission (BEAC, 2013) [4]. It is in this perspective that it seems sensible to explore the theoretical and empirical relationship between monetary policy and the developmental level measured by the HDI.

[2] Amartya Sen, winner of the Nobel Prize for Economics, 1998, of Indian nationality, is distinguished by his work on social welfare.

[3] Unconventional monetary policies consist of three categories of measures: 1) quantitative easing which aims to increase the quantity of money in economy; 2) credit easing or relaxation of credit conditions by the intervention of the Central Bank; and 3) anticipating the interest rate curve to influence the behavior of private agents.

[4] These findings and recommendations were formulated during the Conference held in Libreville, Gabon, on June 13, 2013, on the theme: "Financing CEMAC Economies: Assessment and Key Lessons from the Libreville International Conference". In Bank of France, *Annual Report of the Franc Zone*, 2012. pp. 101 - 104.

Such a perspective reveals a triple analytical, political and social interest. From the analytical view point, it consists of testing the HDI as an innovative target for monetary policy. Politically speaking, the developed model consecrates monetary policy as a new instrument for boosting human development. Finally, from the social view point, finding a link between monetary policy variables and HDI make social welfare become a strategic target for monetary policy. It therefore allows economic policy to strengthen its action on real economy in countries seeking for economic emergence as Cameroon, which sets its deadline to 2035.

It is therefore precisely a matter of highlighting the influence of monetary policy on human development, hence the need to verify the nature of the relationship between monetary policy's dummies and HDI[5]. This verification leads to really test the relationship between monetary policy's instruments (TDi, VM2) and HDI, using a macroeconomic approach. The other parts of the analysis are organized in three points: literature (II), methodology (III) and findings (IV).

Literature

There is a theoretical and empirical relationship which highlights the influence of monetary policy on development.

Theoretical literature

The influence of monetary policy on economic development has long been the subject of a theoretical debate between several schools of thought. For classical economists, currency is neutral, and monetary sphere is separated from economic real sphere in a "dichotomous" way (Walras, 1988). Any increase in money supply only results in an increase in prices, according to the quantitative theory of money (Fisher, 1911).

However, for Keynes (1936, 1930) and his followers, money can affect macroeconomic variables as output, employment and income. Its role in economic development is thus observed both on the producer and the consumer. On the producer side, money is an

[5] HDI is the most commonly used measurement of economic development at the international level, although it is not the only one.

endogenous production factor through its ability to stimulate technological innovation (Schumpeter, 1911). As such, it allows companies to realize their investment plan through production credit. It must therefore be offered to everyone's satisfaction in order to meet agents' production and consumption financing needs, since its production cost is negligible (Tobin, 1965). On the consumer side, the holding of cash balances has a wealth effect leading to an increase in final consumption of goods and services yielding to social welfare (Marshall, 1923; Pigou, 2002). Money thus has a fundamental social function as it emerges from the marxist critics of capitalist economy (Bellofiore, 1985). Thus, a relevant monetary policy supposes a monetary creation concerned with human development. It will therefore be concerned with the satisfaction level of basic needs (feeding, healing, clothing, housing, education, etc ...).

For the first-generation monetarists, money influences short-run variations in output, employment and prices (Friedman & Schwartz, 1963; Friedman, 1969; Brunner & Meltzer, 1963; Laidler, 1999, 1981). They are based on three assumptions: the supply of exogenous money, the stability of the demand for money and the stability of the link between money supply and monetary base. According to this analysis, variation in money supply is the best indicator for measuring the monetary policy's stimulus (Brunner, 1968; Feldstein & Stock, 1994). This school of thought recommends, however, the application of a restrictive monetary policy (Friedman & Schwartz, 1963), with the aim of minimizing inflation.

Under the assumption of rational anticipations, second-generation monetarists maintain that monetary policy is inefficient, even disruptive of economic activity, because it can be anticipated by private agents and remained without effects. They are therefore against any increase in money supply which is not adjusted to the real cycle (Lucas, 1972; Barro, 1976; Sargent & Wallace, 1975). For those authors, money is not a variable for improving well-being.

Reacting to this analysis, the New Keynesian Economy (NKE) demonstrates market failure and monetary policy's effectiveness in the search for collective welfare. It relies, for this purpose, on microeconomic assumptions of information asymmetry (Akerlof,

1970), nominal rigidities and market [6] incompleteness. If the information is imperfect, the agents' expectations cannot be rational. This analysis highlights the limits of the Pareto-optimal economic equilibrium which does not take into account social inequalities. Competitive market often contributes in worsening poverty (Cobham, 2001). Other investigations carried out in this field by Stiglitz & Weiss (1981), Mankiw (1986), Greewald (1995), Yellen (1996) and Romer & Romer (1990) agree on three fundamental points: the non-neutrality of currency, market imperfections which lead to sub-optimal financial contracts and the duty of the State intervention to correct market failures. The NKE concludes that monetary policy is not only relevant, but also, effective as a solution to market failures and human development. An adequate money supply, under the stimulus of monetary policy, appears necessary for economic development. Monetary creation in exchange for credit would make economic agents more able to meet their basic needs. These final consumption expenditures would thus contribute in improving HDI. By its effects, money can, moreover, play an important role in decentralization and sustainable development (Fuders, 2016).

If theoretically, money plays an essential role in economic development, monetary policy may then be well interested in a social objective (Artus, 2001). Despite the interest in inflation, modern monetary policy gives a significant role to economic growth (Taylor, 1993) and is increasingly interested in social welfare (Romer & Romer, 1999), thus, can also target the HDI.

Empirical work

Empirical work has been conducted on money-development causality and on the relationship between monetary policy, growth and social welfare.

[6] Particularly in the financial markets of developing countries as those in the CEMAC, there are many information asymmetries between lenders and borrowers, notably nominal institutional rigidities and market incompleteness leading to the financial exclusion of several Small and Medium size Enterprises (SMEs), the Very Small Enterprises (VSEs) and the working masses.

On money-development causality

The money-development causality was first a debate subject opposing two Schools of thought: the "supply leading" which maintains that economic development causes financial development; and the "demand following" which supports the opposite. However, the empirical work of Laroche *et al.,* (1995) reveals that economic development is caused by financial development. A positive correlation is thus established between the monetary sphere and economic development by Goldsmith (1969), King & Levine (1993) and Levine (1997). Other studies carried out in cross section or in time series confirm these results (Theil, 2001; Levine, 2002, and Wachtel, 2003). In the case of the CEMAC Zone, there is a mixed effect between monetary policy and economic growth over the 1990-2003 period (Douzounet, 2009).

On the relationship between monetary policy, growth and social welfare

There is a robust and stable relationship between money supply (M2) and GDP in the United States (Feldstein & Stock, 1994), for monetary policy helps financing the nominal Gross Domestic Product (Taylor, 1985, 1993; McCallum, 2004, 1990, 1988; Pecchenino & Rasche, 1990; Judd & Motley, 1991, 1992; Hess, Small & Brayton, 1992). It also has an impact on nominal income (Hall & Mankiw, 1994; Bernanke & Blinder, 1992; Friedman & Kuttner, 1992, 1993a). In the CEMAC Zone to which Cameroon belongs, a relationship is established between monetary policy, inflation and the development of economic activity by Mba Fonkwa *et al.,* (2014).

Specifically, monetary policy affects social well-being, as macroeconomic shocks affect poverty through their effect on household income (Ferreira *et al.,* 1999). At the same time, the relationship between monetary policy and populations' well-being is highlighted by Romer & Romer (1999) through a cross-sectional analysis by country. The Latin American case studies by Ganuza & Taylor (1998) lead to the same results. Similarly, based on household data from 38 countries, Easterly & Fischer (2001) produce two interesting findings. First, inflation aggravates poverty and income inequality; second, the poor are more affected

by inflation than the rich. It thus appears that monetary policy reducing inflation improves the life's quality of the poor.

In the case of the West African Economic and Monetary Union (WAEMU), Fielding (2004) analyzes the influence of monetary policy on well-being, choosing as impact variable, the general prices' level measured by the Harmonized Consumer Prices Index (HCPI). Using monthly time series, he determines the impact of monetary policy on the poor and the rich. In the case of South Korea, the effects of monetary policy on individual well-being are analyzed by Kang *et al.,* (2013) who detect a positive correlation between the interest rate and poverty: an increase in interest rate aggravates poverty. These results are consistent with those of Romer & Romer (1999). Agénor (2004) analyzes the effects of macroeconomic fiscal policy on wages, employment and poverty from a country cross-sectional analysis.

Some empirical work uses panel econometrics across several countries to confirm the positive correlation between inflation, income inequality and poverty (Crowe, 2006; Albanesi, 2007). Indeed, the poor are forced to hold a larger proportion of transaction cash. They therefore suffer more from inflation than the rich. In developing countries, trade dependence has been shown to negatively affect the HDI through channels as weak economic growth, macroeconomic instability and political instability, as demonstrated by Nkurunziza & Tsowou Komi (2017). Monetary policy also produces heterogeneous effects on household's income and wealth inequality, as shown by Samarina & Nguyen (2019) and Ampudia *et al.,* (2018) in the euro area.

All these theoretical analyzes and their empirical proofs lead to the conclusion that monetary policy has effects on social well-being, represented by interest rates, inflation, poverty and income inequality. Although relevant, these investigations do not specifically target HDI. Most focus on poverty indicators (poverty profile, income inequality, final consumption, inflation, etc.). There is a need to be more interested in development as measured by HDI being a broader synthetic index. This choice, failing to focus attention on the "fight against poverty", operates an epistemological positioning in favour of the "fight for development". This second approach enables orienting public

policy towards a developmental logic, by evacuating the assistantship mentality which the notion of the fight against poverty often conveys in less developed countries. It would be possible to highlight the monetary policy-HDI relationship, using the following methodology.

Methodology

Three methodological directions can be borrowed by empirical research to evaluate the effects of monetary policy on real economic variables (Lavigne & Villieu, 1996). These include the structural models, the autoregressive vector models (VAR) (Friedman & Schwartz, 1963; Sims, 1980) and qualitative information (Romer & Romer, 1990, 1994). Cross-sectional aggregate data from several countries have also been used by Romer & Romer (1999) or Easterly & Fischer (2001). They draw a negative correlation between inflation and well-being of the poor: low inflation improves the well-being of the poor more than that of the rich. These results are similar to those of Ganuza & Taylor (1998), Cardoso (1992), Azam (2003). In the case of the West African Economic and Monetary Union zone, Fielding (2004) uses the monthly time series to study the relationship between monetary policy and the poor's welfare.

Would a monetary impulse have effects on human development? Through a VAR model making use of time series, the approach adopted here contributes in extending monetary policy towards the social target. The particularity is to integrate HDI as the main target to appreciate the influence of monetary policy on human development.

Choice of model variables

Most studies in this analytical field examined the sense of causality between monetary policy and social well-being, measured either by the level of households' final consumption or by inflation as measured by the consumption price index. This analysis uses time series with the autoregressive vector. This model uses two variables of monetary policy: the key interest rate of the Central Bank noted here TDi and the variation of broad money supply (M2) noted VM2. These two monetary policy

instruments are linked to HDI as an impact variable. Incidentally, the influence of inflation and final consumption on HDI is tested.

Two monetary policy indicators: TDi and VM2.

The choice of the Central Bank's main interest rate (TDi) and the variation in broad money supply (VM2) as monetary policy instruments, meet a dual theoretical and practical requirement. From the theoretical view point, the monetarist approach makes variation in money supply the most reliable indicator for assessing the impact of monetary stimulus on economy (Brunner, 1968). Any monetary policy induces a variation (upwards or downwards) in the amount of money in circulation in the economy. And, depending on the variation scale, monetary policy is said to be at the status quo, active or passive (Feldstein & Stock, 1994). The aggregate money supply retained is M2 in annual variation, noted here VM2, likely to influence the HDI which reflects the social welfare. At the practical level, the Central Bank's key interest rate (TDi) is the most common monetary policy instrument in central banks where unconventional measures are not yet used: this is the case for BEAC in Cameroon on which this study is focused.

Indicator variable for development: the HDI

The debate on the best indicator of social well-being, between income and consumption, is not over. While both variables have advantages and limitations, consumption is more stable (Deaton, 1997)[7]. However, adopting HDI as an indicator of development by the UNDP has been achieved through Sen (1999, 1984). There are, however, other development's indicators including: the Human Sustainability Index (HSI), the National Sweet Happiness (NSH), the Happy Planet Index (HPI), the Soft Domestic Product (SDP) and the Human Development Index adjusted to Inequalities (HDII) (Berline & Lapierre, 2009).

However, HDI has at least two advantages. First, it is a composite index which measures the level of development of a country by incorporating three indicators of well-being: living standard (GDP/capita), health-longevity (life expectancy at birth) and knowledge (school enrollment rate). Secondly, its data are available in time series from some international economic and

[7] Angus Deaton is the Nobel Prize in Economics, 2015, thanks to his analysis on consumption, poverty and well-being.

financial institutions (UNDP, IMF, World Bank, etc.) since the 1990s.

To the HDI as the main impact variable, the model incidentally incorporates inflation, represented here by the Consumer Price Index (CPI) and the Final household Consumption (FC). By so doing, it is possible to identify close and stable explanatory relationships between the two monetary policy indicators (TDi, VM2), and the three well-being indicators (HDI, CPI, FC). The approach adopted is therefore to verify the causal relationship between the Central Bank's policy rate or the variation in money supply in circulation in the economy, and the social welfare reflected by the HDI.

Econometric model

The autoregressive vector model (VAR) used relates two instrumental monetary policy variables (Central Bank's key interest rate TDi and variation in M2 broad money supply) with HDI representing the nation's level of development. To this is added the influence of final consumption (FC) and inflation (CPI). The following regression equation emerges as a VAR model:

$$HDI_t = \alpha + \delta HDI_{t-1} - \beta_1 TDi_{t-1} + \beta_2 VM2_{t-1} + \beta_3 FC_{t-1} - \beta_4 CPI_{t-1} + \varepsilon_t \quad (1)$$

With HDI_t: level of the Human Development Index for the current year t;

α : a constant;

δ: Autoregressive coefficient of the HDI (indicates that the HDI of the current period is related to its own level from the previous period);

β_i , i = 1,…4 : reaction coefficients of the HDI to a pulse on each variable *Xi* of the model;

HDI_{t-1} : Human Development Index of the previous year;

TDi_{t-1} : Key interest rate of the Central Bank of the previous year;

$VM2_{t-1}$: Variation in M2 broad money supply of the previous year;

FC_{t-1} : Final consumption of the previous year;

CPI_{t-1} : Inflation of the previous year;

ε_t : Error term.

Data

Data on HDI come from the UNDP statistics. The Central Bank's key interest rate (TDi) series, known as the Call for Tenders Interest Rate (CTIR), comes from the BEAC's monetary statistics. The variation in annual broad money supply (VM2), Consumer Price Index (CPI), Final Consumption (FC), and GDP were gathered from the World Bank's statistics, including the 2016 version of the World Development Indicators (WDI). These data are annual and concern Cameroon, a developing country in Central Africa. The selected period is from 1990 to 2015, during which HDI data were actually available in the UNDP statistics.

Findings and discussions

Unit Root Test on model variables

Table 1. *ADF Unit Root test's results on model variables*

	TDi	VM2	CPI	FC	HDI
Integration order	I(1)	I(1)	I(1)	I(1)	I(1)
ADF test statistic	-5.242298	-4.917192	-4.701324	-3.653672	-4.819277
CV t-statistics at 5%	-3.612199	-2.986225	-3.612199	-3.612199	-3.612199
P*	0.0016	0.0006	0.0052	0.0461	0.0040

The Augmented Dickey-Fuller (ADF) Unit Root test shows that the ADF statistic is lower than the critical value of the first-difference Student's t-statistic, for each of the five (5) variables selected. Therefore, the different series: Central Bank's key rate (TDi), variation in broad money supply (VM2), Consumer Price Index (CPI), Final Consumption of households (FC) and Human Development Index (HDI) are all stationary in first difference.

Johansen cointegration test

Table 2. *Johansen cointegration test results*

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.830382	42.58098	33.87687	0.0036
At most 1 *	0.757073	33.95990	27.58434	0.0066
At most 2	0.406443	12.51893	21.13162	0.4973
At most 3	0.198832	5.320437	14.26460	0.7010
At most 4	0.112251	2.857586	3.841466	0.0909

Notes: Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

The Johansen cointegration test reveals the existence of two cointegration equations at the 5% significance level.

Correlation between model variables

Table 3. *Correlation test result between HDI and the others model variables*

	FC	CPI	TDi	VM2
HDI	0.96	0.84	- 0.79	0.19

This test reveals three expected results: 1) there is a positive linear correlation between the broad money supply annual variation VM2 and HDI, that is, 0.19; 2) there is a strong positive linear correlation between final consumption and HDI revealed by a coefficient of 0.96; and 3) there is a fairly strong negative linear correlation (-0.79) between the TDi of the Central Bank and HDI. This correlation is stronger between final consumption and HDI relative to monetary policy variables (TDi and VM2). These results are consistent with the economic analysis. But, to refine the analysis, we seek confirmation of these correlations through the Granger causality test.

Bivariate Granger causality test

Table 4. *Pairwise Granger Causality Tests results on the model variables*

Sample: 1990 2015; Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
HDI does not Granger Cause FC	25	0.08752	0.7701
FC does not Granger Cause HDI		12.4595	0.0019
CPI does not Granger Cause HDI	25	8.27969	0.0087
HDI does not Granger Cause CPI		0.18240	0.6735
TDi does not Granger Cause HDI	25	6.40473	0.0190
HDI does not Granger Cause TDi		0.72428	0.4039
VM2 does not Granger Cause HDI	25	8.76601	0.0072
HDI does not Granger Cause VM2		0.57456	0.4565
TDi does not Granger Cause CPI	25	0.79682	0.3817
CPI does not Granger Cause TDi		30.7830	1.E-05
VM2 does not Granger Cause TDi	25	11.2210	0.0029
TDi does not Granger Cause VM2		4.15273	0.0538

The causality test shows that monetary policy influences HDI in the expected direction, according to economic theory. Indeed, the two selected monetary policy instruments (the key interest rate TDi and variation in money supply VM2) cause HDI according to

Granger. The p probability of wrongly rejecting the causation hypothesis is, in both cases, well below the maximum threshold of 5% required. This causal relationship is more robust between VM2 and HDI (error risk of 1.9%), and much less between TDi and HDI (error risk of 0.7%). We conclude that a variation in broad money supply more significantly influences human development than an action on the key interest rate. The political implication of this result is such that in order to faster and more significantly boost human development, monetary authorities should favor decisions leading to a direct increase in money supply, for instance, new "quantitative easing" measures.

Other interesting causalities have been established between final consumption (FC) and HDI on the other hand, and between inflation (CPI) and HDI. Household final consumption therefore improves human development, while inflation influences, in turn, the populations' well-being. Finally, the causality test reveals, that the key interest rate causes the variation of money supply from Granger's view point, with a delay of one year.

The VAR test results

Table 5. *Vector Autoregression Estimates*

Sample (adjusted): 1992 2015; Included observations: 24 after adjustments; Standard errors in ( ) & t-statistics in [ ]					
	TDI	VM2	IPC	CF	IDH
TDi(-1)	0.598716	1.088393	0.216718	-178.0870	-0.003309
	(0.19357)	(4.65931)	(1.56883)	(188.808)	(0.00301)
	[3.09300]	[0.23360]	[0.13814]	[-0.94322]	[-1.09917]
VM2(-1)	-0.001768	-0.729196	-0.082943	-3.826762	0.000117
	(0.00821)	(0.19751)	(0.06650)	(8.00359)	(0.00013)
	[-0.21551]	[-3.69197]	[-1.24721]	[-0.47813]	[0.91459]
CPI(-1)	-0.135184	0.648942	1.013396	9.743717	-0.000177
	(0.02261)	(0.54417)	(0.18323)	(22.0511)	(0.00035)
	[-5.97966]	[1.19255]	[5.53087]	[0.44187]	[-0.50410]
FC(-1)	-0.000126	0.041421	0.017964	0.884527	2.31E-06
	(0.00048)	(0.01154)	(0.00389)	(0.46771)	(7.5E-06)
	[-0.26379]	[3.58876]	[4.62233]	[1.89118]	[0.31012]
HDI(-1)	10.11832	-301.1257	89.25694	-4889.590	0.798483
	(19.5486)	(470.540)	(158.435)	(19067.6)	(0.30400)
	[0.51760]	[-0.63996]	[0.56337]	[-0.25643]	[2.62662]
C	-1.913457	452.6210	72.28293	864.1407	0.184128
	(7.56330)	(182.051)	(61.2982)	(7377.19)	(0.11762)
	[-0.25299]	[2.48624]	[1.17920]	[0.11714]	[1.56551]

R-squared	0.982483	0.791853	0.992367	0.990550	0.987885
Adj. R-squared	0.969008	0.631741	0.986495	0.983281	0.978566
Sum sq. resids	0.907583	525.8336	59.61546	863467.6	0.000219
S.E. equation	0.264223	6.359932	2.141449	257.7219	0.004109
F-statistic	72.91214	4.945601	169.0039	136.2675	106.0069
Log likelihood	5.245769	-71.09770	-44.97286	-159.9424	105.1732
Akaike AIC	0.479519	6.841475	4.664405	14.24520	-7.847764
Schwarz SC	1.019461	7.381416	5.204346	14.78514	-7.307823
Mean dependent	4.698368	7.636327	84.45247	6372.567	0.462125
S.D. dependent	1.500877	10.48035	18.42706	1993.175	0.028066
Determinant resid covariance (dof adj.)			9.507793		
Determinant resid covariance			0.443343		
Log likelihood			-160.5117		
Akaike information criterion			17.95931		
Schwarz criterion			20.65901		

The VAR model test of equation (1) reveals the following regression equation:

$$IDH_t = 0.18 + 0.79HDI_{t-1} - 0.0033TDi_{t-1} + 0.00011VM2_{t-1} + 2.31E^{-06}FC_{t-1} - 0.00017CPI_{t-1} + \varepsilon_t$$

(0.11) (0.30) (0.003) (0.0001) (0.000) (0.0003)

[1.56] [2.62] [-1.09] [0.91] [0.31] [-0.50] (2)

These different results are interpreted as follows.

a) A Lower Central Bank's key interest rate increases HDI

The result of the VAR confirms the correlation and causality tests between TDi and HDI: there is a negative relation between the key interest rate and Human Development Index. This result means that a decrease in the Central Bank's policy rate improves the nation's human development in the short-run and long-run period, with response coefficients of -0.003 and -0.0007 respectively.

b) An increase in broad money supply M2 improves the HDI

An increase in broad money supply M2 circulating in the economy has a positive effect on Human Development Index, with a delay of one year, that is, in the short-run period. The reaction coefficient of HDI to the variation in money supply stands is 0.00017 in the short-run, but it becomes negative in the long-run.

c) Final consumption is positively and strongly correlated with HDI

Final consumption has a positive effect on the nation's human development: an increase in household consumption improves their standard of living. The nation is therefore all the more developed as final consumption is important, since it includes goods and services necessary to satisfy the basic and secondary needs for the well-being's achievement.

d) Human development is degraded through Inflation

The VAR shows a negative relationship between HDI and inflation represented in the Consumer Price Index. An increase in this index degrades the well-being represented by HDI. Inflation is therefore degrading human development in Cameroon.

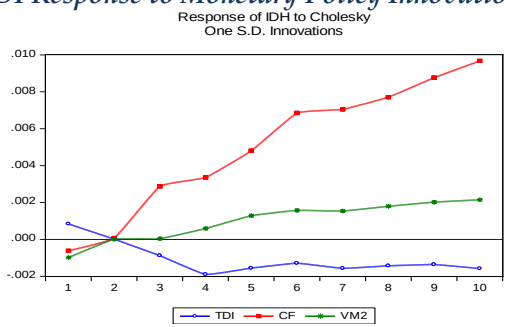
e) HDI follows an autoregressive evolution

Human Development Index (HDI) strongly depends on its own level of the previous period. It follows an autoregressive process: the results of the VAR show that the HDI of the current year also depends on its level of the previous year, with a coefficient of 0.79. But, this influence is not perceptible in the long-run, the coefficient being negative compared to the delayed value of two years, that is - 0.17. These different results confirm those of the correlation and causality tests carried out above. They are also close to those of Kang *et al.*, (2013).

Sensitivity of HDI to monetary policy innovations

The sensitivity of HDI to monetary policy innovations emerges from the interpretation of two results inherent to the VAR model: the impulse response functions and the forecast error's variance of the HDI.

HDI Response to Monetary Policy Innovations



Graph 1. *Impulse response functions of HDI*

First, an impulse on the Central Bansk's interest rate induces a negative reaction of HDI and its degradation over a long period. The rise in the refinancing interest rate of secondary banks to the Central Bank is therefore chronically harmful to the Cameroonian economy. Second, an impulse on the variation in the amount of broad money in circulation (VM2) has a positive effect on HDI. This upward trend is prolonged over a long period of about 10 years. Third, an impulse on final consumption (FC) induces a strong positive reaction of HDI in Cameroon; which means that an increase in final household consumption implies a significant improvement in their level of development.

Decomposition of the HDI's forecast error

Table 6 shows the decomposition of the forecast error's variance which enables to determine the variability of HDI with respect to variations of the other time series used in the VAR model.

Table 6. *Variance decomposition of HDI*

Period	S.E.	TDi	VM2	CPI	FC	HDI
1	0.264223	4.170569	5.724614	5.291215	2.266959	82.54664
2	0.442710	2.711817	3.722118	4.189180	1.493381	87.88350
3	0.904009	3.995111	2.616268	3.306224	23.38699	66.69540
4	1.070533	9.716130	2.530181	2.343859	38.15566	47.25417
5	1.172270	9.378825	3.717940	2.138047	53.74373	31.02146
6	1.273647	6.958855	4.132814	1.741672	68.20555	18.96111
7	1.330700	6.217833	4.169665	1.450608	74.54942	13.61248
8	1.360874	5.419411	4.362686	1.327581	78.68277	10.20755
9	1.398782	4.622987	4.487337	1.246050	81.93055	7.713079
10	1.454134	4.120948	4.500486	1.173638	84.25340	5.951528
Cholesky g: TDI VM2 CPI FC HDI						

These results show that in the short run, the HDI's variability is due to more than 82% to the autoregressive process; to 5.7% to innovations on the variation of money supply (VM2) and to 4.17% to innovations on the Central Bank's key interest rate (TDi). In the long run, this HDI's variability is rather heavily dependent on final consumption (FC), at 53.57% from the 5th year.

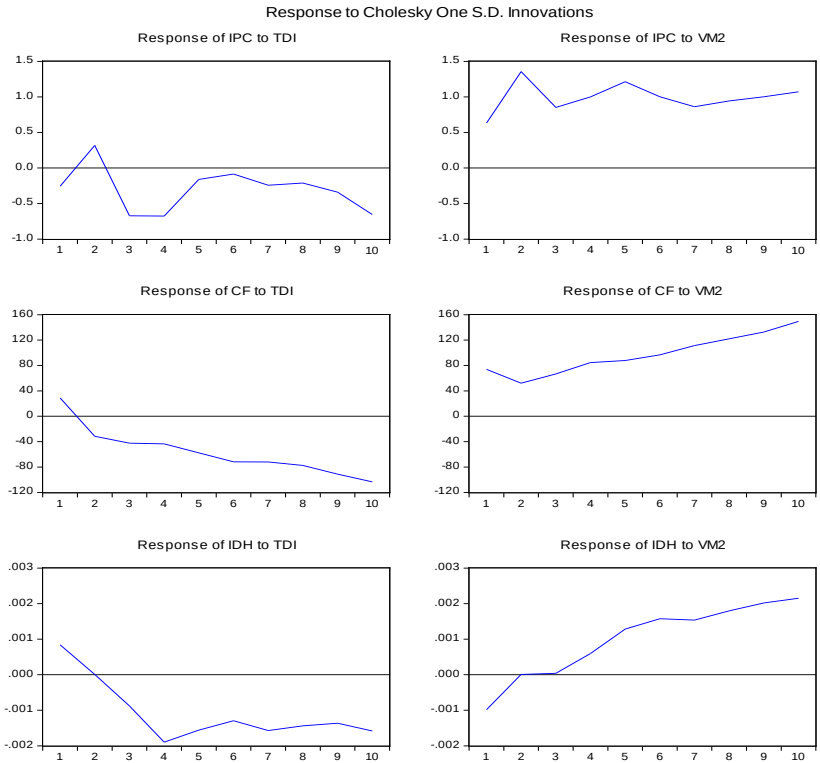
Conclusion

The relationship between monetary policy and human development represented by the HDI appears to be effective. Applying the VAR method to Cameroon's data from 1990 to 2015, the analysis leads to the main conclusion that there is an interesting relationship between the instrumental monetary policy variables and HDI. More specifically, findings reveal the following: 1) A decrease in the Central Bank's key interest rate (TDi) improves the Human Development Index (HDI) in the short and long term; 2) An increase in M2 broad money supply improves the level of development of the nation; 3) Final consumption has a positive impact on human development in the short and long run; 4) Inflation degrades the developmental level in Cameroon in the short and long term; 5) The current year's HDI level is influenced by monetary policy, inflation and final consumption, as well as by its own value of the previous year.

Since the key interest rate of the Central Bank and the variation in broad money supply have effects on HDI, this can therefore be considered as a relevant target for monetary policy, as part of a developmental strategy. Human development is degraded through an increase in the refinancing rate; however, it is improved by an increase in money supply. These findings are close to those of Kang *et al.*, (2013) on the one hand, and to those of Romer & Romer (1999) who, on the other hand, have shown a positive correlation between interest rate and poverty, meaning that poverty is aggravated through an increase in the interest rate. This is the case for Easterly & Fischer (2001) who found that inflation aggravates poverty and inequality. Despite a rather short period of study, the analysis reveals some interesting results. These can validly be taken into account in the consolidation of Cameroon's economic policy pursuing its economic emergence set for 2035. To this end, it appears necessary to integrate the monetary instrument into the revision of the Growth and Employment Strategy Paper (GESP) implemented by the government since 2006. One could also test this relationship, using other measures of economic development in addition to HDI, with panel data across several countries. Clarifying the transmission channels of monetary policy towards

HDI, their timing and their flow could be an interesting research avenue.

Appendix



Source: Author.

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6 A Small Scale Macroeconomic Model for Morocco

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Introduction

Monetary policy analysis instruments have been the focus of many research papers during the latest decades. The aim was to generate a common language, shared, to a certain extent, by economists as well as policymakers, and on which they could rely to assess the economy's features and to drive forecasts. To begin, the Keynesian theoretical framework laid emphasis on aggregate variables such as national income, consumption, investment, government expenditures, and unemployment rate. Workhorses such as IS-LM and Mundell-Fleming models explored the relationships between these variables, beyond any microeconomic behavioural foundations; these models, among others, were claimed to be empirically observed and verifiable.

However, during the 1970's "great inflation" period, those Macro-founded models, mainly Keynesian, had not been able to

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"see it coming", and consequently accumulated substantial critics from noteworthy economists. The main argument of the latter was that the models had failed to explore the full implications of *endogenously* formed expectations on the behaviour of economic agents (Snowdon & Vane, 2005). These economists, to whom we refer as the New Classical school, defended the modelling of the economy as an economic equilibrium and considered the rational expectations' hypothesis, as introduced by Muth (1961) and developed afterwards by Sargent (1975) and Lucas (1976).

To overcome those insufficiencies, and in order to re-establish strong specifications for the macroeconomic models, the stress in the research was shifted toward the microeconomic foundations as a plinth of aggregate economic phenomena analysis. The first to have explicitly introduced and modelled this framework, i.e. real business cycle, would be Kydland & Prescott (1982). Since, the effectiveness of RBC models' predictions has been enhanced as Goodfriend & King's (1997) "new neoclassical synthesis" opened onto the conciliation of the short run Keynesian analysis with the new classical long run perspectives, in what is known today as the Dynamic Stochastic General Equilibrium (DSGE). The works of other economists, e.g. Barro (1977) and Mishkin (1982) were of crucial added-value, providing empirical evidence to the issue. Calvo (1983), Fischer (1977) and Phelps & Taylor (1977) showed the real effect of nominal disturbances, thereby bringing more accuracy to the models by including rigidities.

The DSGE models proved indeed to be a strong and reliable workhorse for economic analysis and policy evaluation; as a matter of a fact, many central banks included them in their toolboxes for monetary prevision and simulation purposes, since they are founded on the behaviour of optimising agents and based on the neoclassical theory of growth. Also, these models have provided an elaborate image of various features of the economy. Whereas, their main drawback is that they are often exceedingly robust and too sophisticated for policymakers, who would generally confine themselves to simple, plausible and coherent models that are sufficiently adequate to capture monetary policy transmission mechanisms. Besides, DSGE modelling is seen as a real challenge in central banks in developing countries.

As a result, more economists aim to build advanced but simplified macroeconomic models with the tractability and communicability features of the IS-LM. Therefore, there has been a convergence between the IS-LM framework and the DSGE approach which seriously considers rational expectations and the micro-foundations of macroeconomic phenomena. This "synthesis" has lead to the emergence of core models; the simplest one consists on the combination of an aggregate demand (IS), an aggregate supply (Phillips Curve), and a monetary policy reaction function (e.g. Taylor Rule).

The model we motivate and describe in this paper is subscribed in this very line and is, at the image of the above-mentioned small scale models, embedded on the dynamic stochastic general equilibrium models. To a large extent, our research work fits in the line of the models developed by Batini & Haldane (1999), Svensson (2000a), and Arreaza *et al*. (2003), and Martínez *et al*. (2002). These macro models are: Structural, i.e. each equation reflects a justified economic relationship; in general equilibrium, i.e. all variables of interest are endogenous and interdependent. They take into account the Lucas critic, or even Friedman's, as they embody both forward-looking and backward-looking expectations. The stochastic elements are explicitly introduced and constitute an integral part of the models. This sets them apart from deterministic models that are made stochastic only by the addition of an error term.

In the present research paper, we first review the literature regarding the issue. Then, we shift emphasis toward describing the idiosyncrasies of the Moroccan macroeconomic framework and data. In the third section, a New Keynesian macroeconomic reduced-form model is introduced for the Moroccan economy; it encompasses three main blocks: an aggregate demand equation, a price setting equation and a Taylor rule. Afterwards, we discuss the calibration approach we followed out to parameterize the equations system. By the end, we get to discuss the monetary policy analysis by simulating three different shocks.

Small scale models: Reviewing the literature

As a matter of a fact, the category of models that we intend to develop in this paper is suitable for developing countries, since it does neither require long series nor too many components (e.g. microeconomic variables…). In addition, most developing countries have just recently started inflation targeting policy and their statistical material is still in the process of development[1]. For that matter, using a small and communicable model that embodies few but pertinent macroeconomic variables seems to be the optimal choice for this category of countries. Moreover, an inflation targeting policy puts central banks under the obligation to communicate their monetary policy stance to economic agents. These models could be an efficient tool for this sort of communication. Consequently, a substantial number of central banks, notably in low and middle income economies, started recently to engage this sort of models as a tool for monetary policy analysis.

The main purpose of the model we build in this paper is to simulate various scenarios for analyzing monetary policy transmission mechanisms in the short run. Our model belongs to the line of New Keynesian reduced-form models, side to side with the work of Berg *et al.* (2006b) which introduces 4 blocks: an aggregate demand, an aggregate supply, an interest parity equation and a monetary policy rule. The authors chose parameterization techniques, based on economic principles and available econometric evidence, and announce the possibility of an iterative process to adjust, in an economically consistent way, coefficient values that were chosen, to examine the properties of the model, and to make changes in the structure of the model when this is required for the model to behave appropriately. Other papers used the same type of models to answer different questions. Giordani (2004) based his model on from a modified version of Svensson (2000a) in order to compare its impulse responses to the VAR's; the model does not refer to any exchange rate equation, and concludes that the Taylor rule provides a description that does not fit the Canadian monetary policy. Mahadeva & Smidkova (2001) shed the light on disinflation targeting in the Czech Republic, using a small scale model with forward looking

expectations and three transmission channels: the real interest rate, the anticipations of inflation and the exchange rate. The paper uses approximately the same blocks as the ones mentioned above. Arreaza *et al.* (2003) use a small scale macroeconomic model (SSMM) that is made of four blocks (IS equation, Phillips Curve, IRR and an Uncovered Interest Parity (UIP)) and that encompasses rational expectations. Their objective was to conduct simulation experiments in order to analyze the effect of shocks on inflation and to investigate the effect of a temporary increase in public expenditure and an increase in interest rate. Tanuwidjaja & Choy (2006) use this sort of models to examine the role of central bank credibility in achieving inflation targeting. Their model offers new possibilities, as it introduced an oil equation as well as an LM curve.

The last-mentioned paper corroborates how the tractability of the new Keynesian reduced-form models allows the modeller to set adjustments in the model's structure out to match the characteristics of the economy they are describing. We can see how such models provide a systematic framework that can help policymakers have clear insights on the macroeconomic features and allow them to ask the right questions, in relevance with their own respective economy. And most importantly, such models are often derived explicitly from microeconomic foundations in the literature, and the aggregation of these micro-foundations usually leads to equations that are similar to the ones we introduce in the present paper.

Beyond the fact that it is a developing country, Morocco follows a fixed exchange rate regime; although it is an open economy, its capital account is closed. The fixity of the exchange regime and its potential impact on monetary policy has been discussed in several papers, e.g. Benigno *et al.* (2007). The main conclusion of the latter joins Obstfeld & Rogoff's (1996), emphasizing that a fixed exchange regime does not necessary imply that the "peggers" and the "leaders" should have the same policy rule. This is somehow consistent with reality: in the context of 2008 financial crisis's aftermath, we have witnessed a strong downward influence on interest rates in the U.S. and in the Euro Zone, while Bank Al-Maghrib chose not to act on the key interest rate taking into

account the distortions and other structural features of the kingdom's economy.

The Moroccan data and macroeconomic framework

Before assessing any modelling experimentation for the Moroccan economy, we might have to draw a panoramic image of its specificities. It is worth noticing in this framework that since the early 1980s, the policy goal was to achieve a sustainable growth and reduce the debt burden by being more market oriented. Following the steps of the Structural Adjustment Program (SAP), the features of the modern economy and banking system did not start to really show up until 1996, which coincides with the liberalization of the loan rates, but most importantly with the advent of a new inflation regime. That explains the reason why we chose the time sample 1996-2010, since it provides enough data to drive a model that specifically represents the contemporary monetary policy framework, without biasing the analysis with context-related economic, fiscal and monetary perturbations that took place starting from the year 2011. This time sample could be decorticated into a certain number of time frames.

During the late 1990s, Morocco had known a mild activity growth, with an average of 2.8 percent. Inflation was kept then slightly under the 3 percent threshold. In 2001, GDP growth rate had scored 6.5 percent, and in 2002, it reached around 4.2 percent; this drastic increase was mainly driven by the agricultural output (propitious weather conditions). We should keep in mind the significant influence of the agricultural component on the Moroccan GDP as well as the price level since the country is viewed, to some extent, as agriculture-oriented. This fact constitutes one of the underlying reasons behind the volatility of the output, especially when seen the random aspect of the agricultural activity, tightly tributary of the rainfall level. As for the central bank's interest rate, it hasn't moved much from 3.25 percent from 2003 to 2010, except for a subtle 0.25 percent variation in 2009. It is worth mentioning, however, that in the period from 2011 up to the present, the interest rate was reduced several times in order to support economic growth that has been suffering from exceptionally low agricultural output and the economic

repercussion of the international financial crisis on foreign demand. In this context, in 2014 alone, the interest rate was reduced twice. Its level is at 2.25 percent since 2016.

On the other hand, Morocco is an open economy. However, its behaviour does not affect world prices. Subsequently, we consider the "small open economy" hypothesis in the modelling process. Whereas, there are still some "barriers", e.g. a closed capital account, preventing free capital mobility. Besides, the exchange rate is kept under control, which limits its fluctuations, and eventually the strength of its channel of monetary transmission.

As explained above, we use quarterly data starting from 1996Q1 up to 2010Q4[2], including inflation, GDP, interest rate and exchange rate in the Moroccan economy. As a price level measure, we use the consumer price index inflation gap. The real activity is measured by the gap between real GDP and potential output, which is computed through the Christiano-Fitzgerald Frequency filter. All variables are de-trended using this filter that identifies the long term fluctuations as part of the growth trend and classifies the more jumpy ones as part of the cyclical component. We chose not to use the Hodrick-Prescott filter as the cycle series it yields would be characterised by an intense volatility, thereby most likely reducing the significance of the relations between the variables in the model.

In the period examined in this paper, Bank Al-Maghrib does consider the short interest rate as the first operational instrument of monetary policy, but makes use of other instruments as well (e.g. the reserve requirement). As a consequence, we substitute the key interest rate with the weighted average interest rate (*Taux moyen pondéré*) which is, in this case, subject to more fluctuations in response to different shocks.

As we can notice in Figure 1, the average interest rate is on a downward trend, which is consistent with the openness and liberalization policy that has characterised Morocco during our sample period. To a certain extent, this evolution is in co-movement with the real exchange rate, which started decreasing since 1999. As for GDP, it follows, on the contrary, a globally increasing path since 1996 (and even since the mid 1980s); this observation should confirm the countercyclical relationship that

exists between output growth and the interest rate, or even the exchange rate. As regards to inflation, it has been sustained at an average 2 percent rate for the period 1996-2011.

Building the reduced-form model

As mentioned above, the model encompasses three main blocks: the aggregate demand, represented by an IS curve that relates the output gap with expected and lagged explanatory variables; the aggregate supply, i.e. a Phillips curve which sets the price level according to expected inflation, the output gap and the exchange rate. The third block is the monetary policy rule; we assume that the Moroccan central bank follows a Taylor rule that relates the interest rate with expected inflation and the output gap.

Fundamentally, those equations are based on the log-linearization of the Euler equation of consumption resulting from the optimization program of a DSGE model. Thus, the model fits in the New Keynesian framework, providing empirical evidence down from agents' individual behaviour, through first order conditions. Hence, the equations below could be perceived as the aggregation of the latter. The model is set in a stochastic context, as it encompasses random shocks (aggregate uncertainty regarding the future), as agents only know the distribution of the said shocks[3] ; they do not have insights on whether the future values of innovations are going to be zero or one. It is possible to assume that in the case of a linear model, there is no significant divergence between the stochastic and the deterministic results. Still, we prefer not to put aside this potential possibility, in case the model is basically non-linear and just approximated through our first order log-linearization process.

All variables are log-linearized. Furthermore, they are expressed in terms of gap (deviation from the trend level). The Augmented Dickey-Fuller unit root test indicates that all gap variables are stationary, which is supposed to enhance the estimates, by reducing residuals' serial autocorrelation.

The aggregate demand equation

The IS curve we use here is comparable the type of equations derived from the household optimization program. We consider

forward-looking as well as backward-looking expectations, in order to incorporate the persistence. We take into account the small open economy assumption, as mentioned above. Thus, beyond what had been proposed by Berg *et al.* (2006a; 2006b), i.e. an aggregate demand that depends on the real interest rate, the real exchange rate in addition to the past and expected output itself, we included foreign output as an exogenous variable as well, since the Moroccan economy is largely impacted by the international context through the export demand, among other variables.

The equation is written as follows:

$$\hat{y}_t = \alpha_1 . \hat{y}_{t-1} + \alpha_2 . \hat{r}_{t-1} + \alpha_3 . y_t^* + \varepsilon_t^y \quad (1)$$

Where $\hat{y}_t$ is the deviation of the output from its trend level, $\hat{r}_t$ is the real interest rate gap and y_t^* is the Euro zone (12 countries) output gap that we consider as the foreign output gap, since they are by far the key trade partners. We do not consider the exchange rate as an exogenous variable, since its impact is most likely insignificant because Morocco currently follows a fixed exchange regime.

The coefficient α_2 reflects the transmission mechanism of monetary policy on the output gap level. Theoretically, interest rate should have a negative effect on the output gap. Thus, if it is in a high level, investors and borrowers will be discouraged and the real activity will lose pace. Inversely, an expansionary policy implied by a low level of interest rate stimulates investment and production.

The price-setting equation

The supply side of the model is represented through a Phillips curve which allows describing inflation dynamics. The buckle of Phillips equation developments belong to the line of New Keynesian framework. Several versions of this equation have sensitive similarities with the aggregation of the firms' optimization program; it is possible for it to be traced back to microeconomic foundations.

We introduce in this model a hybrid version that introduces both forward-looking and backward-looking expectations. Thus, inflation is explained by the output gap, economic agents' expectations and the real exchange rate.

$$\Pi_t = \beta_1 . \pi_{t-1} + (1 - \beta_1) . \pi^e_{t+6} + \beta_2 . \hat{y}_t + \beta_3 . \hat{s}_t + \varepsilon^{\pi}_t \quad (2)$$

[Where π_t is the gap between the inflation mean and the inflation rate measured by $\pi_t = \log(cpi_t - cpi_{t-4}) * 100.$] [4]

We computed the expected inflation as the moving average of the six quarters to come, because as a rule-of-thumb in Morocco, monetary policy and the inflation transmission mechanism are only effective after a period of 6 quarters. The parameter β_1 identifies the nature of the economy. As a matter of fact, a "speedboat economy" means that the weight of the lead term is more important than the lag term; in other words, β_1 is below 0.5. Consequently, the central bank could be considered as credible at the eyes of the economic agents, or probably, it is the existence of price flexibility in the economy that would be the cause of such phenomenon; hence, merely a subtle deviation in interest rate would cause a significant variation in inflation. The other case, i.e. "aircraft economy", implies that only accumulated adjustments in interest rate could move inflation toward the target [5]. As a hypothesis, we state that the Moroccan economy is most likely an "aircraft" one, essentially because of the existence of significant rigidities in many of its aspects. This assumption is even more strengthened when assessing the persistence of inflation.

The coefficient β_2 is the central bank's sacrifice ratio, defined as the total output loss that is generated by a variation in trend inflation[6]. It is supposed to be positive, for two particular reasons: in the literature, a positive output gap drives an upward pressure on inflation, and, in conformity with the sacrifice ratio theory, when reducing inflationary tensions, the central bank likely "sacrifices" a part of the output level and *vice versa*. As for the parameter β_3, it captures the degree of the pass-through. Said differently, it's the real exchange rate transmission mechanism impact on domestic prices. In principle, a small open economy is characterized by a high pass-through since the economy's

structure is less developed and largely exposed to foreign price variations.

The monetary policy rule

We suppose that the central bank uses the weighted average of the nominal interest rate as an operational target. The central bank would set the interest rate, with taking into account the output gap, in order to achieve the equilibrium level of the inflation rate. We have come up against the fact that Bank-Al-Maghrib does not follow an inflation targeting regime, therefore, we are obliged to establish the target either as the trend level, or the mean value, i.e. around 2.1 percent. Plus, the sovereign bank does not follow an explicit monetary policy rule, so we attempt to capture the reaction function with a Taylor-type rule as follows:

$$i_t = \theta_1 i_{t-1} + (1-\theta_1)[\theta_2(\pi^e_{t+6} - \pi^T) + \theta_3 . \hat{y}_t] + \varepsilon^i_t \qquad (3)$$

Where i_t is the nominal interest rate gap and π^T is the inflation target. We define the inflation target as the logarithm of the average value of the inflation for the period 1996-2010. θ_1 Is a smoothing parameter, which suggests that the interest rate is set gradually in reaction to inflation[7]. In other words, the monetary policy is observed as inertial, and the interest rate does not fully accommodate a shock in the period it occurs.

θ_2 indicates the degree of the central bank's intervention which goes in line with the nature of the economy. Actually, in an "aircraft economy", as in our case, only accumulated adjustments of the interest rate can reduce inflationary pressure; hence, that implies a low θ_2. On the other hand; a "speedboat economy" requires a sudden and drastic reaction.

In contrast with several other monetary rules (see Parrado, 2004b) among others], our interest rule excludes the exchange rate, because the Moroccan economy operates with a fixed exchange regime and the central bank does not manage the exchange rate in order to achieve a given inflation target. Countries and zones with flexible regimes such as Canada, the US, and the Euro zone are usually bound to use their interest rate once there is a significant variation of the exchange rate. In most cases, their central banks

actually have an exchange rate target, aside from the inflation target.

Unlike these countries, the Moroccan exchange rate is exogenously pegged on the Euro (80 percent) and US dollar (20 percent). Moreover, the capital account is relatively closed. Therefore, the exchange rate is far from being determined by the differential between foreign and domestic interest rates as emphasized in the uncovered interest parity (UIP)[8]. We combine, to a certain extent, the conclusions of Benigno *et al*. (2007) Obstfeld & Rogoff (1996) saying that pegging the domestic currency on a foreign one does not suppose that the interest rate rule should be the same, because pegging the interest rate would only lead to instability and not to a steady exchange rate evolution[9].

Model calibration

We calibrate the model based on a twofold approach. Firstly, we establish a preliminary coefficient calibration based on the stylized facts of the Moroccan economy. It is worth observing that this type of models, in order to be useful for policy makers, needs to accommodate their perspective about the economy, which can be founded on their experience, other models for similar countries, or the discussions with other observers[10]. Secondly, we confront and adjust said calibration by estimating all equations one by one, i.e. not as a system. In this frame, we use both the generalized least squares (GLS). Then, we use the Generalised Moments Method (GMM) for benchmarking purposes to estimate the three blocks as simultaneous equations and compare with the GLS outputs.

This effort was deployed with the aim of building a structural macroeconomic model where each equation should have an interpretation that sticks to the economic intuition. In order to actually compute these behavioural equations and generate artificial series and simulate scenarios for monetary policy analysis, it is necessary to firstly choose specific parameter values for $\beta_{1,}$ β_2, β_3, α_1, $\alpha_2, \alpha_3, \theta_1, \theta_2,$ and θ_3.

We started with the information provided by our methodology so far, and then we proceeded with an iterative method by developing an initial working version of the model and assessing its outputs. Afterwards, we gradually adjusted the parameters'

values until the model started generating artificial series that *imitate*, to a significant extent, the aspects of the Moroccan economy, the latter being represented by the actual data.

For the IS curve, we were inspired to a large extent from the GMM one-equation estimation result. We chose then 0.55 for the output gap lag term[11], with no lead term; we had attempted to approximate the latter by computing the moving average of six quarters future horizon and also by adding leads to the variable, but all these attempts biased the model's outputs. The possible explanation would be the fact that expectations need to be extracted from population investigations.

In conformity with the theoretical literature, we gave a negative value (i.e. -0.002) to the coefficient of the interest rate. The size of our coefficient is significantly smaller than the ones observed in countries such as the Czech Republic, the USA, Canada and EU economies; its value in these countries varies between -0.1 and -0.2. Actually, we had tried similar parameterisation but the model's generated series were too volatile than the actual ones, as demonstrated in figure 2.A, chart 2.A.1. When following an iterative approach –following the economic intuition-, we came up with the conclusion that it is the -0.002 parameter that fits best the Moroccan macroeconomic framework. The difference between our parameter and what is mostly used in the aforementioned countries could be explained by the fact that the real activity in Morocco usually shows less dependency on the interest rate as demonstrated by several indicators, e.g. by the year 2010, the bankarization rate was barely at 47 percent; this rate did not even exceed 6 percent in rural areas.

The Phillips Curve's coefficients were mostly based on our own investigations. Thus, the persistence parameter with the one-lagged inflation was set around 0.54, with a forward looking expectations term of 0.46. The relationship between the real effective exchange rate and the inflation is perceived to be the pass-through channel; in this vein, our investigation has found out that the latter affects the domestic price index by 29 percent. As for the output gap, it is positively correlated with the inflation, with a 0.14 coefficient.

When tackling the policy rule that most represents the behaviour of the Moroccan central bank, we came up against several challenges, particularly the fact that Bank Al-Maghrib's key interest rate did not move much during the examined period. The main reason behind this fact would be that the intervention of the monetary authorities in the Kingdom is wisely based on the nature of the shocks generating inflationary pressures. Therefore, we first calibrated this block according to the standard Taylor rule version. However, when generating the models' artificial series, it seemed that the model over-evaluates to some extent the authorities' interest rate reaction. In figure 2.A (Chart 2.A.2) we compare between our own calibrations with that of the canonical Taylor rule used by the central bank. In this frame, both artificial series fluctuate along with the actual one; however, our version seems to better represent the reality, as the evolution of its generated series does not stray from the actual data's.

Table 1. *Final calibration of the model's parameters*

Parameter	Parameter signification	value
α_1	Output gap persistence; a high value means high persistence (0.95), a low value is synonym to more volatility (0.1).	0.55
α_2	Actually, the real interest rate weight varies between -0.1 and -0.2, for extremely high or low dependency on the financial aspect of the economy.	-0.002
α_3	Foreign output gap weight, which typically does not go beyond the range between 0.1 and 0.5	0.099
β_1	Inflation persistence. It describes the respective shares of forward and backward looking expectations. The value varies between 0.4 (low persistence) and 0.9 (high persistence). The linear homogeneity condition : lag term + lead term = 1	0.54
β_2	The output gap impact on inflation. The value, usually varies between 0.1 (low impact and high sacrifice ratio) and 0.5(high impact and low sacrifice ratio)	0.14
β_3	Reflects the share of the imported good in the consumption good basket. Generally, its value varies between 0.1 (for relatively closed economies) and 0.9 (for extremely open economies)	-0.29
θ_1	Policy rate persistence in Taylor rule. The value lies between 0 (no persistence in policy) and 0.8 (for high inertia).	0.7
θ_2	The weight set by the central bank, of the differential between expected inflation and the target. It ranges on average between 0.3 and 1.	0.2
θ_3	The weight set by the central bank, of the output gap in policy rule. Typically varies between 0.3 and 1.	0.08

Thus, the final model through which we intent to make monetary analysis is as follows:

- *IS Curve*:

$$\hat{y}_t = 0.55 * \hat{y}_{t-1} - 0.002 * \hat{r}_{t-1} + 0.1 * y_t^* + \varepsilon_t^y$$

- *Phillips Curve*:

$$\pi_t = 0.54 * \pi_{t-1} + 0.46 * \pi_{t+6}^e + 0.14 * \hat{y}_t - 0.29 * \hat{s}_t + \varepsilon_t^\pi$$

- *Monetary Policy Rule*:

$$i_t = 0.7 * i_{t-1} + 0.3 * [0.2 * (\pi_{t+6}^e - \pi^T) + 0.08 * \hat{y}_t] + \varepsilon_t^i$$

With: $\pi^T = log(inflation\ mean) = 0.43$

Simulation exercises

Before examining the reaction of the main variables to a series of shocks, we first define the steady state values. The latter were computed so that there would be no secular growth rate, i.e. so that the real output coincides with its potential level (a nil output gap). The inflation's steady state value is the hypothetical inflation target (that we assumed to be the mean[12]), which implies an inflation gap equal to zero. The interest rate should be in its neutral level that we consider, in this instance, to be the trend; therefore, we took the gap to be zero as well. Furthermore, in this steady state, there should be no external disturbances, so we take the foreign output to be in its potential level[13]. We used the software platforms Eviews and Dynare (under Matlab) to confirm whether or not these values accurately represent the steady state, and the results were positive.

In this section, we simulate diverse shocks and scenarios on the economy's key variables and then assess how the endogenous variables react, notably the interest rate, seen that it hints the monetary authorities' behaviour according to the simulated situation. We first test how the economy reacts to a 1 percent variation in the policy rate, with the aim to compare with the theoretical and empirical evidence and make sure one last time that the model does not represent any misspecification. Then, we simulate a 1 percent output shock. Finally, we evaluate the potential impact of a 1 percent variation in the rational agents' expected inflation level.

The economy's sensitivity to a monetary policy shock

We assume that the monetary authorities decide to raise the key rate by 1 percent as to drive a downward influence on inflationary pressures. This decision would directly bring up the weighted average interest rate with approximately the same proportion. In figure 3, this scenario's outcomes are generated through the model.

The commercial bank interest rate, particularly the loan rate, is supposed to increase. This would lead to a decrease in liquidity, consumption and investment, which would drive a downward influence on the real activity, *ceteris paribus*. This explains the negative output gap as an impulse response, even though in a less important percentage. This decrease reaches its momentum around the third period, while inflation takes more time to fully react to the shock, i.e. from five to six quarters. A possible explanation of the latter would be the monetary policy transmission delay, known in the stylized facts to be exactly six quarters. The existence of price stickiness and expectations (dominated by the backward-looking component) prevents the price level from moving faster, thereby making the adjustment quite lengthy. Another explanation –that is not mutually exclusive with the first one, is that the Moroccan economy relies more on the real activity, which would provide strength to the demand transmission channel, and it is the negative variation in the output gap that gives more pace to the inflation decreasing path[14].

Through this first sensitivity test shock, the model seems to behave in conformity with the economic principles, and that monetary policy in Morocco influences both GDP and inflation dynamics. This follows perfectly the rules-of-thumb related to the interconnections between these three variables. Therefore, we can proceed to validly analyze other shocks.

The monetary policy after an output shock

In figure 4, we simulate the effect of a 1 percent drop in the output gap. From the chart we notice that such a shock drives a disinflationary pressure on the prices level, as the latter reaches -0.15 percent after 2 quarters, then this pressure starts loosing strength as the intensity of the negative gap shrinks until reaching

back equilibrium after 9 periods. The persistence of inflation makes it take 3 more quarters before meeting with the initial state.

On the other hand, monetary authorities should reduce the interest rate if they want to trim down the shock's effect. That is exactly what we observe through the model's impulse responses. Then, as the real shock is dissipated, the interest rate should be adjusted; otherwise, the economy might face inflationary pressures while the banking system suffers from over-liquidity. This second round policy reaction can be verified in this case, since the interest rate is being raised as the output gap converges toward the steady state (or even, toward a positive value, which would lead eventually to higher inflation[15]). Whereas, monetary policy takes over 16 periods to join back its initial level which corroborates the inertial aspect discussed before.

When testing the effect of a positive shock in the output gap due to, say, an exports windfall, the model shows that it keeps the same logic when it comes to the relation between the three variables examined here, as they react the same way, just positively.

The reaction to a shock in economic agents' expectations

Since 2006, Bank Al-Maghrib has chosen to communicate its monetary policy stance through monetary policy reports and quarterly notes. Since then, non-financial economic agents should supposedly become more aware of the inflation level and the course of actions made by the central bank when controlling the monetary and financial framework. Based on this assumption, we simulate the scenario where non-financial economic agents anticipate a higher inflation in the future[16].

In this perspective, we evaluate the reaction of the variables of interest when there is a 1 percent increase in rational agents' expected inflation level (see figure 5). It is plausible to say that when anticipating inflation, agents can actually create inflation since they usually take steps to protect themselves from its effects by adjusting their prices. Hence, these inflationary expectations would lead to an amplification of the current price level, not in the same magnitude however; we observe a 0.46 percent increase (i.e.

the proportion of forward-looking agents in the economy) in the inflation gap starting from the first quarter as an immediate reaction of the variable to the agents' change in behaviour before returning back to the steady state after approximately six periods. This phenomenon, along with the eventual inflationary tensions incoming within a six-quarter horizon, should lead monetary authorities to move up the interest rate from its neutral state, in a mild proportion though, i.e. +0.06 percent, rejoining back the equilibrium after 13 quarters. This adjustment in monetary policy is mostly with the aim to anticipate inflation expectations and consequently bypass it.

As regards to the real activity, the feedback is negligible (0.0007). We conclude that inflation expectations do not end up disturbing the real aspect of the economy if monetary authorities react with the right proportion at the right timing.

Concluding remarks and recommendations

In the present paper, we specify a New Keynesian reduced-form macroeconomic model along the line of those used by a significant number of central banks. The purpose has been to provide an operational workhorse for monetary policy analysis in Morocco; the latter consists of three main blocks, i.e. an aggregate demand (IS curve), a price-setting (Phillips) curve and a Taylor-type monetary policy rule. And, diverse scenarios are simulated for analysing monetary policy transmission mechanisms, in the short run mostly.

Although the model contains only three blocks and encompasses few ingredients, its simplicity and flexibility enable it to be an efficient instrument of describing and analysing monetary policy transmission mechanisms. On the other hand, the equations are the aggregation of microeconomic optimization programs.

The model generates the same variables' movements as the actual ones. Moreover, it shows some gradualism in the behaviour of monetary policy makers, since the interest rate generally persists over longer periods than the other variables. When it comes to the agents' inflation expectations, we conclude that a variation in the latter do not end up disturbing the real activity if the monetary

authorities react at the right time according to the transmission delay.

At last, since the small scale model we introduced in this paper fits in a relatively flexible generation of models, we emphasise the possibility for other researches to broaden the conceptualisation as well as the problems treated with such model. For that reason, we hint some possible extensions that could be developed based on our initial work:

- The inclusion of more blocks, and thus, more entities (government reaction function, exchange rate equation, labour market, investment, savings…);

- Adding employment variables as exogenous determinants of inflation dynamics or even the production level; testing therefore the assumption that such a correlation is significant in the Moroccan economic framework;

- Estimating potential output using a structural approach instead of a statistical one, namely through the production function method, thereby providing the model's construction with a larger economic foundation;

- Leading explicit sensitivity analysis for the calibrated parameters, in order to determine which variables are most affected when adjusting its correlation coefficient value. Researchers have the possibility to construct the model according to a parameterisation range instead of just a single calibration; thus, the impulse responses could be studied and compared in accordance with the chosen parameters;

- Or, identifying the model so that it drives forecasts; the latter could come from the combination of market expectations and the judgments of experts and policymakers (i.e. the semi structural basis).

Notes

[1] In the Moroccan case, the central bank officially initiated a price stabilization strategy in 2006 (Bank-Al-Maghrib reports)

[2] The data is drawn from Bank-Al-Maghrib's website as well as the IFS's (IMF).

[3] *i.e.* a null mean and a constant standard deviation.

[4] CPI is the quarterly consumer Price index

[5] See Berg *et al*. (2006b), p.11.

[6] See Ball (1994)

[7] See Gerlach-Kristen (2004)

[8] An uncovered interest rate states that the exchange rate is a function of the difference between the foreign and domestic interest rate plus a risk premium: $s_t = s_{t+1} + (i_t^* - i_t) + Prem$

[9] See Benigno *et al*. (2007).

[10] See Berg, *et al*. (2006b).

[11] This mild persistence is consistent with the Moroccan stylized facts because GDP is tributary to agriculture that represents some volatility. Conceding a higher persistence would reduce the model's anchorage on the framework.

[12] We can't really consider an inflation trend during the 1996-2010 period since the consumer price index growth fluctuated around 2.1 percent in a stable pattern. This is the reason why we considered the mean to be the potential level and thus, the target.

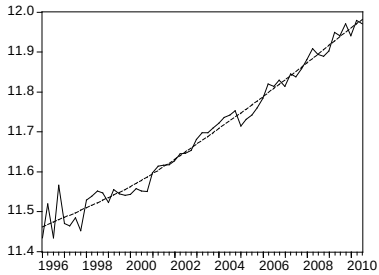
[13] Above in this document, the hypothesis of a small open economy has been retained; the equilibrium values of the variables are thus dependent on how close is the rest of the world to its potential growth rate.

[14] See Claus *et al*. (2000).

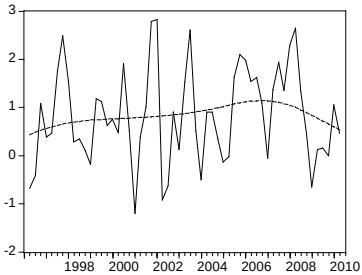
[15] The Speed limit is not taken into account since the data as well as the buckle of the empirical literature show no sign of such phenomenon.

[16] When referring to rational anticipative agents, we speak about the 46 percent proportion of the population that is allegedly forward-looking, as represented by the coefficient $(1 - \beta_1)$ in the Phillips Curve equation above.

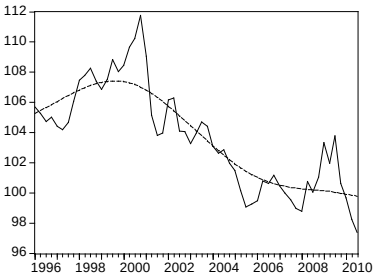
Appendix



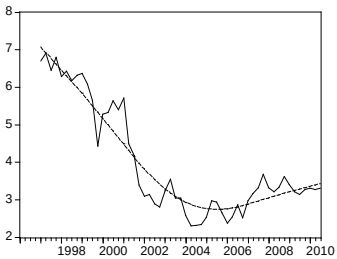
Graph 1: *Log real global GDP*



Graph 2: *Log Inflation*



Graph 3: *Real exchange rate*



Graph 4: *Real interest rate*

------- The variable's trend

Figure 1. *The variables distribution*

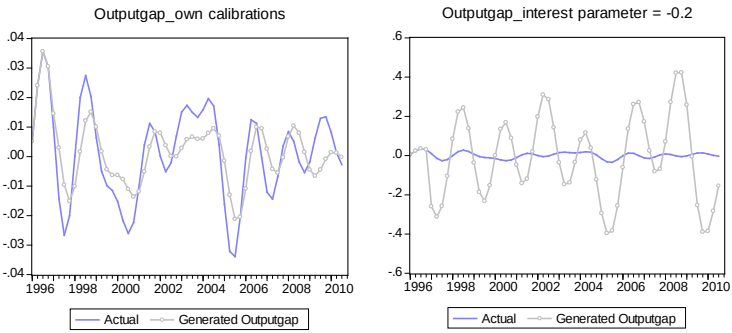


Chart 2.A.1: *The IS Curve [interest rate parameter]*

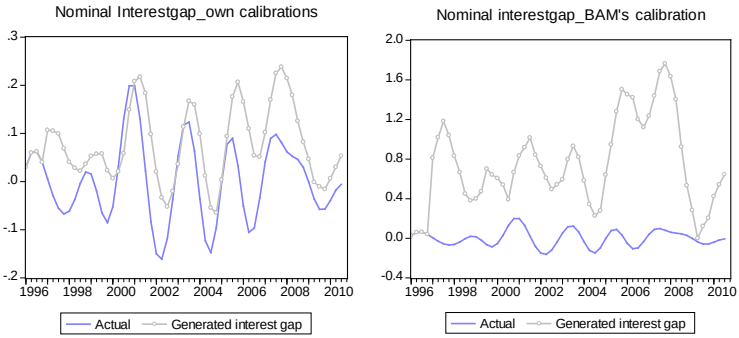


Chart 2.A.2: *The Taylor Policy Rule [Inflation parameter]*

Figure 2.A: *The model's generated series with different calibrations*

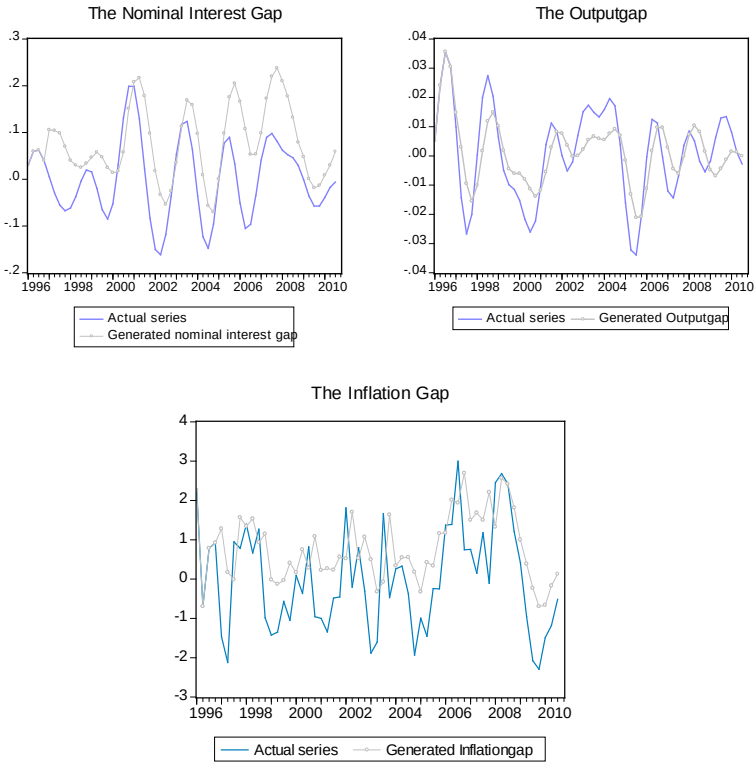


Figure 2.B: *The final model's generated series*

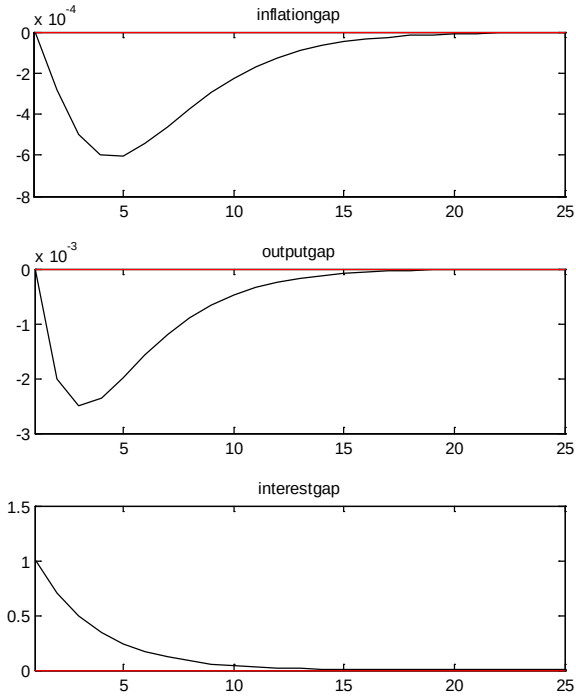


Figure 3: *The variables' impulse responses to a monetary policy intervention ((Shock magnitude: $\Delta i = 1\%$)*

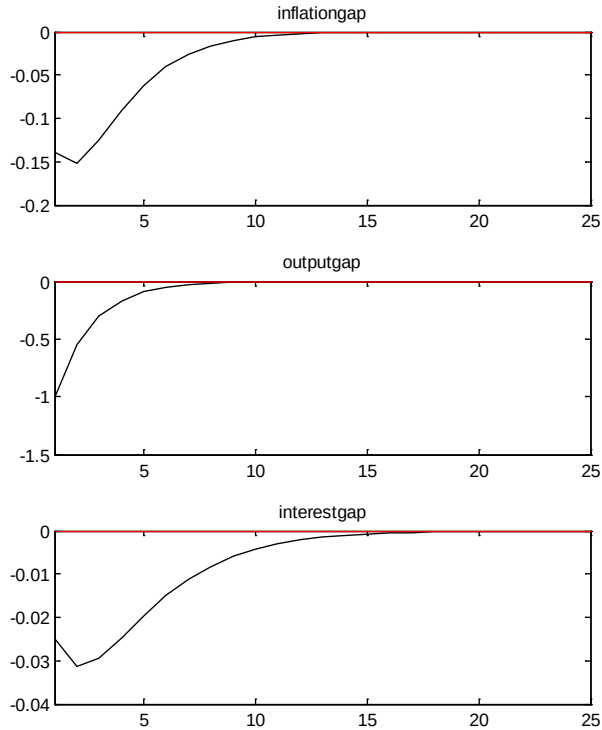


Figure 4: *The variables' impulse responses to an output gap shock (Shock magnitude: $\Delta\hat{y}$= -1%)*

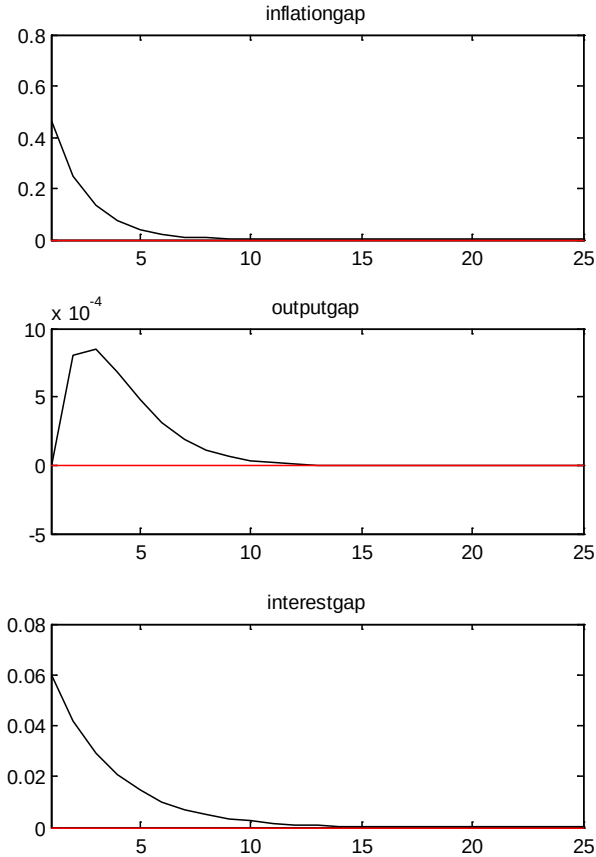


Figure 5: *Impulse responses to a variation in the agents' inflation expectations (i.e. $\Delta\hat{\pi}^e$=1%)*

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