# Political Instability, FDI and Economic Growth in Sub-Saharan African Countries: Evidence from Modelling Dynamic Simultaneous Equations

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Research Paper 372

Bringing Rigour and Evidence to Economic Policy Making in Africa

# Political Instability, FDI and Economic Growth in Sub-Saharan African Countries: Evidence from Modelling Dynamic Simultaneous Equations

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# Abstract

The aim of this study is to examine the consequences of interaction between political instability and foreign direct investment (FDI) on economic growth of 31 countries in Sub-Saharan Africa in order to analyse one of the channels through which political instability affects economic growth. To achieve this objective, the study relies on a dynamic panel procedure and the Three Stage Least Squares Method to estimate a model of simultaneous equations over the period 1984-2015. The empirical results indicate that political instability affects economic growth directly and indirectly through its impact on foreign direct investment. We also highlight the simultaneous character of the relationship between political instability and the level of economic development in Sub-Saharan African countries. The results of the study then corroborate the idea that political instability hinders growth and thus calls for measures to improve the quality of political climate, which is one of the conditions necessary for a country's economy to benefit from foreign direct investment.

Key words: Political instability, FDI, economic growth, simultaneous equation model, Sub-Saharan Africa

# 1. Introduction

## Background

In the past few years, foreign direct investment (FDI) has become a significant source of private external financing for developing countries in general and those in Sub-Saharan Africa in particular. Stylized facts on the entry flows of FDI in Sub-Saharan Africa show that the level of FDI has increased considerably since the 1970s. Indeed, the flows have grown from an average of US$ 906 million between 1970 and 1979 to US$ 1.273 billion between 1980 and 1989, then US$ 4.323 billion and US$ 10.091 billion over the periods 1990-1999 and 2000-2003, respectively, to reach US$ 42.5 billion in 2014 (UNCTAD, 2005; 2015).

Even though these trends in the development of FDI have not been linear due to economic and financial crises, and tensions and conflicts that have affected various countries, these figures show that the level of net flows of FDI towards Sub-Saharan African countries has increased considerably since the beginning of the 1970s and that Sub-Saharan African countries are increasingly seen to be significant destinations of FDI (World Bank, 2012).

However, despite these significant inflows of FDI, most Sub-Saharan African countries suffer from fragile economic growth (Arbache and Page, 2009) and extreme poverty[1]. Equally, researchers have not managed to ascertain in a clear and robust manner, the positive effects of direct foreign investment on the economic growth of Sub-Saharan African countries. To highlight this point, in terms of the effects of positive growth, we could cite studies undertaken by Ndikumana and Verick (2008), Gohou and Soumaré (2012), Asiedu and Gyimah-Brempong (2008), Esso (2010), Otchere et al (2016), and in regard to negative or insignificant growth effects, studies by De Mello (1999), Akinlo (2004), Ahmed et al (2007), Kose et al (2009) and Anyanwu (2014).

Studies indicate that various characteristics specific to Sub-Saharan African countries constitute major hindrances towards the transmission chain of positive effects of FDI on economic growth, contrary to the case in East Asian countries, for example. Taking into account domestic conditions in empirical analyses of these local conditions could, according to these researchers, allow for a better understanding of the relationship between FDI and growth.

This study, rather than examine a wide range of heterogenous factors that are likely to explain the huge gap between theoretical descriptions[2] and empirical

results, will focus on various aspects of political risks[3] to identify the role played by political instability in the transmission chain of effects of foreign direct investments to economic growth of Sub-Saharan African countries. It then assumes that the political risks that are the order of the day in Sub-Saharan African countries[4] increase the uncertainty of the environment in which foreign direct investments take place, and consequently diminish the desire by transnational and multinational companies to invest. Furthermore, political risk negatively affects economic growth by reducing the rate of growth of productivity, and to a lesser degree the accumulation of physical and human capital (Aisen and Veiga, 2013). We also argue that political risk is likely to limit the area of operations of policy makers, thus leading to operationalization of sub-optimal macroeconomic policies.

Several authors have focused on the possible interrelationship between political risk or political instability and foreign investment, and political instability and economic growth. One could cite studies undertaken by Busse and Hefeker (2007), Daude and Stein (2007), Alfaro et al (2008) and Javorcik and Shang-Jin (2009) who highlighted the adverse consequences of political instability on foreign direct investments and those of Barro (1991), Alesina et al (2003) and Aisen and Veiga (2013) who demonstrate that the effect of political instability has harmful effects on economic growth. However, various authors have not found any significant relationship, and argue that political and institutional variables are not significant determinants for the attraction of foreign investment (Wheeler and Mody, 1992; Campos and Nugent, 2003; Blonigen and Piger, 2014). Guidolin and La Ferrara (2007), quoted by Burger et al (2016), go even further by indicating that some foreign companies find it profitable to invest during periods of political instability.

It is evident that despite the high number of studies on the subject, a common trait that is evident in all these works is that they examine political instability as an exogenous factor which determines economic growth, without being influenced by economic performance. Yet, the level of economic development (or income level) could play an important part in the reduction of political instability. Indeed, Mauro (1995) and Miljkovic and Rimal (2008) have demonstrated that low income countries (less developed) tend to be politically unstable. Consequently, high-income countries (endowed with better economic levels) tend towards a higher level of political stability (Adelman and Morris, 1968; Helliwell, 1994). Also, the empirical evidence obtained from research in political science corroborates these results, which implies that political instability could be determined in an endogenous manner (Gyimah-Brempong and Traynor, 1999). On the other hand, most of these studies have mainly focused on an examination of the relationship between two variables, namely either political stability and FDI, or foreign direct investment and economic growth. Studies which focus simultaneously on the relationship between these three variables are quite few. To our knowledge, this study is one of the pioneer attempts at an empirical research of the tripartite relationship: political instability, foreign direct investment, and economic growth within the framework of Sub-Saharan African countries. An investigation of this tripartite relationship between political instability, foreign direct investment and

economic growth seems less essentialist because it provides important information on variables on which economic policy makers could insist upon so that the economies of Sub-Saharan African countries benefit fully from the advantages derived from inflows of FDI. Consequently, the results of this study could help in prioritizing the policies to be implemented.

The objective of this study is therefore to analyse, using rigorous techniques of panel data, the consequences of the interaction between political instability and FDI on economic growth in Sub-Saharan African countries. In this regard, our study differs from previous empirical studies over various issues. Firstly, we provide a conceptual framework through which we explore the question of simultaneity in political instability, FDI and economic growth relationship to take into account the totality of possible interactions that could exist between the studies' variables[5]. Secondly, the estimation of a model of multiple equations will allow us to identify factors likely to explain political instability and explore the direct and indirect channels through which political instability affects economic growth. Thirdly, we will use the method of Principal Components to construct a more wholesome measurement of political instability contrary to that used in previous empirical studies. Fourthly, the lagged values of political instability have been included in the model to capture the intertemporal relationship between political instability and economic growth. Finally, the use of panel techniques allows us to correct the correlated effects of countries with regressors, thus exploring the dynamics of the tripartite relationship between political instability, FDI and economic growth.

The rest of the study is organized as follows. Section 2 gives a critical review of literature on the relationship between political instability, foreign direct investment and economic growth. Section 3 describes the data and some stylized facts. Section 4 gives the methodology and section 5 discusses the results of the econometric estimations. The study ends with a conclusion (section 6) which brings out the main results and recommendations for economic policies.

# 2. Literature review

In this section, we review the theoretical and empirical studies on the relationship between FDI and economic growth, and then discuss the concept of political instability and its influence on economic growth and FDI.

## Effects of FDI on economic growth

Neoclassical and endogenous growth models, despite being drawn from different perspectives, are the theoretical bases upon which most empirical studies on the relationship between FDI and economic growth are based. In this theory, there are divergent points of view on the impact of FDI on long-term economic growth. For example, neoclassical models argue that FDI does not increase the rate of economic growth in the long-term, but only affects the level of production. Indeed, an increase in FDI only leads to temporary growth of capital and per capita income because, in the long-term, capital stock is subjected to the law of diminishing returns, which limits its impact on growth. However, they argue that FDI could improve long-term economic growth as long as FDI has an impact on technological development (Solow,1957; De Mello, 1997). However, endogenous growth models which depend on the law of increasing returns demonstrate that FDI could act favourably on long-term growth through externalities and ripple effects such as training and the development of human capital (Lucas, 1988; Rebelo, 1991; Romer, 1986).

Apart from these two theories (seen as modernist theories by Adams (2009)), which suggest that FDI could stimulate economic growth in developing countries, others see FDI as a tool of dependency and as consequently being quite harmful to recipient countries. This is particularly so in the case of the dependency school of thought. For such researchers (Amin, 1974; Bornschier and Chase-Dunn, 1985), the advantages that peripheral nations derive from the presence of foreign capital are illusory as they only create a few precarious and poorly paid jobs and a high presence of strong dependency links which then destroy traditional economies. Equally, according to Reinhart and Reinhart (2008), significant inflows of foreign capital are often linked, in developed economies, to macroeconomic results that are highly volatile for revenue growth, inflation and foreign accounts. Within emerging economies, they are associated with a higher probability of economic crises. However, in developing countries, they are associated with procyclical budget policies.

Regarding these contrasting theoretical points of view on the role of FDI in economic growth, several empirical studies have sought to investigate the relationship by examining sampled developing countries in general and more specifically those in Sub-Saharan Africa. In reading through empirical literature, we also observe the quasi-absence of a consensus between most existing studies on the subject. Some studies have effectively demonstrated the effect of growth on FDI whereas others have been unable to highlight this positive relationship. A number of these studies have found a positive and significant relationship between FDI and growth, of which we could mention the studies undertaken by Aizenman et al (2013) on a sampled 100 countries over the 1990-2010 period, and Seetanah (2009) over a sampled 39 Sub-Saharan African countries using the OLS and GMM methods. Equally, by working on a sample of 50 Sub-Saharan African countries over the 1980-2009 period, Gui-Diby (2014), using the GMM method, arrived at a conclusion that FDI has a positive impact on economic growth. Similar results have also been arrived at by Borensztein et al (1998), Hansen and Rand (2006), Sylwester (2005), Ndikumana and Verick (2008), and Adamu and Oriakhhi (2013).

Contrary to these studies, which found a positive correlation between FDI and growth, others have found an insignificant or negative effect. Akinlo (2004), for example, finds an insignificant effect of FDI on the Nigerian economy. Similar results were arrived at by Ayanwale (2007). Adams (2009) and Agbloyor et al (2014) also found independent and significantly negative effects of FDI on the growth of African countries. Negative and insignificant results between FDI and growth were also arrived at by Carkovic and Levine (2005), and Hermes and Lensink (2003).

In regard to mixed empirical results on the relationship between FDI and economic growth, other studies suggest that the effect of FDI on economic growth depends on characteristics that are specific to host countries and that the country has a minimum level of absorption capacity in terms of human capital, institutional infrastructure, and market liberalization which allows for the exploitation of the benefits of FDI (Adams, 2009). In this regard, we could cite studies by Borensztein et al (1998), who examine the role of FDI in the diffusion of technologies and on the economic growth of 69 developing countries. Their approach seeks to simultaneously integrate the role of the introduction of more advanced technologies through the activities of multinationals with that of conditions of training capacity development in host countries as growth factors, and to analyse in a specific manner the complementarity between FDI and human capital that is likely to generate productivity gains. These researchers find that the effect of FDI on growth is positive but insignificant in the interaction between FDI and human capital. A similar result is arrived at by Ayanwale (2007) who notes that a low level of education is the cause of lack of a significant impact of FDI on economic growth in Nigeria.

Studies by Hermes and Lensink (2003), Alfaro et al (2004a; 2008) and Otchere et al (2016) highlight the significant role of the interaction between development of a financial system and foreign direct investment in economic growth[6]. Agbloyor et al (2014) also arrived at such a conclusion with sampled African countries.

Trade openness is also considered a pre-condition for FDI to positively impact on economic growth (Balasubramanyam et al, 1996; Otchere et al, 2016). Also, Adams and Opoku (2015), focusing on a sampled 22 Sub-Saharan African countries, find that foreign direct investment and an adherence to regulations do not have a significant impact, taken separately, but their interaction becomes positive and significant on economic growth. Their results suggest that the effect of growth on FDI is stimulated in the presence of appropriate regulations and of quality.

Bengoa and Sanchez-Robles (2003) and Azman-Saini et al (2010) found that the effect of FDI on growth is insignificant without the interaction between FDI and economic liberty. These results show that economic liberty in a receiving country is a positive factor for the entry of FDI. A study carried out by Driffield and Jones (2013) on developing countries over the period 1984-2007 also finds that the flows of foreign capital are beneficial to economic growth under conditions in which there are institutions of good quality.

The impact of the macroeconomic context both on economic performance and the attraction of inflows of FDI has also been the subject of a large number of studies (Demekas et al, 2007; Alguacil et al, 2011).

The presence of developed infrastructure also seems to be considered as a condition for FDI to develop from economic growth (Asiedu, 2002; Morrisset 2000; Kinda, 2008; Yabi, 2010). Examining the impact of foreign direct investment on 57 developing countries demonstrates that FDI only contributes to the growth of total factor productivity in a small group of countries which distinguish themselves from others by their remarkable economic performance. The results also show that the rate of growth is one of the main determinants of geographical distribution of FDI within developing countries.

In summary, local conditions could not only attract foreign capital flows, but also play a key role in the effect of growth on FDI in developing countries (Alguacil et al, 2011). Furthermore, an improvement of local capacities could have a direct impact on the rate of economic growth.

## Concept of political instability, FDI and economic growth: An overview

### Measures of political instability

In as much as instability or political risk are considered a composite concept, that is thus difficult to define and quantify (Burger et al, 2016), in economic literature the measurement of political instability is related to political problems and to changes in political power through violence, and changes related to legal forms (Alesina et al, 1996; Fosu, 1992; Barro,1991). However, this definition, which does not take into account all the forms of socio-political instability, is still somewhat simplistic.

According to the first definition proposed by Lipset (1959), political instability is simply the inverse of political stability. Miljkovic and Rimal (2008) consider a change of government as a sign of political instability. This definition indicates that political instability is the non-persistence in a form of government, regardless of the type of rule. According to Butkiewicz and Yanikkaya (2006), the most frequently used measures for analysing political benefits of instability are classified into three categories: Government stability, social agitation/stability, and political violence.

In a wider sense, socio-political instability is presented in three forms (Gupta, 1991): instability of the elite or the executive which includes coup d'états, government changes and crises; instability of masses that corresponds to social movements such as strikes, demonstrations and riots, and; armed instability taking into account civil and guerrilla wars, and all violent political actions. By examining each of these three forms of instability more closely, we chose the third type of instability in the sense that this form of instability is the major cause of political instability in Sub-Saharan African countries. Indeed, according to the conflict and political violence index of 2014, five African countries are classified in the category of countries with an extreme risk of political violence and 10 countries are at a high risk. Equally, Marsh's political risk map 2015 shows that 14 of the main political hotspots in 2015 are located in Sub-Saharan Africa.

## Relationship between political instability and economic growth

A more widespread consensus has been established in economic literature according to which instability or political risk is associated with poor performance in terms of economic growth (Chen and Feng, 1996; Jong-a-Pin, 2009; Klomp and De Haan, 2009; Aisen and Veiga, 2013; Barro, 1991). Mankiw (1995) argues that political instability, measured by the frequency of revolutions, coups or wars, is negatively related to economic growth. Similar results have also been arrived at by Alesina et al (1996) and Persson and Tabellini (1999). Odedokun and Round (2004) estimated that political instability is part of the ways in which inequality reduces growth. Collier et al (2003) when addressing the subject indicates that civil war leads to a reduction in national production by destroying infrastructure and physical capital, but also by diverting resources to unproductive sectors such as military expenditure.

Abu et al (2015) examine the causal relationship between corruption, political instability and economic development in ECOWAS countries over the period 1996-2012 by using an error correction model. The results taken from the estimations reveal the existence of a causality relationship between political instability and short-term economic development. A similar result was also obtained by Okafor (2017) for the same sampled ECOWAS countries.

According to Arndt, Mckay and Tarp (2016), the significance of political stability and the prevention of conflicts for economic and social development is well-known and clearly highlighted in the recent occurrences in Ivory Coast and Madagascar.

Indeed, according to the authors, in 14 out of the 16 Sub-Saharan African countries, representing close to three-quarters of the population of Sub-Saharan Africa, political stability is presented as a prerequisite for growth stimulation and poverty reduction.

## Relationship between political instability and FDI

According to the manual of balance of payments of the International Monetary Fund (IMF, 2009), a direct investment from a foreign country is the export of capital to another country to acquire or create an enterprise and to take shares (at a threshold of 10% of a company). Based on this definition, political stability should be considered as a pre-condition to FDI benefitting from economic growth. Even more so because political stability determines both security and the profitability of investment projects. In other words, countries which are less at risk attract more per capita FDI. Studies undertaken by Sachs and Sievers (1988) are within this paradigm. Indeed, the researchers affirm that political stability is one of the most significant determinants of FDI in Africa. Also, studies by Busse and Hefeker (2007), Daude and Stein (2007), Alfaro et al (2008), and Anyanwu and Yameogo (2015) have demonstrated that there is a negative and statistically significant relationship between FDI and political instability. Rogoff and Reinhart (2003) have also demonstrated that there is a negative and statistically significant relationship between FDI and conflicts in Africa. Gouenet (2016), in a study that focuses on Cameroon over the period between 1960 and 2002, also finds that the indicator of the risk of instability has a negative impact on inflows of FDI.

Besides these studies that highlight the significant role of political institutions in attracting FDI, others do not find any relationship (Wheeler and Mody, 1992; Noorbakhsh et al, 2001; Blonigen and Piger, 2014) and some also found a positive relationship (Campos and Nugent, 2003).

The above literature review demonstrates that the results of the relationship between FDI and economic growth are mixed, but they also reveal amidst theoretical controversies, that apart from the fact that they have a negative effect on economic growth, the risk of political instability has consequences on direct foreign investments in the sense that it creates an unfavourable environment and increases uncertainty, which then reduces the impact that foreign investment could have on growth.

A significant empirical question remains unresolved: What is the influence of the risk of political instability on the relationship between foreign direct investment and growth? This study aims to examine how the risk of instability undermines growth through foreign direct investment in the context of Sub-Saharan African countries.

# 3. Data and some stylized facts

This study is dependent on unbalanced panel data taken from 31 countries in Sub-Saharan Africa over the period 1984-2015. This period is justified through the fact that data taken from the International Country Risk Guide (ICRG) on variables of political risk are not available before 1984. The countries have also been selected in function of the availability of their data.

To capture the effects of political risk, which is our variable of interest, just like scientific studies that cater for the risk of political instability at the heart of their analysis (Busse and Hefeker, 2007; Alfaro et al, 2008; Asiedu and Lien, 2011; Méon and Sekkat, 2012; Burger et al, 2016), we used variables issued from the database of the Political Risk Service Group (PRS Group). Following the empirical studies undertaken by Alesina et al (1996), Alesina and Perotti (1996) and Barro (1991), we highlight various aspects of political risk such as internal conflicts, government stability, religious tensions, external conflicts, ethnic tensions and the participation of military officers in politics[7]. These variables that measure political instability within a country are scored using varied scales with a high note indicating a better political climate.[8] We standardized these indicators on a scale of 0 to 10 to be able to compare the data and then use it to produce an aggregated index.

Using all six indicators at the same time in the analysis could cause problems of multicollinearity because these variables could be strongly correlated. There is also the risk of over-identification due to the high number of coefficients to estimate. However, the use of each of the six variables could lead to an omission bias of variables (Keho, 2012). A solution for choosing between these problems is to combine the variables into a sole indicator with specific weights. Evidently, such an approach leads us to the question of weights assigned to each variable. To avoid subjectivity in the definition of weights, we rely, borrowing from studies undertaken by Buchanan et al (2012), Keho (2012) and Globerman and Shapiro (2002), on a principal component analysis (PCA).

Table 1: Results of the principal component analysis

| Components | | | | | | |
|---|---|---|---|---|---|---|
| | PCA1 | PCA2 | PCA3 | PCA4 | PCA5 | PCA6 |
| Eigenvalues | 3.11597 | 1.0894 | 0.695706 | 0.469978 | 0.420751 | 0.20819 |
| % of variance | 51.93 | 18.16 | 11.60 | 7.83 | 7.01 | 3.47 |
| Cumulative % | 51.93 | 70.09 | 81.68 | 89.52 | 96.53 | 100 |
| Vectors | | | | | | |
| Variable | Vector 1 | Vector 2 | Vector 3 | Vector 4 | Vector 5 | Vector 6 |
| External conflicts | 0.4367 | -0.2966 | -0.2146 | -0.7236 | -0.0272 | 0.3884 |
| Military in politics | 0.3725 | 0.4077 | -0.5784 | 0.2054 | 0.5641 | -0.0048 |
| Government stability | 0.3106 | -0.6531 | 0.3222 | 0.3964 | 0.4538 | 0.1005 |
| Internal conflicts | 0.5119 | -0.1195 | -0.0340 | -0.0526 | -0.2743 | -0.8028 |
| Religious tensions | 0.3054 | 0.5240 | 0.7171 | -0.2419 | 0.2430 | 0.0192 |
| Ethnic tensions | 0.4677 | 0.1744 | 0.0160 | 0.4645 | -0.5838 | 0.4406 |

Table 1 illustrates the results of the analysis of the main components (ACP). The results of our ACP are satisfactory. Firstly, they verify the conditions of factorization. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which measures the quality of sampling, is at 0.781, which is a good index by Kaiser (1974)[9]. Bartlett's test of sphericity is highly significant[10]. The results of these two tests given in Annex Table A4 give a basis for the use of factor analysis to reduce data.

It is evident from Table 1 that the main component extracts 51.93% of the initial total variance; the second major component restores 18.16% of the variance, and so forth. Under these conditions, we retain the first two components because together they restore 70.09% of the total variance. The percentages of variance as explained by each of these two components are used to obtain specific weights that serve to calculate the index of political instability.

As demonstrated in the table on descriptive statistics (Annex Table A5), the aggregate index of political instability reflects an average of 5.92 with a standard deviation of 1.75.

Table 2 represents the averages of sub-periods of these disaggregated variables. Furthermore, we give an illustration by means of comparison, the trends of these indicators in East Asian countries (Table 3). As is demonstrated in Table 2, most indicators in Sub-Saharan African countries show scores that oscillate around 5, which gives a good indication of their weakness. Efforts to improve the score of political risk indicators seem to be insufficient. Compared to East Asian countries, Sub-Saharan African countries experience a lag in terms of political risk. Asian countries have recorded remarkable progress in terms of improvement of their indicators of political

risk. As a whole, the results show the efforts Sub-Saharan African countries have made in terms of initiating an improvement in the quality of their political climate.

Table 2: Averages of political risk variables in Sub-Saharan African countries

|  | 84-2000 | 2001-2014 | 84-2014 |
|---|---|---|---|
| Government stability | 4.19 | 5.90 | 5.21 |
| Internal conflicts | 5.21 | 5.48 | 5.23 |
| External conflicts | 5.94 | 6.88 | 6.44 |
| Military in politics | 3.83 | 4.41 | 4.26 |
| Religious tensions | 5.90 | 6.20 | 6.17 |
| Ethnic tensions | 4.20 | 4.74 | 4.55 |

Source: Calculations derived from data from the International Country Risk Guide

Table 3: Mean of the variables of political risk in East Asia[11]

|  | 84-2000 | 2001-2014 | 84-2014 |
|---|---|---|---|
| Government stability | 5.22 | 6.89 | 6.18 |
| Internal conflicts | 7.46 | 7.74 | 7.67 |
| External conflicts | 6.71 | 7.50 | 7.18 |
| Military in politics | 5.69 | 8.56 | 7.12 |
| Religious tensions | 6.71 | 7.43 | 7.06 |
| Ethnic tensions | 6.42 | 7.90 | 7.17 |

Source: Calculations derived from data from the International Country Risk Guide

How does the aggregated index of political stability designed using the six variables of political risk affect FDI and economic growth in Sub-Saharan African countries?

# 4. Methodology

We first present a specification of the models that will allow us to identify the factors contributing to political instability and to analyse the consequences of the interaction between political instability and FDI on economic growth in Sub-Saharan African countries. Secondly, we describe the estimation method used to estimate the specified models. Finally, we give the results of the preliminary empirical analyses.

## Model specification

Like the studies of Gyimah-Brempong and Traynor (1999), we combine two prongs of literature, namely those undertaken by political scientists and those undertaken by economists on the relationship between political instability and economic growth[12] and we see political instability and economic growth as being conjointly endogenous.

Given the significance of political instability on FDI and economic growth, we are interested in embarking on a study of its determinants. According to the literature, the equation on political instability is as follows:

$$Polinst_{i,t} = \alpha_0 + \alpha_1 Polinst_{i,t-1} + \alpha_2 g_{i,t} + \alpha_3 Y_{i,t-1} + \alpha_4 X_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \qquad (1)$$

Whereby i represents the individual dimension, t the time dimension, Polinst represents the aggregate indicator of political instability. We introduced a lagged value of the political instability indicator because of the hypothesis that countries which experience political instability develop an intemporal culture of political instability (Londregan and Poole, 1990). We therefore expect a coefficient that is positive;, economic growth rate. Further, all things remaining equal, a more rapid and rigorous economic growth should agitate in favour of political stability._{t-1} represents the lagged logarithm of real per capita income. We have included this variable because the level of development of a country is likely to influence the level of political instability (Gyimah-Brempong and Traynor, 1999). This variable was lagged by a year because of the argument according to which it takes time for a population to react in terms of production. $X$, is a vector of control variables that are supposed to influence political instability. $\eta_i$ represents the individual specific effect that could be fixed or random,

$\mu_t$ the temporal effect and $\varepsilon_{i,t}$ the error term of the model.

The vector $X$ includes the following independent variables:

- The inflation rate: Inflation is an indicator of macroeconomic stability. It takes into account the quality of economic policies put in place in a country. This variable is included in the equation to control the effect of economic uncertainty on political instability. A negative sign is therefore expected.

- Mortality rate, infant (per 1,000 live births): Like studies undertaken by Goldstone (2005), we use child mortality rate as a measure of quality of life, which could thus affect the well-being of the population. Its sign should be positive because, according to the same researchers, this variable is one of the best determinants of political instability throughout the world.

- The human capital stock measured by gross enrolment rate in secondary school: The expected effect of this variable on the probability of political instability is ambiguous. In cases where this variable measures the accessibility of secondary school education in a country, one could expect that this would have a negative effect on the probability of political instability. This variable could also be considered as an indicator of the level of education within the population. In this regard, an educated population should be more conscious of political, social and economic problems than an uneducated population, thus more susceptible to react against the government.

- Income inequalities: These are approximated using the Gini coefficient which is the most used empirical measure in these studies (Ncube et al, 2014). A positive coefficient is expected because, according to studies undertaken by Ortiz and Cummins (2011), Marshall and Cole (2011) and Ncube et al (2014), sharp income inequalities are a source of instability and of political and social conflicts.

- Urbanization: This is measured by the rate of urban population growth (annual %). According to Manarik (1981), revenue allocation tends to be less equitable in urban areas, which could be the source of eventual conflicts between different social classes. Furthermore, because of the high population density in urban areas, it is easier to organize demonstrations against the government in this zone. Auvinen (1997) and Annett (2000) also argue that it is more difficult for the government to provide basic services in densely populated towns, which would thus lead to discontent. From the foregoing, one would expect a positive coefficient sign for the urbanization variable.

- The last independent variable included in the equation is a political variable. Following empirical studies, we retain as the political variable, management of a democracy. Researchers consider democracy as a meta institution; in other words, from which other institutions are either born or strengthened (Rodrik, 2000; Acemoglu, Johnson and Robinson, 2005). Thus, a negative coefficient is expected.

We will then examine the effects of political instability on foreign direct investment. The goal of this study is to explore how political instability undermines growth through FDI in the African context. We therefore specify an equation that allows us to link FDI to political instability, presented as follows:

$$IDE_{i,t} = \varphi_0 + \varphi_1 IDE_{i,t-1} + \varphi_2 Polinst_{i,t} + \varphi_3 Polinst_{i,t-1} + \varphi_4 g_{i,t} + \varphi_i X_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \qquad (2)$$

Whereby FDI represents the net entries of FDI (as a percentage of GDP). We include a lagged variable of FDI in the equation on FDI to explore the dynamic nature of FDI in Sub-Saharan Africa. Also, several studies have discerned a correlation between the lagged value of FDI and the current value of FDI (Asiedu, 2011). $X$ is a vector of control variables supposed to influence foreign direct investments. The vector $X$ includes the following variables:

- Openness: This variable captures the trade policy and could positively influence the entry of FDI.

- The inflation rate : Inflation is an indicator of macroeconomic stability. It takes into account the quality of economic policies put in place in a country. A negative sign is expected because of the rate of inflation likely to have adverse consequences on inflows of IDE.

- Growth rate of GDP: Among the three motives that push companies to invest beyond their borders, one of the main economic determinants in the search for markets is the per capita income. Thus, the growth rate of a country is one of the most significant determinants of the flow of FDI toward Sub-Saharan Africa. A positive sign of this coefficient is thus expected.

- Domestic investments are approximated by gross fixed capital formation: This variable also captures the level of infrastructure development (Asiedu and Lien, 2011). A positive coefficient is expected.

- Population growth: This variable represents the size of the population, giving the trends of the size of potential markets for foreign investment. Indeed, a large population in constant evolution is an attractive market for foreign investment. Thus, a positive coefficient is expected.

Since another objective of this study is to analyze the impact of political instability on FDI and beyond that to determine its effects on economic growth, it seems opportune to specify, in the first place, a third equation in which the rate of economic growth is explained by FDI and, in the second place, a fourth equation that takes into

account the interaction between FDI and political instability. To this end, we specify the following two equations:

$$g_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 IDE_{i,t} + \beta_3 PolInst_{i,t} + \beta_i X_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \qquad (3)$$

$$g_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 IDE_{i,t} + \beta_3 PolInst_{i,t} + \beta_4 IDE * PolInst_{i,t} + \beta_5 X_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \quad (4)$$

$X$ is a vector of control variables that are supposed to influence economic growth. The vector $X$ includes some traditional determinants of growth currently used in the literature. The retained indicators are the country's degree of trade openness, the rate of inflation, population growth rate and development aid. The choice of these indicators invites a few comments:

- Openness is measured by the sum of imports and exports as a percentage of GDP. In assuming that international trade openness benefits economic growth, a positive coefficient is expected (Chang and Mendy, 2012; Aisen and Veiga, 2013).

- Inflation is an indicator of macroeconomic stability. It takes into account the quality of economic policies put in place in a country. A negative coefficient is expected because the inflation rate is likely to have adverse consequences on economic growth of open economies, since real depreciation in such economies is more costly (Romer, 1993).

- A higher population growth rate is supposed to lead to a decrease in per capita GDP growth. Thus, a negative coefficient is expected (Mankiw et al, 1992; Aisen and Veiga, 2013).

- According to Gomanee et al (2005), aid has a positive and direct effect on growth. A similar result was given by Loxley and Sackey (2008), and Tarp et al, (2011). Thus, we expect a positive sign of the coefficient.

Finally, the model of dynamic simultaneous equations that we retain for this study is comprised of three equations that are presented as follows:

$$\begin{cases} Polinst_{i,t} = \alpha_0 + \alpha_1 Polinst_{i,t-1} + \alpha_2 g_{i,t} + \alpha_3 y_{i,t-1} + \alpha_4 \inf l_{i,t} + \alpha_5 mort_{i,t} + \alpha_6 tss_{i,t} + \alpha_7 ineg_{i,t} + \alpha_8 Urb_{i,t} \\ + \alpha_9 demo_{i,t} + \eta_i + v_t + \varepsilon_{i,t} \\ IDE_{i,t} = \varphi_0 + \varphi_1 IDE_{i,t-1} + \varphi_2 Polinst_{i,t} + \varphi_3 Polinst_{i,t-1} + \varphi_4 g_{i,t} + \varphi_5 Ouv_{i,t} + \varphi_6 \inf l_{i,t} + \varphi_7 inv_{i,t} + \varphi_8 pop_{i,t} \quad (5) \\ + \eta_i + v_t + \varepsilon_{i,t} \\ g_{i,t} = \beta_0 + \beta_1 y_{i,t-1} + \beta_2 IDE_{i,t} + \beta_3 Polinst_{i,t} + \beta_4 Ouv_{i,t} + \beta_5 \inf l_{i,t} + \beta_6 pop_{i,t} + \beta_7 Aid_{i,t} + \eta_i + v_t + \varepsilon_{i,t} \end{cases}$$

From this model (5), one could draw the total effect of an increase by a decimal point of the standard deviation of political instability on economic growth during a year. $t\left(\frac{dg}{dPolinst}\right)$ is thus presented as follows:

$$dg/dPolinst = \partial g/\partial Polinst + \left(\partial g/\partial IDE\right)\left(\partial IDE/\partial Polinst\right) = \beta_3 + \beta_2\varphi_2 \qquad (6)$$

Furthermore, the inter-temporal impact of the gap by a year of political instability on economic growth is presented as:

$$dg/dPolinst_{i,t-1} = \left(\partial g/\partial IDE\right)\left(\partial IDE/\partial Polinst_{i,t-1}\right) + \left(\partial g/\partial Polinst\right)\left(\partial P/\partial Polinst_{i,t-1}\right) = \beta_2\varphi_3 + \beta_3\alpha_1 \qquad (7)$$

This inter-temporal effect exposes the impact of political instability on economic growth a year after the commencement of political instability. Alternatively, this could be interpreted as the effects of previous episodes of political instability on economic growth over the present period. Note that this relationship between political instability and economic growth does not represent the usual multiplier effect; it only shows the total effect that political instability could have on economic growth, regardless of the varied source of political instability.

The data used in this study is calculated in average over eight four-year sub-periods (1984-1987; 1988-1991; 1992-1995 ;1996-1999; 2000-2003; 2004-2007; 2008-2011; 2012-2015). The goal is to smoothen the short-term variations of the level of growth, variations essentially linked to business cycles.

A detailed description of all variables and the various data sources and the list of countries included in the empirical analysis is given in the Annex.

## Econometrics method

In the framework of the econometrics analysis, we estimate a model of dynamic simultaneous equations to capture the effect of various lagged dependent variables (namely political instability, direct foreign investment and the rate of economic growth on real per capita GDP) on the current explained variables. To do so, the dynamic system is estimated by first using the Generalized Method of Moments (GMM) on a dynamic panel. Several reasons are given in favour of the choice of this technique. Indeed, this method allows for the control of individual and temporal effects, and to resolve the problem of endogeneity likely to be attached to various explanatory variables. Furthermore, this method allows us to provide solutions to problems of simultaneity bias, inverse causality and omitted variables. This method also explores all the conditions of orthogonality that exist between the lagged endogenous variable and the error term. The consistency of the GMM estimator is based on the validity of the following hypothesis: (i) the instruments are valid, and; (ii) the error terms are not autocorrelated.

To test the validity of our lagged variables as instruments, Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) suggest the use of the Sargan/Hansen overidentification test. To verify the hypothesis of non-correlation of error terms, the same researchers suggest a second order autocorrelation test because, by construction, the first difference error term is correlated to the first order but should not be correlated to the second order. There are two major types of GMM estimators in dynamic panels, namely the GMM first difference estimator, and the system GMM estimator (GMM system). Blundel and Bond (1998) demonstrated through Monte Carlo simulations that the second is more performant than the first, because the first gives biased results on the finished samples when their instruments are weak, which leads us to retaining the second.

Secondly, to examine the robustness of the results, we resort to the use of Three Stage Least Squares Method (3SLS) in effecting the estimations. Several reasons are given in favour of the choice of this technique. Firstly, it is the method used in the case of unbalanced panels, as in our case. Also, 3SLS are more effective than 2SLS and the GMM[13] according to Arrelano-Bond, as they allow for hedging against the simultaneity bias. Furthermore, Greene (2012) demonstrates that, among all the estimators of instrumental variables, the Three Stage Least Squares Method estimator is asymptomatically efficient.

## Empirical analysis

### Descriptive and correlative statistics

Table A5 in the Annex is a summary of the statistical properties of the variables used in the study. Even though the results of trends of the aggregate indicator of political risk translate into the fact that Sub-Saharan African countries are highly risky politically, the results of the table also reveal that some standard deviations are high, which could signify that the variances are not minimal between the values of variables. It is therefore necessary to undertake a logarithm transformation of this to standardize the series.

Table A6 in the Annex presents the matrix of correlation coefficients between the different explanatory variables of the study. As is evident, the correlation coefficients between the different variables are all weak, in general, with the exception of the correlation between some indicators of political risk; in our case between internal conflict variables and those of external conflict, and between the variable of ethnic tensions and that of internal conflicts. To avoid eventual multicollinearity between political risk indicators, it seems more sensible to aggregate the information retained from each component of political instability so that the information is not repetitive. These results confirm the use of Principal Component Analysis (PCA) which, in determining the weight for each inserted variable, allows us to sort the information.

## Unit-root test

To test the existence of a unit-root test in the series, we use Fisher's unit-root tests on panel data that takes unbalanced panel data into account.

Table 4 gives the results of the unit tests of different series. After standardization of the series, the results show that all the variables are stationery at level in the Fisher sense.

Table 4:    Panel data with unit root tests- ADF Inverse Normal Statistic (Z)

| Variables | Level | First Difference | Integration order |
|---|---|---|---|
| **Political instability index (POLINST)** | **-9.4953 (0.0000) \*\*\*** | - | **I(0)** |
| Log (Foreign Direct Investment) (*IDE*) | **-3.3282 (0.0004) \*\*\*** | - | **I(0)** |
| Log (Rate of growth of per capita GDP) (*g*) | **-7.0116 (0.0000) \*\*\*** | - | **I(0)** |
| Log (Trade openness) (*Ouv*) | **-6.6697 (0.0000) \*\*\*** | - | **I(0)** |
| Gross fixed capital formation (*Inv*) | **-5.7758 (0.0000) \*\*\*** | - | **I(0)** |
| Inflation rate (**Infl**) | **-6.9066 (0.0000) \*\*\*** | - | **I(0)** |
| Rate of annual population growth (**Pop**) | **-9.9378 (0.0000) \*\*\*** | - | **I(0)** |
| Aid (***Aid***) | **-5.5099 (0.0000) \*\*\*** | - | **I(0)** |
| Urbanization (***Urb***) | **-7.2699 (0.0000) \*\*\*** | - | **I(0)** |
| Log (Mortality rate) (***Mort***) | **-7.9426 (0.0000) \*\*\*** | - | **I(0)** |
| Log (Gross enrolment rate in secondary education) (***tss***) | **-6.7336 (0.0000) \*\*\*** | - | **I(0)** |
| Income inequality (**ineg**) | **-7.1401 (0.0000) \*\*\*** | - | **I(0)** |
| Democracy (**Demo**) | **-4.0346 (0.0000) \*\*\*** | - | **I(0)** |

Note: The values in parentheses are p-values (\*\*\*), (\*\*), (\*) signify a threshold of 1%, 5% and 10%, respectively. The other Fisher-type tests give the same results.
Source: Calculations by the author

# 5. Empirical results

## Baseline results

The basic results indicated in Table 5 are derived from an estimation that uses the two-step system Generalized Method of Moments. These results are generally significant and do not pose any econometric problem[14].

The model of simultaneous equations in which the results are presented in Table 5 give results of the estimation of a system comprised of three equations (equation on political instability, equation on foreign direct investments, and equation on economic growth).

Table 5: Political instability, FDI and economic growth on a dynamic panel (GMM system estimator)

| GMM System method | | | | | | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Error | Z | P>z | [95% Conf. Interval] | |
| Dependent variable: Political instability index (Polinst) | | | | | | |
| Lagged political instability (Polinstt-1) | 0.3375914 | 0.2864889 | 1.18 | 0.239 | -0.2239167 | 0.8990994 |
| Rate of economic growth (g) | 0.0284811 | 0.0646319 | 0.44 | 0.659 | -0.098195 | 0.1551572 |
| Lagged income (yt-1) | -0.0709476 | 0.0199884 | -3.55 | 0.000 | -0.1101241 | -0.031771 |
| Mortality rate (Mort) | 0.0061323 | 0.0080436 | 0.76 | 0.446 | -.0096328 | 0.0218974 |
| Gross enrolment rate in secondary education (tss) | 0.0224149 | 0.0095547 | 2.35 | 0.019 | 0.0036881 | 0.0411417 |
| Income inequality (ineg) | -0.0169679 | 0.0466091 | -0.36 | 0.716 | -0.10832 | 0.0743843 |
| Urbanization rate (Urb) | 0.1798809 | 0.0986654 | 1.82 | 0.068 | -0.0134997 | 0.3732615 |
| Democracy (Demo) | -0.2974708 | 0.1685237 | -1.77 | 0.078 | -0.6277713 | 0.0328296 |
| Constant | 2.579403 | 1.455655 | 1.77 | 0.076 | -.2736289 | 5.432435 |
| AR2 (p-value) | -1.39 (0.165) | | | | | |
| Hansen J test (p-value) | 22.27 (0.384) | | | | | |

Table 5 Continued

| GMM System method | | | | | | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Error | Z | P>z | [95% Conf. Interval] | |
| Dependent variable: Foreign Direct Investment (IDE) | | | | | | |
| FDI (lagged) | 0.3596588 | 0.0608058 | 5.91 | 0.000 | 0.2404816 | 0.478836 |
| Political instability index (Polinstt) | -0.908329 | 0.5408757 | -1.68 | 0.093 | -1.968426 | 0.151768 |
| Political instability index (Polinstt) | -0.9170904 | 0.4179333 | -2.19 | 0.028 | -1.736225 | -0.0979561 |
| Trade openness | 0.0989025 | 0.019323 | 5.12 | 0.000 | 0.0610301 | 0.136775 |
| Rate of inflation | -0.000113 | 0.0002036 | -0.56 | 0.579 | -0.0005122 | 0.0002861 |
| Rate of economic growth (g) | 0.6081149 | 0.1474146 | 4.13 | 0.000 | 0.3191876 | 0.8970423 |
| Investment (% of GDP) | 0.1032635 | 0.1300235 | 0.79 | 0.427 | -0.1515779 | 0.3581048 |
| Rate of annual population growth (Pop) | -1.090975 | 0.7634233 | -1.43 | 0.153 | -2.587257 | 0.4053068 |
| Constant | .5701424 | 1.491136 | 0.38 | 0.702 | -2.35243 | 3.492714 |
| AR2 (p-value) | -0.32 (0.746) | | | | | |
| Hansen J test (p-value) | 17.15 (0.755) | | | | | |
| Dependent variable: Rate of economic growth (g) | | | | | | |
| Income (Lagged) | -0.2990837 | 0.0395536 | -7.56 | 0.000 | -.3766073 | -.22156 |
| FDI | 0.0682348 | 0.0363987 | 1.87 | 0.061 | -.0031054 | .139575 |
| Trade openness | 0.0229309 | 0.0185451 | 1.24 | 0.216 | -0.0134168 | .0592786 |
| Infl | -0.0003297 | 0.0002037 | -1.62 | 0.105 | -0.0007289 | .0000695 |
| Rate of annual population growth (Pop) | 0.9523389 | 0.3493037 | 2.73 | 0.006 | 0.2677162 | 1.636962 |
| Aid | -0.0226596 | 0.0134175 | -1.69 | 0.091 | -0.0489574 | .0036382 |
| Political instability index (Polinstt) | -0.7644261 | 0.3809677 | -2.01 | 0.045 | -1.511109 | -.0177431 |
| Constant | -1.144922 | 0.9315118 | -1.23 | 0.219 | -2.970651 | .680808 |
| AR2 (p-value) | 1.37 (0.170) | | | | | |
| Hansen J test (p-value) | 20.61 (1.000) | | | | | |

Note: The AR2 statistic represents the autocorrelation of order 2 test. The values and the p-value demonstrate an obvious absence of a correlation of order 2. In as much as the AR1 statistics are not given here, they validate the hypothesis of a correlation of order 1 in error terms. J-test is the Hansen's over-identification test. The Hansen test does not allow for the rejection of the null hypothesis of the validity of instruments.
Source: Calculations by the author

Several interesting results emerge from econometric estimations of the model of dynamic simultaneous equations. In the first sub-section, we discuss the results of the equation on political instability, the second discusses those of the equation on FDI, the third discusses the results of the equation on economic growth, while the fourth sub-section is dedicated to a general discussion.

## Equation on political instability

When one considers the results of the equation on political instability, one notes that the sign of lagged political instability is positive and significant on the statistical plane. Such a result agrees with those arrived at by Gyimah-Brempong and Traynor (1999), who argue that Sub-Saharan African countries that have experienced political instability tend to develop a culture of political instability. One also observes that the level of development that is captured in this study by the lagged logarithm of real per capita income displays a negative coefficient and is statistically significant to the order of 1%. Such a result agrees with those arrived at by Alesina et al (1996) and Siermann (1988). Indeed, it is evident from the estimations that an increase by a percentage of the lagged per capita GDP leads to a decrease in political instability by 0.07 standard deviation.  In terms of political implications, such a result signifies that an improvement in the economic conditions is necessary for Sub-Saharan African countries to establish a stable political environment.

The results of the estimations also show that the coefficient of elasticity of the variable of the gross enrolment ratio in secondary education is positive and statistically significant at a threshold of 5%. Such a result does not necessarily mean that education has been harmful in the promotion of political stability in Sub-Saharan African countries but rather draws attention to the fact that a more educated population should be more aware of political, social and economic problems than an uneducated population, therefore more likely to act against the government, which would then increase the probability of political instability in the country.

Equally, the urbanization rate displays a positive and statistically significant coefficient at the order of 10%. Such a result could be explained by the fact that populations that live in urban areas find it easier to assemble, exchange ideas and information to participate in political activities that are against the government.

We also observe that the coefficient of the democracy variable[15] displays a negative and significant sign at the order of 5% in the sampled Sub-Saharan African countries. This result is similar to that arrived at by Blanco and Grier (2009). Thus, we may assume that democracy is strongly associated to political stability. Countries that have democratic regimes suffer less from political instability, on average. These results highlight, from this fact, the necessity to establish institutions and to put in place policies that favour the establishment and the strengthening of democracy in Sub-Saharan African countries.

## Equation on direct foreign investment

The results of the equation on foreign direct investment show that the coefficients of the political stability index of the previous year and those of the current year display negative signs and are statistically significant to an order of 5% and 10%, respectively. These significantly negative coefficients indicate that political instability in the current year and in the previous year have a negative impact on the actual flows of FDI. Indeed, it is revealed from these estimations that an increase by a standard deviation point of political instability immediately leads to a reduction of FDI by 0.90 percentage points. The FDI in the current year is also reduced by 0.91 percentage points because of an increase by a standard deviation point in political instability during the previous year.

The results also indicate that the coefficients of the rate of economic growth and the degree of trade openness are both positive and statistically significant to an order of 1%. The positive and significant coefficient of the economic growth rate validates the theoretical hypothesis according to which countries whose economic growth is relatively higher would attract more FDI. This result is similar to those arrived at by Krugell (2005), Onyeiwu and Shrestha (2004) and Nsiah and Wu (2004) on sampled African countries. The results also suggest that more open economies will attract more FDI. Thus, reforms that target more trade openness would be favourable for the entry of FDI in Sub-Saharan African countries.

The coefficient of lagged foreign direct investment in the equation on FDI also displays a positive sign for its coefficient and is statistically significant at a threshold of 1%. This result agrees with that arrived at by Asiedu (2013) who clearly indicates that there is a correlation between foreign direct investment in the previous year and in the current year.

## Equation on economic growth

On examining the results of the growth equation, we observe that the coefficient of initial per capita GDP has a correct sign (negative) and is statistically significant, thus validating the hypothesis of a conditional convergence between countries in the sample as stipulated in the theories on economic growth. This result agrees with those in the studies undertaken by Barro and Sala-i-Martin (1997).

Political instability displays a negative coefficient as expected and is significantly different from zero at a threshold of 5%. Indeed, it is evident from the results that an increase by a standard deviation point of political instability leads to a decrease in economic growth to an order of 0.76 percentage points in Sub-Saharan African countries. This effect is relatively significant given that the average rate of GDP growth in Sub-Saharan Africa during the period under study was only 0.94%. The result reaffirms the pernicious role of political instability on economic activity in Sub-Saharan African countries and agrees with those arrived at by de Barro (1991), Alesina et al (2003), and Aisen and Veiga (2013).

Also, the regressions reveal a positive and statistically significant coefficient at a level of 10%. This result confirms that FDI plays an important role in the stimulation of economic growth in Sub-Saharan African countries (Aizenman et al, 2013; Adamu and Oriakhi, 2013; Seyoum et al, 2015; Gui-Diby, 2014; Chong et al, 2010 and Zghidi et al, 2016).

The coefficient of growth rate of the population is positive and significant. Consequently, the size and the population growth rate are seen to be significant for economic growth given their impact on economic activities such as production and the creation of large markets for goods and services (Busse and Groizard, 2008). The results agree with those arrived at by Adams and Opoku (2015) and Agbloyor et al (2014) who find that demographic growth has a stimulating effect on expenditure and consumption and consequently on economic growth.

The results also highlight the negative and significant coefficient of public aid on development in Sub-Saharan African countries. This could be explained by the fact that in Sub-Saharan African countries, institutional weakness, lack of human capital and infrastructure deficit often lead to situations where allocation of public or development aid does not necessarily imply an improvement in economic growth.

## Discussion

All in all, the empirical results given in Table 5 indicate that political instability negatively affects economic growth in Sub-Saharan African countries in two ways: in the first place, a direct manner through a reduction in production and in the second place indirectly in an intemporal manner by its impact on present and future levels of FDI[16]. Indeed, the total effect of an increase by a standard deviation point of political instability on economic growth in the course of the year, which is equal to $dg/dPolinst = \beta_3 + \beta_2\varphi_2 = -0,8264$ is broken down as follows: -0.7644 direct effects and -0.062 of indirect effects through a reduction in FDI, whereas the intemporal effects of a lag by a year of political instability on growth is equal to $dg/dPolinst_{i,t-1} = \beta_2\varphi_3 + \beta_3\alpha_1 = -0.3206$. This effect of intemporal growth from political instability implies that an increase in political instability in the prior period had a negative and significant impact on economic growth in the current period through a reduction in foreign direct investment. Thus, these different calculations suggest that studies that do not take the indirect impact of political instability into account tend to seriously under-estimate the effects of political instability on economic growth in Sub-Saharan African countries, and more importantly still to leave out the channels through which political instability undermines economic growth.

## Robustness

We subject these results to tests for robustness. To do so, we first resorted to an estimation of Three Stage Least Squares Method (3SLS) to effect the estimations.

Secondly, we test the robustness of the obtained results through an estimation of the model of economic growth in which we included an interactive variable with the aim of capturing the effect of political instability on the relationship between FDI and economic growth[17].

The results of the estimations of the fixed effects model are thus presented in Table 7. It is important to note that the questions related to autocorrelation and to heteroscedasticity, which arise in the model of simultaneous equations, have been resolved by the operationalization of the alternative tests of Durbin-Watson, Breusch-Godfrey and White (1980), respectively. Only the main results and lessons learned are given.

The estimations undertaken using the Three Stage Least Squares Method confirm the baseline results. Indeed, the coefficients of variables in the different equations have the expected signs and are statistically significant, except for the variables of human capital in the equation on political instability and of trade openness in the equation on foreign direct investment which, inasmuch as they are the expected signs, are statistically insignificant. The results coming from econometric estimations reaffirm the pernicious role of political instability on economic growth in Sub-Saharan African countries. Indeed, these results reveal that the total effect of an increase by a standard deviation point of political instability on economic growth during the present and past periods is 0.604 and 0.393, respectively. Also, in the equation on political instability, the sign of the coefficient of lagged political instability despite always being positive remains significant on the statistical plane. Such a result agrees with those arrived at by Gyimah-Brempong and Traynor (1999) who argue that Sub-Saharan African countries that have experienced political instability tend to develop a culture of political instability.

Furthermore, income inequalities now appear with a positive and statistically significant coefficient in the equation on political instability, indicating that countries with high income inequalities are more likely to be politically unstable. Such a result agrees with those arrived at by Alesina and Perotti (1996), Perotti (1996) and Odedokun and Round (2001). Equally, the results demonstrate that the coefficient of domestic investment is positive and significant in the equation on FDI. This result agrees with those of Asiedu and Lien (2011). As expected, the coefficient of inflation rate displays a negative and significant sign in the model on economic growth. This result agrees with those of Barro (1991), Ondoa (2013) and Adams and Opoku (2015).

Regarding the model with the interaction term (Table 7), the results derived from econometric estimations reaffirm the crucial role of FDI on economic growth in Sub-Saharan African countries.

Table 6:    Political instability, FDI and economic growth on a dynamic panel
            (3SLS Estimator: Analysis of Robustness)

| Three Stage Least Squares Method (3SLS) | | | | | | |
|---|---|---|---|---|---|---|
| | Coefficient | Std. Error | Z | P>z | [95% Conf. Interval] | |
| Dependent variable: Political instability index (Polinst) | | | | | | |
| Lagged political instability (Polinstt-1) | 0.4634253 | 0.0732649 | 6.33 | 0.000 | 0.3198287 | 0.6070219 |
| Rate of economic growth (g) | -0.0160557 | 0.0241376 | -0.67 | 0.506 | -0.0633646 | 0.0312531 |
| Lagged income (yt-1) | -0.1232568 | 0.0410501 | -3.00 | 0.003 | -0.2037135 | -0.0428 |
| Mortality rate (Mort) | -0.0003615 | 0.004467 | -0.08 | 0.936 | -0.0091166 | 0.0083936 |
| Gross enrolment rate in secondary education (tss) | 0.0069409 | 0.0065681 | 1.06 | 0.291 | -0.0059323 | 0.0198142 |
| Income inequality (ineg) | 0.0344267 | 0.0173993 | 1.98 | 0.048 | 0.0003248 | 0.0685287 |
| Urbanization rate (Urb) | 0.1400111 | 0.0748367 | 1.87 | 0.061 | -0.0066662 | 0.2866883 |
| Democracy (Demo) | -0.3427898 | 0.1628342 | -2.11 | 0.035 | -0.661939 | -0.0236406 |
| Constant | 2.633708 | .6766763 | 3.89 | 0.000 | 1.307447 | 3.959969 |
| Dependent variable: Foreign Direct Investment (IDE) | | | | | | |
| FDI (lagged) | 0.7687259 | 0.0958858 | 8.02 | 0.000 | 0.5807933 | 0.9566586 |
| Political instability index (Polinstt) | -0.5954331 | 0.2120558 | -2.81 | 0.005 | -1.011055 | -0.1798114 |
| Political instability index (Polinstt) | -1.181301 | 0.3606318 | -3.28 | 0.001 | -1.888126 | -0.4744756 |
| Trade openness | 0.0153737 | 0.0108155 | 1.42 | 0.155 | -0.0058243 | 0.0365717 |
| Rate of inflation | 0.0006473 | 0.0007882 | 0.82 | 0.412 | -0.0008976 | 0.0021922 |
| Rate of economic growth (g) | 0.7763605 | 0.4146348 | 1.87 | 0.061 | -0.0363088 | 1.58903 |
| Investment (% of GDP) | 0.3102678 | 0.055795 | 5.56 | 0.000 | 0.2009115 | 0.419624 |
| Rate of annual population growth (Pop) | 0.1972447 | 0.3685539 | 0.54 | 0.593 | -0.5251076 | 0.9195971 |
| Constant | -0.7135287 | 0.9832733 | -0.73 | 0.468 | -2.640709 | 1.213651 |
| Dependent variable: Rate of economic growth (g) | | | | | | |
| Income (Lagged) | -0.2604318 | 0.0443223 | -5.88 | 0.000 | -0.3473019 | -0.1735617 |
| FDI | 0.1256237 | 0.0388259 | 3.24 | 0.001 | 0.0495263 | 0.2017211 |
| Trade openness | 0.0088846 | 0.0090681 | 0.98 | 0.327 | -0.0088887 | 0.0266578 |
| Infl | -0.0009525 | 0.0002946 | -3.23 | 0.001 | -0.0015299 | -0.0003751 |
| Rate of annual population growth (Pop) | 0.11947092 | 0.2166192 | 0.55 | 0.581 | -0.3050949 | 0.5440367 |
| Aid | -0.0074786 | 0.0139498 | -0.54 | 0.592 | -0.0348198 | .0198625 |
| Political instability index (Polinstt) | -0.5295217 | 0.1452301 | -3.65 | 0.000 | -0.8141675 | -0.2448759 |
| Constant | -2.637876 | 0.9754207 | -2.70 | 0.007 | -4.549665 | -0.7260863 |

Source: Estimations by the author using Stata 12.0

Table 7:    Results of the regression of the model with interaction terms
            (Dependent variable; Economic growth)

|  | Fixed Effects Method | | |
|---|---|---|---|
| Variables | Coefficient | T | P>\|t\| |
| FDI | 1.425 | 4.36 | 0.00 |
| Political instability | -0.018 | -0.08 | 0.936 |
| FDI*political instability | -0.196 | -3.96 | 0.000 |
| Trade openness | -1.422 | -1.08 | 0.281 |
| Infl | -0.708 | -3.03 | 0.003 |
| Rate of population growth | 3.310 | 3.66 | 0.000 |
| Aid | -0.002 | -0.00 | 0.997 |
| Constant | 0.224 | 0.04 | 0.966 |
| F-statistic (P-value) | 11.7 (0,0000) | | |
| Hausman test (P-value) | 16.39 (0,0218) | | |

The results also demonstrate that the coefficient associated with the indicator of political instability is negative and statistically insignificant. To capture the role of political instability in the relationship between FDI and economic growth, we evaluated the joint effect of the index of political instability and FDI by including their product in the two equations on growth. The results show that the marginal effect associated with the interaction term is statistically significant and negative. These results thus suggest that when foreign direct investments tend to positively influence economic growth, political instability contributes by mitigating this positive effect. This result confirms the basic hypothesis stipulating that political instability is a hindrance in the transmission chain of the effects of FDI on economic growth in Sub-Saharan African countries.

Overall, the set of results clearly indicate that the estimation of the model on dynamic simultaneous equations using the General Method of Moments (GMM) for dynamic panels and the Three Stage Least Squares Method allows us to more conveniently evaluate the nature and the connection between political instability, FDI and growth. Indeed, it allowed us to highlight the specific channels through which political instability undermines economic growth in Sub-Saharan African countries. Thus, the results have confirmed the conclusions arrived at by Gyimah-Brempong and Traynor (1999) who state that the models of simultaneous equations are presented as very important models in studies on the direct channels through which political instability affects economic growth.

# 6.  Conclusion

In this study, we have attempted to examine the consequences of interaction between political instability and FDI on economic growth on sampled Sub-Saharan African countries over the period 1984-2015. In this regard, we first used a Principal Component Analysis (PCA) to construct a composite index of political instability. Thereafter, we empirically examined the relationship averaging the estimation of a model of dynamic simultaneous equations which seem more convenient for the evaluation of the nature of the connection between political instability, FDI and economic growth.

The results of the study are similar to the conclusions arrived at in previous studies which found that political instability exerts a negative and statistically significant impact on economic growth in Sub-Saharan African countries. Furthermore, the results derived from the estimations give us empirical evidence that political instability affects economic growth directly and indirectly through its negative impact on foreign direct investment. The results are also compatible with the hypothesis on simultaneity in the relationship between political instability and economic growth.

In view of these results, various implications in terms of policy could be given. They indicate that the importance of variables of political risk should not be neglected if Sub-Saharan African countries want to achieve and conserve their high growth levels. The results of this study suggest that increase in well-being of most citizens of African countries could be improved by reducing political instability. This confirms the argument that political instability is a vice that should be prevented and fought. Not having granted a central place to these factors, the various reforms undertaken in terms of liberalization and the promotion of FDI did not allow for the relaunch and support of sustainable economic development in Sub-Saharan African countries. In future, it will be important that more Sub-Saharan African countries commit themselves to putting in place a series of appropriate measures aimed at preventing and resolving internal and external conflicts, ironing out religious and ethnic tensions, reducing military presence in politics, and improving the score of government stability. This could be arrived at, as is evident from the results of the study, by an improvement of economic performance, by the establishment and strengthening of democratic regimes and finally by a reduction of income inequalities in Sub-Saharan African countries. It is these numerous challenges that countries in Sub-Saharan Africa should combat to derive more benefits from foreign direct investment, which is an important driver of economic growth. These recommendations are specifically directed towards Sub-Saharan African countries, in the sense that most unstable States are situated in that zone.

# Notes

1. According to IMF (2011), the proportion of people living below the poverty line (US$1.25 a day, adjusted according to purchasing power parity) has only slightly decreased in Sub-Saharan Africa because it increased from 59% in 1996 to 51% in 2005.

2. Theoretical literature tends to highlight the positive effects of FDI flows over long-term growth (Findlay, 1978; Lucas, 1988; Rebelo, 1991; Romer, 1986).

3. In this paper, we use the terms political risk and political instability interchangeably.

4. Indeed, Sub-Saharan Africa is one of the regions in the world where a good number of states experience political instability due to a high occurrence of wars, frequent military interventions in politics, and religious and ethnic conflicts (Dupasquier and Osakwe, 2006; Abu et al., 2015).

5. Which linear type models used in most studies cannot achieve.

6. However, Carkovic and Levine (2005) reject the role played by financial development in the relationship between FDI and economic growth.

7. To cohere with the objective of this study, we chose only six components which are considered as the most vulnerable and likely to provoke serious political instability in a country (Saha and Yap, 2014). Variables such as socio-economic conditions, the investment profiles, corruption, the respect of judicial laws and texts, the conduct of democracy and the quality of bureaucracy refer mostly to the business climate, which could turn out to be either quite persuasive or dissuasive regarding the decision to undertake an economic activity rather than the causes of chronic political instability.

8. See Annex A3 for the composition and the notation scale of indicators.

9. Kaiser suggest an evolution using the following reference points: reject below 0.5, Mediocre between 0.5 and 0.6; Average between 0.6 and 0.7; Good, between 0.7 and 0.8, Very Good, between 0.8 and 0.9; Excellent below 0.9.

10. If the significance tends towards 0.000, it is highly significant; lower than 0.05 significant; between 0.05 and 0.10 acceptable, and above 0.10 reject.

11.     The East Asia panel is composed of China, Hong Kong, Korea, Malaysia, Singapore, Thailand, and Taiwan.

12.     Indeed, in most studies, while political scientists argue that rapid economic growth favours political stability (McGowan and Johnson, 1984; Londregan and Poole, 1990), economists push the idea that political instability has adverse consequences on economic growth (Fosu, 2001; Gasiorowski, 1999 and Jong-A-Pin, 2009). Because of that, political scientists consider economic growth as being exogenous whereas economists consider political instability as being exogenous.

13.     GMM has limits in terms of the simultaneity bias, and Holtz-Eakin et al. (1988) suggest the use of Three Stage Least Squares Method (3SLS).

14.     The statistics of the Hansen over-identification test and Arellano and Bond's autocorrelation of order 2 does not allow for the rejection of the hypothesis of the validity of instruments used and the hypothesis of the absence of autocorrelation of the second at 1%, respectively.

15.     A maximum number of points is given to countries which are based on free and fair elections as is stated in the constitution: it is the alternance of democracies. Thus, a high score indicates the existence of democratic institutions of high quality.

16.     Equally, the negative and statistically significant coefficients of the current and lagged values of political instability in the FDI equation combined with the positive and significant coefficient of FDI in the equation of growth also sufficiently prove that political instability negatively influences economic growth through FDI channels.

17.     This growth model was tested under the framework of a fixed effects model. To verify the existence of individual fixed effects, we operationalized a specific effects Fisher test whose null hypothesis depends on the homogeneity of individual effects. The calculated statistics reject the null hypothesis (Table A-7). Thus, the presence of individual fixed effects on our model was confirmed. We then sought to find out whether these effects were not in fact random effects. The Hausman test indicates that the fixed effect model is the optimal estimation technique to use. The results of the estimations of the fixed effects model are presented in Table 7.

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# Annexes

Table A1: List of countries

| South Africa | Ethiopia | Liberia | Sierra Leone |
|---|---|---|---|
| Angola | Gabon | Malawi | Sudan |
| Botswana | Gambia | Mali | Tanzania |
| Burkina Faso | Ghana | Mozambique | Togo |
| Cameroon | Guinea | Namibia | Uganda |
| Republic of Congo | Guinea Bissau | Niger | Zambia |
| Democratic Republic of Congo | Kenya | Nigeria | Zimbabwe |
| Ivory Coast | Madagascar | Senegal | |

Table A2: Definitions and sources of variables

| Variables | Definition | Source |
|---|---|---|
| Revenu (Y) | The real per capita GDP growth rate | W D I |
| Trade openness (Ouv) | (Imports + exports) / GDP | W D I |
| Inflation rate | Rate of variation of Consumer Price Index (annual %) | W D I |
| Foreign Direct Investment (IDE) | Foreign Direct investment, net inflows (% of GDP) | W D I |
| Population | Annual population growth rate for year t (%) | W D I |
| Aid | Public aid for development as a percentage of GDP (flow of resources intended for public services and development) | W D I |
| Urb | Urban population growth (annual %) | W D I |
| Mort | Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. | W D I |
| TSS | Gross enrolment rate in secondary education | W D I |
| Ineg | Gini index | W D I |
| Demo | Democratic responsibility measures how governments react to their population. Democracy provides different actors in society with the possibility to exert pressure on the State by sanctioning it in case of failure. The principal of democratic responsibility makes the State accountable to its citizens for its actions. It is obligated to take its citizens into account in management of its affairs. A maximum number of points is given to countries which are based on free and fair elections as stated in the constitution; it is the alternance of democracies. A minimum number of points is given to countries whose State leadership is a sole individual; a dictatorship. | International Country Risk Guide (ICRG) |

WDI = World Development Indicators

## Table A3: Institutional indicators of the PRS group

The International Country Risk Guide (ICRG) indicator was created in 1980 by the editors of International Report, for more than 140 countries and it comprises 30 indexes. In 1992, they joined the Political Risk Services group (PRS). Under the framework of this study, we retained six indicators in functions of the objectives of the study which are given below.

| POLITICAL RISK COMPONENTS | | |
|---|---|---|
| Component | Definition | Point (max.) |
| Government Stability | It measures the aptitude of public authorities to undertake programmes that they formulated and to sustain them | 12 |
| Internal Conflict | The index of internal conflicts as a percentage of the degree of political violence in a country | 12 |
| External Conflict | External conflicts are related to risks faced by the government due to external actions that could lead to non-violent external pressure (for example trade restrictions, territorial disputes and diplomatic pressure- to cross-border conflicts and to war | 12 |
| Military in Politics | A measurement of the participation of the armed forces in politics. Because armies are not elected, their involvement, even at a peripheral level, reduces democratic responsibility. Military involvement could lead to internal or external threats, become symptomatic of underlying problems, or become a large-scale take over by the military. In the long-term, a military system of government would certainly reduce the effective functioning of the government, become corrupt, and create a difficult environment for foreign firms | 6 |
| Religious Tensions | The measurement of religious tensions ensuing from the domination of society and/or governance by a single religious group, or the desire to dominate in a manner that replaces civil law by religious law, exclude other religions from political/social processes, suppress religious freedom or the expression of religious identity | 6 |
| Ethnic Tensions | Measure the degree of tension attributable to racial, national or linguistic division | 6 |

Source: International Country Risk Guide (ICRG)

Table A4: Result of the Kaiser (1974) and Bartlett (1950) test

Bartlett test of sphericity
Chi-square = 587.737
Degrees of freedom = 15
P-value = 0.000
Kaiser-Meyer-Olkin Measure of Sampling Adequacy
KMO = 0.781

Table A5: Definition of variables and descriptive statistics

| Variables | Observations | Mean | Standard deviation |
|---|---|---|---|
| Political instability index | 248 | 5.923762 | 1.755442 |
| FDI | 248 | 3.362238 | 8.521839 |
| g (%) | 248 | 0.9378669 | 4.310135 |
| Ouv | 248 | 66.62631 | 31.4945 |
| Inv | 248 | 18.74451 | 7.785939 |
| INFL | 248 | 38.67377 | 222.0144 |
| POP | 248 | 2.731783 | 0.8170055 |
| AID | 248 | 11.40312 | 12.07856 |
| Urb | 248 | 4.310794 | 1.549839 |
| Mort | 248 | 84.15746 | 33.75252 |
| TSS | 195 | 30.6976 | 19.5793 |
| Ineg | 105 | 44.22137 | 9.109662 |
| Demo | 245 | 2.877218 | 1.177164 |

Source: Estimations by the author using Stata 12.0

Table A6: Correlation matrix between variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stab. Gouv. (1) | 1 | | | | | | | | | | | | | | | | | |
| Conf. Int (2) | 0.45* | 1 | | | | | | | | | | | | | | | | |
| Conf. Ext (3) | 0.43* | 0.67* | 1 | | | | | | | | | | | | | | | |
| Milit. Pol. (4) | 0.06 | 0.47* | 0.36* | 1 | | | | | | | | | | | | | | |
| Tens. Rel. (5) | 0.07 | 0.37* | 0.19* | 0.32* | 1 | | | | | | | | | | | | | |
| Tens. Eth. (6) | 0.29* | 0.70* | 0.45* | 0.50* | 0.43* | 1 | | | | | | | | | | | | |
| IDE (7) | 0.22* | 0.10 | 0.10 | -0.07 | 0.013 | 0.096 | 1 | | | | | | | | | | | |
| g (8) | 0.38* | 0.25* | 0.20* | 0.107 | -0.007 | 0.24* | 0.1075 | 1 | | | | | | | | | | |
| OUV (9) | 0.20* | 0.24* | 0.17* | 0.025 | 0.19* | 0.18* | 0.498* | 0.007 | 1 | | | | | | | | | |
| INV (10) | 0.22* | 0.30* | 0.22* | 0.19* | 0.17* | 0.36* | 0.192* | 0.22* | 0.24* | 1 | | | | | | | | |
| Infl (11) | -0.09 | -0.089 | -0.01 | -0.08 | 0.064 | -0.038 | -0.03 | -0.13* | 0.054 | -0.13* | 1 | | | | | | | |
| Pop (12) | -0.023 | -0.013 | -0.0009 | 0.007 | -0.17* | -0.109 | -0.01 | 0.33* | -0.06 | 0.072 | -0.07 | 1 | | | | | | |
| Aid (13) | -0.10 | -0.018 | -0.061 | 0.0008 | 0.12* | 0.051 | 0.28* | 0.053 | 0.22* | 0.052 | -0.03 | 0.11 | 1 | | | | | |
| Urb (14) | -0.20* | -0.14* | -0.25* | 0.041 | 0.014 | -0.043 | -0.09 | -0.09 | -0.05 | 0.12* | -0.13* | 0.13* | 0.07 | 1 | | | | |
| Mort (15) | -0.21* | -0.31* | -0.20* | -0.17* | -0.06 | -0.16* | 0.044 | -0.07 | -0.10 | -0.31* | -0.004 | 0.041 | 0.35* | 0.09 | 1 | | | |
| Tss (16) | 0.24* | 0.33* | 0.23* | 0.23* | 0.17* | 0.16* | 0.051 | 0.031 | 0.21* | 0.07 | -0.05 | -0.35* | -0.39* | -0.37* | -0.65* | 1 | | |
| Ineg (17) | 0.07 | 0.15 | 0.03 | 0.34* | 0.23* | 0.14 | 0.004 | 0.041 | 0.25* | 0.006 | 0.04 | -0.03 | -0.12 | -0.090 | -0.10 | 0.5* | 1 | |
| Demo (18) | 0.17* | 0.33* | 0.29* | 0.41* | 0.17* | 0.24* | 0.027 | 0.079 | 0.05 | 0.21* | -0.08 | -0.01 | -0.15* | -0.005 | -0.4* | 0.38* | 0.1628 | 1 |

Note: * Designates correlation coefficients significant to the error threshold of 5%

Source: Estimations by the author using Stata 12.0

Table A7: Results of the Fisher heterogeneity test

H0: A=$A_i$ et B=Bi
H1: il existe au moins i ≠j tel que
$A_i$≠$A_j$ et B≠$B_j$
F test de A, B=$A_i$, $B_i$: F (30, 210) =1.61
P-value = 0.000

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