DE GRUYTER OPEN
REBS Review of Economic & Business Studies
DOI 10.1515/rebs-2018-0074
Volume 11, Issue 2, pp.65-92, 2018
ISSN-1843-763X

DOES CORRUPTION MATTER FOR UNEMPLOYMENT IN SADC COUNTRIES?

DOPÉ M. ADJOR [*], LÉLENG KEBALO [**]

Abstract: *Is corruption, the main source of unemployment in the SADC countries? Do the effects of corruption outweigh those of income inequalities, human capital and government revenues in explaining the unemployment rate within the SADC area? Through these questions, the objective of our paper is to propose targeted policies that can enable decision-makers to reduce the unemployment rate within the SADC area. Through a panel vector autoregressive model, our empirical investigation on a sample of nine (09) SADC countries reveals that the education level and income inequalities contribute the most to explain the total unemployment rate. However, for the youth unemployment, corruption is the main factor followed by the level of education. To reduce total unemployment in the area, SADC countries need to reduce income inequalities and the mismatch between education and the labour market needs and/or countries' development programs. For the youth unemployment, the reduction of corruption to all its forms should be the priority of political and economic decisionmakers*.

Keywords: *Unemployment, youth, corruption, income inequality, education, public policy.*

JEL Classification: *J40, J48, J64, O15*

1. INTRODUCTION

The questions about the factors that influence the unemployment rate and the policies to be implemented to eradicate it are not new issues. Since Nickell (1979), there has a succession of works that develop economic, institutional and social policies to reduce the level of unemployment rate in economies (Mincer, 1991; Perugini and Signorelli, 2010; Rendahl, 2016). Indeed, the level of unemployment rate represents a macroeconomic condition, for a country. Thus, its reduction is a major concern for economic and political decision-makers.

Ten years after the 2007 financial crisis and the great recession of 2008, the employment levels in developed countries are returning to their pre-crisis dynamics

[*] Dopé M. Adjor, adjor.dope.madeleine@gmail.com, [1]Department of Economics, University of Lomé, Togo
[**] Léleng Kebalo, kebalollg@gmail.com, Corresponding author

or trends (Boz and Tesar, 2018). However, in developing countries and in sub-Saharan Africa in particular, the unemployment rate is rising, despite the efforts of political and economic decision-makers. This constitutes a recurrent problem in sub-Saharan African countries. Several institutions, through economic, institutional and social policies, are trying to reduce the level of unemployment, especially among young people, without success. Indeed, the unemployment is an economic problem whose damage is more pronounced among youth than the total population (Perugini and Signorelli, 2010; Condratov, 2014). Moreover, this young class is the most represented in the African population. It is in this sense that the youth unemployment (aged 15-24) has attracted the attention of researchers and especially political and economic decision-makers since the advent of the 2007 financial crisis and the general recession of 2008 (Bell and Blanchflower, 2011; O'higgins, 2012; Katz, 2014).

With an average unemployment rate of 7.58% and a youth unemployment rate estimated at 13.47%, the SADC, economic region of Southern Africa, present one of the highest levels of unemployment among economic regions in the world, this comparatively to developing countries (5.43% for total unemployment rate and 10.44% for youth). These levels of unemployment rate within the area, constitute a real challenge for the public and economic authorities. The desire of these authorities is to reduce these levels of the unemployment rate and especially to have a large middle class necessary to create and generate economic growth. Despite the efforts of public authorities and institutions to reduce the level of unemployment and especially combat the sources of this phenomenon, the task keeps hard, and not significant, are the results.

However, the authorities, in order to stabilize their economic and social activities, are seeking to eradicate this scourge. This leads countries to research and analyze the causes of unemployment in the area. O'Reilly et al. (2015) argue that to solve the unemployment problem within a geographic entity, it is important to seek to understand the causes. According to O'Reilly et al. (2015), what could explain these levels of the unemployment rate in the SADC area? And how can we resolve this problem, especially among youth? In relation to the first question, theoretically, there are huge controversies about the causes of unemployment within a region.

For neoclassical theory, the unemployment rate is a natural phenomenon that results from the trade-off between labour supply and demand. Among Keynesians, however, this is due to insufficient demand for labour. The Keynesian theory also suggests that one of the sources of unemployment rate within an area is the

inefficiency of public policies (Battaglini and Coate, 2011, 2016; Condratov, 2014; Rendahl, 2016). The low mobilization of public resources necessary to conduct expansionary fiscal policies can lead to higher the levels of unemployment rate within an area. As other determinants of the unemployment rate within an area, the economic literature identifies the human capital (Nickell, 1979; Mincer, 1991 and Condratov, 2014) and the increase in income inequality within countries (Helpman et al., 2010). More, a person is educated, less is the probability to be unemployed (Mincer, 1991). Hence, a country with a high proportion of an educated population will have a low level of the unemployment rate (Mincer, 1991 and Condratov, 2014).

Moreover, when national wealth is held by a minority, and income is poorly redistributed, the outcome within a country is the increase in the unemployment rate. More recently, theory on the determinants of unemployment within regions has focused more on institutional determinants. Indeed, it is increasingly clear that the institutional environment of a country or region can influence the economic activity and the unemployment rate (Asiedu and Freeman, 2009; Ali and Krammer, 2016; Ali and Saha, 2016, 2017; Bouzid, 2016). Thus, since the works of Myrdal (1968), Mauro (1995, 1997, 1998) and Tanzi (1998a, 1998b), the literature has identified the corruption, the most recurrent problem when we refer to the economic and social development, as a factor that can influence the level of the unemployment. The corruption is an old phenomenon that is at the source of unemployment levels in both developed and developing countries (Asiedu and Freeman, 2009; Ali and Krammer, 2016; Ali and Saha, 2016). Thus, to reduce unemployment, we must seek to solve and eradicate the level of corruption in the countries. That is why, since the 1980s, the fight against corruption has been a priority of international policies and development debates.

Faced with these different economic and institutional sources of unemployment, it can be possible for a political or economic decision maker, to make mistakes in the elaboration of economic policy to solve the problem of unemployment in the SADC area. In addition to this, despite the multitude of works carried out in the literature on the economic, institutional and social determinants of the unemployment rate, one of the limitations, to our knowledge, is that it does not prioritize the factors that may influence the total unemployment rate on the one hand and the youth unemployment rate in a country or region on the other. This could help to propose prioritized and targeted economic and institutional policies that will enable policymakers to effectively address the problem of total unemployment and in particular, the youth unemployment rate in the SADC area.

With regards to the unemployment in the SADC countries, to help to solve this problem and fill this gap in the literature, our paper analyzes on the one hand the effects of income inequality, government revenue, human capital and control of corruption on the total unemployment rate and in particular that of youth in the SADC area. On the other hand, our paper seeks to determine the economic, social or institutional phenomenon that contributes the most to the explanation of the unemployment within the SADC area, in order to prioritize the factors. To achieve our objectives, we adopt a panel vector autoregressive model for a sample of nine (09) SADC countries, over a period from 2007 to 2016, a decade since the advent of the 2007 financial crisis. We hypothesize that corruption is the dominant factor in the explanation of the two types of unemployment included in our analysis.

The analysis performed reveals that the control of corruption and the increase in government revenues in the SADC countries, allow, to reduce the level of unemployment (total and youth). However, the rise in income inequality and education levels contribute, to increase the unemployment rate (total and youth). We explain this last result by the mismatch between the education/training and the labour market needs and/or the development programs of the countries. Hence, there is a need to reorient the education system of SADC countries. We, therefore, conclude that to reduce the total unemployment rate in the SADC countries, in order, we should seek to reduce the income inequality, then, a better orientation of education and training to labour market needs and finally make enormous efforts in the mobilization of government revenues. Concerning the reduction of the level of youth unemployment, the eradication of corruption and the reorientation of education and training within the area should be the priorities of political and economic decision-makers.

The rest of our paper is structured as follows. First, section 2 presents a literature related to our research issue. The section 3, then presents the stylized facts to better understand the evolution of unemployment rates in the SADC area. Section 4 presents the data and the methodology needed to achieve our objectives. After, the section 5 presents and discusses the results. Finally, section 6 concludes our paper.

2. LITERATURE REVIEW

The unemployment is a multidimensional concept that incorporates economic, political, institutional, social aspects; but also, an interesting academic and political issue (Acemoglu, 1995). Thus, several factors can influence the level of the unemployment in a country/area. In the first part of this section, we present a

literature review first, on the traditional determinants of the level of the unemployment and then on those specific to the youth unemployment. In the second part, we present a review of the direct and indirect effects of corruption on both types of the unemployment rate. What explains the level of unemployment within a region or geographical entity? Which factors can influence the level of unemployment? Which economic or social phenomena must be influenced to reduce the level of unemployment in an area?

To answer all these questions, the traditional economic theory suggests that, the inefficiency of a geographic entity's public policies is the main cause of rising unemployment. According to Keynesian theory, the low mobilization of public resources and inefficient economic policies remain one of the main factors in the rise in the unemployment rate in an area. Indeed, for Battaglini and Coate (2011), the implementation of expansionary fiscal policies reduces the level of unemployment. Thus, a very important role of fiscal policy is to reduce the level of unemployment and stabilize the economy. However, the conduct of expansionary fiscal policies requires a strong mobilization of public revenues. Thus, when some country experiences enormous difficulties in mobilizing revenues, this can render fiscal policies ineffective and consequently increase the level of unemployment (Battaglini and Coate, 2011; Rendahl, 2016).

The central government revenues are mostly intended to finance the sectors of the economy (education, health) through public expenditures channels (public investment). That is why political and economic decision-makers, for the most part, use budgetary policy to combat the scourge of unemployment, especially among young people. The consequence of these operations, when countries present difficulties in mobilizing revenues, is the increase in the level of public or central government debt in the countries (Battaglini and Coate, 2011). In addition to the inefficiency of public or fiscal policies, the economic literature identifies the level of human capital as a determinant of the unemployment rate in a country. At the level of human capital, we are more interested in the level of education of the population of a geographical entity.

Nowadays, the global economic system is anchored more on the knowledge economy at the place of the industrial economy (Condratov, 2014). Over the years, human capital has become one of the central drivers of economic growth. Theoretically, it is argued and demonstrated that one of the major benefits of education is the low risk of unemployment for a person with a high level of education. For Nickell (1979), one of the pioneers of quantitative analysis of the relationship between education level and unemployment, there is a natural advantage

for the more educated to easily obtain employment compared to the less educated. In addition, they have a greater capacity to generate more income for a company and greater job stability. More educated a person is, less is the probability to be unemployed (Nickell, 1979; Mincer, 1991). Consequently, a country with a high proportion of an educated population will experience low unemployment (Nickell, 1979; Mincer, 1991; Condratov, 2014). The latter conclusion may be controversial. Indeed, as is often the case in Africa, it can happen that the level of unemployment in a region or a geographical entity is high, despite the high proportion of educated people (secondary and tertiary levels). Theoretically and practically, this phenomenon can be explained by greater competition in the labour market and by the mismatch between the qualifications or expertise of job seekers and job offers.

In addition to the inefficient public policies, human capital, the economic theory identifies as an additional source of unemployment, the income inequality within a geographical entity (Helpman et al., 2010). First, the income inequalities can influence the level of unemployment in function of trade openness of the countries. When income inequalities exist within in country and when the country is opened to the rest of the world, then the high competitiveness of foreign goods and services increases the production cost of local companies. To reduce the production cost, the local companies of a country, reduce the labour force that contributes, to raise the unemployment within a region (Helpman et al., 2010; Kebalo, 2017). Besides this, the fact that the national wealth is held by a minority and poorly redistributed can explain the level of unemployment of a country or an area. It is in this sense that Kebalo (2017) argues that, it is necessary for African countries, in order to reduce the level of unemployment and promote their economic growth, to significantly reduce their economic openness and inequality.

Another factor that can influence the level of unemployment in a region or geographical entity is the weight of the informal sector (shadow economy) in the economy. Theoretically, it is argued that when the weight of the informal sector increases in an economy, there is an increase in the level of unemployment. Empirically, Dell'Anno and Solomon (2008), in examining the relationship between the two phenomena, finds that in the US, there is a positive, significant and structural relationship between the informal sector (shadow economy) and the unemployment rate. Enste (2003) finds a positive and bilateral causal relationship between the weight of the informal sector and the level of unemployment. When the informal sector dominates economic activity, then there will be an increase in the level of unemployment. Similarly, when unemployment is high in an economic sector, agents are more likely to turn to the informal sector, which increases its

weight. How does the informal sector (shadow economy) increase the unemployment rate in a geographical entity? The rise of the informal sector represents a problem for the implementation of a good fiscal economy policy. Indeed, it is difficult and laborious to collect taxes (labour and corporate taxes, ...) from the informal sector contributing to the increase in revenues, necessary to finance public expenditures and for the good conduct of economic policies. But one advantage of the informal sector is that it can absorb a part of the unemployment rate in an economy.

If the traditional determinants of unemployment are fiscal policy, human capital (level of education), income inequality and the weight of the informal sector (shadow economy), there are specific additional determinants with regard to the youth unemployment rate (Contini, 2010). The significant reduction of youth unemployment remains one of the greatest social concerns and a challenge for all political and economic decision-makers. Indeed, according to Contini (2010), youth unemployment, the most dominant segment of the world population, represents a function of the macroeconomic condition of a geographical entity. Theoretically, it has been shown that unemployment is an economic problem whose extent of damage is more pronounced among young people than among the adult population (Perugini and Signorelli, 2010; Condratov, 2014; Krugman, 2012; Hurd and Rohwedder, 2010; Bell and Blanchflower, 2011; Katz, 2014). With regards to the determinants, the youth unemployment is undoubtedly due to the low level of education and also to the lack of professional experience of individuals in this age group (15 to 24 years).

The lack of professional experience of young people represents a risk for any company and especially a handicap for the youth class compared to adults. The second factor that can influence the level of youth unemployment is the business cycle and the economic growth of a country or region. Indeed, the level of youth unemployment is sensitive to the business cycle than that of adults (Condratov, 2014). During periods of recession, youth unemployment is higher than adult unemployment (Hurd and Rohwedder, 2010; Bell and Blanchflower, 2011; Krugman, 2012; Katz, 2014; Blanchard et al., 2014). In addition, Tomíc (2016) by analyzing the determinants of youth unemployment in 28 countries of the European Union and over the period 2002 to 2014; shows that the level of youth unemployment is more pronounced in countries with low economic growth, more income inequality, with a high public debt, and a low level of infrastructure. Apart from the economic cycle and economic growth of a country or region, youth unemployment rates are influenced by the labour market dysfunctionalities

(minimum wage), labour market reforms (Condratov, 2014) and corruption (Bouzid, 2016; Tomic, 2016).

The labour market reforms appear to play an important role in explaining the level of employability of youth in a region or geographic entity. Bouzid (2016), in analyzing the causal relationship between the level of corruption and the level of youth unemployment, seeks to show how corruption through bribes in state institutions, can generate employment opportunities, and therefore call into question the efficiency of the workforce in enterprises. With corruption, young people, risky for companies, less qualified, can claim jobs or positions of high quality. Thus, their lack of efficiency will have an effect on production, leading the company to stop hiring. Finally, another additional factor in the level of youth unemployment is the lack of or barriers to labour mobility in regions or countries (Tomíc, 2016). However, for Mauro (1995), corruption remains the most recurrent problem when we refer to economic and social development, and consequently to unemployment. Corruption is an old phenomenon that is at the source of unemployment levels in both developed and undeveloped countries (Ali and Krammer, 2016; Ali and Saha, 2016; Asiedu and Freeman, 2009; Tanzi, 1998b). That is why, since the 1980s, the fight against corruption has been at the forefront of international policies and development debates. Theoretically, it is quite demonstrable that the institutional environment can influence the economic and social development of a geographic entity (Ali and Saha, 2016; Bouzid, 2016).

Since Tanzi's (1998b) work, the level of corruption has been at the middle of all economic activity and must be introduced into the analysis of the relevance of regional and global economic policies, thought or implemented. Theoretically, it is clear that the level of corruption can influence the level of unemployment. And this is possible through several channels. First, corruption increases the level of unemployment by affecting public expenditures. Through the diversion of public revenues necessary for the proper conduct of public policies, the increase in corruption negatively affects public expenditures by reducing the public revenues (Tanzi and Davoodi, 1998; Tanzi, 1998b). Thus, with little revenues mobilized, the education sector and others employment generating sectors can be affected, making fiscal policies less effective. Second, corruption affects the level of unemployment by reducing the level and productivity of a country's public investment (Dissou and Yakautsava, 2012). Consequently, corruption has a negative effect on the economic growth of countries (Mauro, 1995, 1997) and consequently on the level of youth unemployment. The results are the same with those of Ajie and Wokekoro (2012), Matthew and Idowu (2013) and Enofe et al. (2016) who, by studying the penalties

of corruption on economic growth and employment, show that the corruption penalizes economic growth and increases the unemployment and poverty. Third, corruption affects the unemployment rate through the rise in income inequality in a country (Tanzi and Davoodi, 1998). However, in reference to Helpman et al. (2010), it is shown that the increase in income inequality within a geographical entity increases its level of unemployment. Fourth and finally, the corruption reduces the level of foreign direct investments needed to create, sustain economic growth and therefore reduce the level of youth unemployment, because the youth unemployment rate is strongly influenced by the business cycle and the economic growth (Wei, 1997a, 1997b).

At the end of our literature review, we noted that the traditional determinants of the unemployment rate are the inefficiency of public policy (Battaglini and Coate, 2011; Rendahl, 2016), the human capital (Nickell, 1979; Mincer, 1991; Condratov, 2014), income inequalities (Helpman et al., 2010) and the weight of the informal sector (Dell'Anno and Solomon, 2008; Enste, 2003). To these traditional determinants, are added, some specific determinants of youth unemployment rate such as the economic cycle and economic growth (Hurd and Rohwedder, 2010; Katz, 2014), migration (Tomić, 2016), and labour market dysfunctionalities (Condratov, 2014). Finally, the literature reveals the effect of corruption on the dynamics of the unemployment rate (Bouzid, 2016).

Despite the multitude of work performed in the literature on the economic, institutional and social determinants of the unemployment rate, one of the limitations in our knowledge of the literature review is that, it does not rank the factors that can influence the total unemployment rate on the one hand, and the youth unemployment rate of a country or region on the other. To fill this gap in the literature, our paper analyzes the effects of income inequality, government revenues, human capital and corruption on the total unemployment rate and in particular that of youth in the SADC area. The countries in this region represent our field of investigation. On the other hand, our paper seeks to determine the economic, social or institutional phenomenon that contributes most to unemployment in the SADC area in order to prioritize/rank the factors.

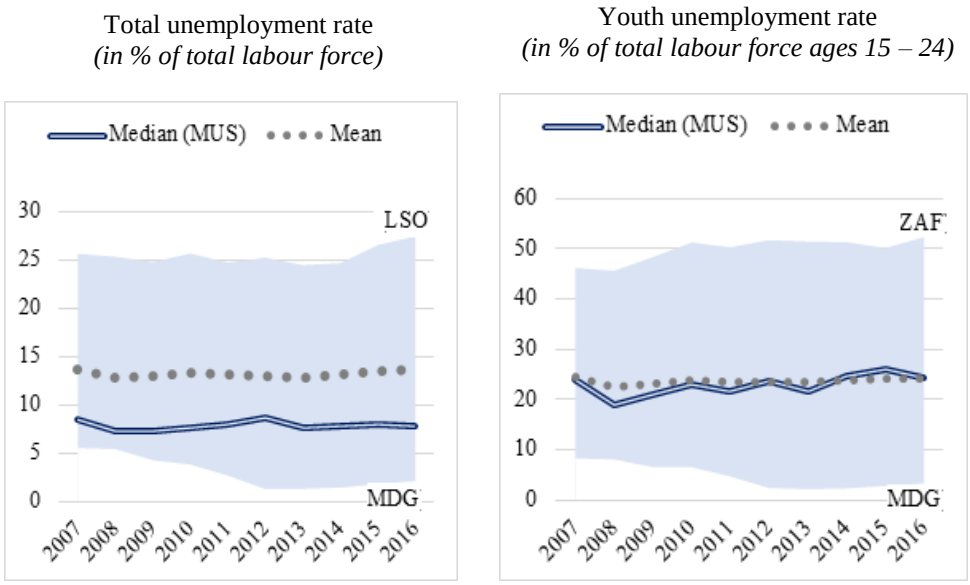
3. STYLIZED FACTS

Why are SADC countries seeking to reduce their unemployment levels? Indeed, since the financial crisis of 2007, the average unemployment rate in the SADC region is one of the highest in the world (7.58% for total, and 13.47% for

youth; see figure 1 below), this comparatively to the developing countries (5.43% for total unemployment and 10.44% for youth). This level of the unemployment (especially among young people) in the SADC region is a real challenge for public and economic authorities. Thus, the desire of the authorities is to seek to reduce the level of unemployment and especially to have a large middle class necessary to create and generate economic growth.

Despite the efforts of public authorities and institutions to reduce the level of unemployment and especially combat the sources of this phenomenon, the task is difficult, and not significant are the results. However, in reference to O'Reilly et al. (2015), to solve the unemployment rate problem within a region, it is important and necessary to analyze the behaviour of the unemployment rate over the countries of the region. In this sense, this section analyzes the behaviour of the total and youth unemployment rates within the SADC area. We present stylized facts on nine (09) countries of the region (see table 3 in appendices).

Figures 1 and 2 below present the evolution of the total and youth unemployment rates of nine SADC countries. When we analyze the two figures carefully, we notice that the average total unemployment rate and that of young people in the SADC region are more driven by the level of unemployment of some countries such as South Africa (24.31% and 49.84% respectively), Mozambique (23.91% and 41.15%), Lesotho (25.43% and 34.86%) and Botswana (17.04% and 32.39%). This group of countries has a very high level of unemployment within their economies. In an antagonistic way, we have the Madagascar which is the best pupil concerning the reduction of the level of unemployment within the area; both for the total population (2.98%) and the youth (4.77%).



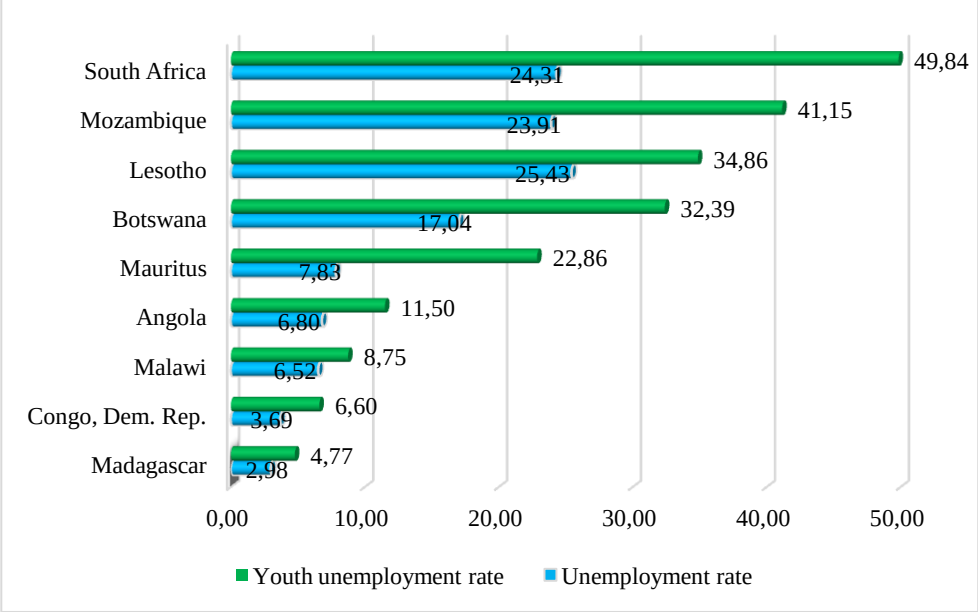
Note: MUS for Mauritius, LSO for Lesotho, MDG for Madagascar, ZAF for South Africa.
Source: authors with data from the International Labour Organization, ILO (2017).

Figure 1. Evolution of the unemployment rate of the nine SADC countries in our sample

By referring to the averages and median (Mauritius' unemployment rate) of the computed unemployment rates (7.58% for the total, and 13.47% for youth), there is concealed within the SADC area, a geographical and economic heterogeneity with regard to the behaviour of unemployment rates. First, we have the group of countries such as South Africa, Mozambique, Lesotho, Botswana and Mauritius which have high levels of unemployment and which must make enormous efforts to reduce this level of unemployment within their economies; especially that of young people. Secondly, we have countries such as Angola, Malawi, the Democratic Republic of Congo and Madagascar with low unemployment rates. We believe that one of the differences between the two groups of countries regarding the level of unemployment could be the high weight of the informal sector and the lack of real data on the level of unemployment in these countries. This did not provide the real unemployment rate for the countries of the group 2.

We seek to propose the economic policies that would help significantly to reduce the level of unemployment in the SADC area. For this, it would require to

conduct the countries of Group 1, such as Mozambique, Lesotho, Botswana, Mauritius and South Africa, to significantly reduce their unemployment rates. However, in reference to O'Reilly et al. (2015), to reduce the level of unemployment, it will be necessary to seek to determine the causes. In the following section, we present the data and methodology deemed adequate to achieve our objectives. Indeed, our first objective is to analyze the effects of some determinants of the level of unemployment on the unemployment rate (total and youth) of the SADC countries. Our second objective is to prioritize/rank these determinants of the unemployment rate in order to facilitate the implementation of targeted economic policies to combat the level of total unemployment, and that of youth in particular, in the SADC area.



Note: Total unemployment rate (in % of the total labour force) and youth unemployment rate (in % of total labour force ages 15 – 24)
Source: authors with data from the International Labour Organization, ILO (2017).

Figure 2. Cross-sectional evolution of
average unemployment rate of the SADC countries

4. DATA AND EMPIRICAL STRATEGY

4.1 Data

In order to prevent a political or economic decision-maker to make mistakes in the elaboration of economic policies to solve the unemployment problem within SADC, we set ourselves the objectives, to analyze first, the effects of some determinants of the level of unemployment (total and youth). Then, we prioritize/rank these determinants of unemployment so that it facilitates the implementation of effective and targeted economic policies in the fight against this scourge within the region. It is in this sense that we retain in this paper some traditional determinants of the level of unemployment such as the level of education (human capital), the income inequality, the central government revenue, and an institutional variable, the level of corruption. We use these variables to answer our research question: "between income inequality, government revenue, human capital and corruption, which contributes the most to the rise in the total unemployment rate, especially for youth, in the SADC region?".

Definitions of variables

To achieve our various objectives, the variables considered in our study are the following. We have:

- ✓ The total unemployment rate ($URate_{it}$) which is measured as the level of unemployed people wishing to work as a percentage of the total labour force,
- ✓ The youth unemployment rate ($YURate_{it}$) which is measured as the level of unemployed youth as a percentage of the active population therefore the age is between 15 and 24 years,
- ✓ The level of corruption control (Coc_{it}): it reflects the perceptions of the extent to which public power is exercised for private purposes, including small and large forms of corruption, as well as the "capture" of the state by elites and private interests. This index is between -2.5 and 2.5. Thus, when a country presents an index close to 2.5, it is said that there is a very good governance environment in the country. If not, we are talking about an environment of bad governance,
- ✓ The income inequality which is approximated in our analysis by the growth rate of gross domestic product per capita Δy_{it},
- ✓ The human capital Edu_{it} quantified by secondary education level; and finally,
- ✓ The government revenues $TRev_{it}$ of each country to analyze the effect of fiscal policy on the level of unemployment.

The data sources and measures used in our paper are presented in table 4 in appendices.

Variables properties

Before proceeding to the presentation of our methodology and estimation techniques, it is important that we perform a unit root test. For this, we perform the unit root test of Levin et al. (2002) which indicates that all the variables considered and listed above, are stationary (see table 5 in appendices). The descriptive statistics for the variables are presented in table 4 in the appendices.

Choice and justification of our analysis period

To achieve our objectives, we are working on a sample of nine (09) SADC countries (see table 3 in appendices), over a period from 2007 to 2016, a decade since the advent of the 2007 financial crisis. The choice of this period is motivated, on the one hand, by the availability of data for the countries and, on the other hand, by the desire to better understand the behaviour of the unemployment rate of the SADC countries over the last decade. This will enable us to propose economic policies that can potentially help address the problem of unemployment if these policies are taken into account by the institutions.

4.2 Methodology and empirical strategy

With regard to the methodology to address the issue of sources of unemployment in countries of an economic region, fixed effects and long-run models are often used (Tomić, 2016; Bouzid, 2016). The first bias of its analyses is that they do not take into account the endogeneity of the determinants of unemployment. Indeed, the determinants of unemployment can be explained among themselves. The second methodological bias in the literature is the lack of calculation of the contributions of the determinants of the unemployment rate. The calculation of the contribution of the factors influencing the level of the unemployment makes it possible, first, to rank these factors. Second, it helps to develop the economic policies needed to effectively combat the factors influencing the level of unemployment and hence the level of unemployment within a region. To account for these methodological shortcomings and also to achieve our objectives, we use a panel vector autoregressive model (PVAR) for nine (09) SADC countries (see Table 3, appendices)

How does the PVAR model help us achieve our objectives?

The panel vector autoregressive models (PVAR) are built on the same logic as standard VAR models and have the same structure in the sense that all variables are endogenous, but with the addition of an inter-individual dimension (i). These are models that are particularly interesting and almost perfect for analyzing the interactions between variables, the reactions of an economic or social indicator, following a shock, on a group of countries within a region. The responses of an indicator to shocks or changes in variables can be analyzed through the analysis of impulse response functions; while the contributions of factors to the explanation of an indicator can be analyzed through the variance decomposition of forecast errors (Canova and Ciccarelli, 2013). Through the PVAR model, we first seek to analyze the reaction of the level of unemployment for each variation in the control of corruption, per capita income, human capital, and state income. In other words, it is a question of seeing how the unemployment rate (total and youth) reacts for each variation of the other variables. This analysis is done through the interpretation of impulse response functions. Second, through the analysis of the variance decomposition of forecast errors, we seek to quantify the contribution of each variable to the explanation of the level of unemployment in the SADC area. The rest of the methodology based on the PVAR model is presented in appendices.

Model

We, therefore, consider two (02) models in our investigation. One model for the total unemployment rate and another for the youth unemployment rate X^t and X^y correspond respectively to these two models. We thus have in order the vectors:

$$X^t = (URate_{it}, Coc_{it}, Edu_{it}, \Delta y_{it}, TRev_{it}),$$

and

$$X^y = (YURate_{it}, Coc_{it}, Edu_{it}, \Delta y_{it}, TRev_{it}).$$

where $URate_i$ et $YURate_i$ represent the total unemployment rate and the youth unemployment rate respectively. Coc_i represents the corruption control index, Edu_i the level of secondary education, Δy_i the per capita gross domestic product growth rate et finally $TRev_i$ the government revenue.

In function on these two vectors, we have standard PVAR models as follows:

$$X_{i,t}^j = \beta_i + \Gamma(L)X_{i,t} + \varepsilon_{i,t}, (1)$$

where $j = \{t, y\}$, $\Gamma(L) = \Gamma_1 L^1 + \Gamma_2 L^2 + \Gamma_3 L^3 + \cdots + \Gamma_p L^p$ is the polynomial matrix of the lag operator L; β_i is the vector of individual fixed effects (specific to each country or economy) and $\varepsilon_{i,t}$ is finally the vector of idiosyncratic errors.

5. FINDINGS AND DISCUSSIONS

At the end of our econometric approaches, and after estimating our two models with a lag p = 1, we obtain results based, on the one hand, on the analysis of impulse response functions and, on the other hand, on the contribution of variables to the explanation of the total and youth unemployment rates. Recommendations for targeted economic policies to reduce each type of unemployment are proposed at the end of the section.

5.1 Analysis of the reactions of the unemployment rate in the SADC area?

Independently of the level of total unemployment or for young people, the trend of the results is the same (table 1 and 2). In SADC countries, a better control of corruption contributes, to reduce the unemployment rate. However, the decline effect is more pronounced for the youth than for the total unemployment rate. These results corroborate with those found by Bouzid (2016), Matthew and Idowu (2013), and Enofe et al. (2016). Similarly, increased government revenue mobilization allows countries to reduce the level of unemployment. This time, the decline effect is more pronounced for the total unemployment rate than for the youth rate. A trend that seems to corroborate with the results of Battaglini and Coate (2011) and Rendahl (2016). Indeed, better revenue mobilization within a country allows the authorities to have enough resources to implement effective fiscal policies, which in turn reduces the level of unemployment in our case. Thus, as Tanzi and Davoodi (1998) and Tanzi (1998b) have argued, with better control of corruption within a region, this would allow the different tax systems of an economy to mobilize more public revenue needed to implement public and social policies to reduce unemployment. Apart from that, by reducing income inequality as Tanzi and Davoodi (1998) have argued, the control of corruption can reduce the level of unemployment, especially among young people.

Table 1. Responses of the total unemployment rate in the SADC area

t	Coc_i	Δy_{it}	Edu_i	$TRev_i$
1	-1,386	-0,049	0,054	0,002
2	-0,661	0,036	0,099	-0,010
3	-0,304	0,023	0,049	-0,021
4	-0,058	0,004	0,038	-0,018

Table 2. Responses of the youth unemployment rate in the SADC area

t	Coc_i	Δy_{it}	Edu_i	$TRev_i$
1	-5.752	-0.065	0.080	-0.008
2	-0.405	0.063	0.121	-0.002
3	-0.467	0.009	0.053	-0.015
4	-0.595	-0.002	0.048	-0.012

Note: t for periods
Source: Authors with data provided

Beyond the effects of corruption control and public revenues that reduce the level of unemployment rates, our analysis highlights the problem of income inequality in the creation of unemployment in countries. Our results show that, within the SADC area, rising income inequality is contributing to higher levels of unemployment. Results that corroborate those of Helpman et al. (2010). Inequalities in the distribution of income and the acquisition of national wealth have as effects, the increase of unemployment rate within an economic region and more specifically within SADC area.

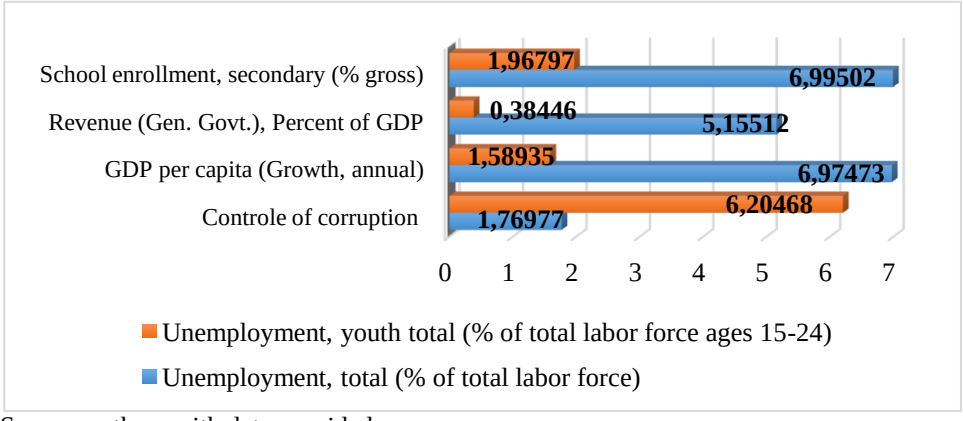
With regards to the human capital effect, our results show that the improvement in human capital or in the level of education contributes to raising the level of unemployment on the labour market in SADC countries. Surprisingly results. But not for us. Through the MDGs, the SADC countries have improved their level of education. Despite this, the level of unemployment is rising. Normally, the economic literature argues that the improvement of the level of human capital contributes, to reduce the unemployment rate. However, this is not the case within the SADC. Two reasons can explain this result. Firstly, we have strong competition in the labour market and, secondly, we have the mismatch between the qualifications or expertise of job-seekers and job vacancies. The high level of unemployment in SADC, either total or youth unemployment, is explained by the inadequacy of training provision in relation to labour market needs and development programs. Hence the need to seek to reform the education systems of African countries, taking into account their needs and their development programmes.

5.2 Which variables contribute the most to the explanation of the unemployment rate within the SADC countries?

After analyzing the responses of the unemployment rate to changes in human capital, government revenue, income inequality and corruption control, it is important to identify the variables that contribute the most, to the explanation of the unemployment rate within the SADC area. The idea is to prioritize/rank our variables so that targeted, priority and effective economic policies can be proposed to address the unemployment problem in the SADC area. The figure 3 below shows the contributions of human capital, central government revenues, income inequality and corruption control to the explanation of the level of unemployment within the SADC area. Overall, the level of human capital and income inequality are the most important determinants of the level of total unemployment in the SADC region. Comes in third position, the mobilization of public revenues as a determining variable of the level of unemployment in the SADC countries. The

importance of corruption remains marginal. However, when we look at the youth unemployment rate, our framework shows that corruption is one of the main causes within the SADC countries. Corruption is then followed by the level of education.

Thus, it is clear that in order to reduce the overall unemployment rate in SADC countries, the first step should be to reduce income inequality and encourage a better orientation of training or education in relation to labour market needs. Second, countries should make enormous efforts in the mobilization of the revenues needed for the formulation and effective conduct of economic and social policies. As regards reducing the level of youth unemployment, decision-making authorities (political and economic) should seek to combat corruption in all its forms effectively. By significantly reducing the level of corruption in the SADC countries, the authorities can be sure to significantly reduce the level of youth unemployment. But which economic policies or measures should be implemented to significantly reduce the level of total unemployment and that of youth in particular? The following subsection presents some proposals for targeted economic policies that could help to eradicate the unemployment problem in the SADC countries.



Source: authors with data provided.

Figure 3. Contributions of variables (in %) to explain the unemployment rate in SADC

5.3 Recommendations for targeted policies to reduce the level of unemployment within the SADC countries

In this subsection, we propose economic policies or measures to be put in place to reduce the level of unemployment in SADC countries. Targeted measures

are proposed for each category of unemployment. We propose priority policies to minority policies.

✓ **How reduce the total unemployment rate within the SADC countries?**

We have argued in our work that in order to reduce the overall level of unemployment in the SADC countries, the first step should be to seek to reduce income inequality and better orient education to labour market needs. Second, countries should make enormous efforts to mobilize the revenues needed to develop better economic and social policies. Thus, to reduce the income inequalities, we suggest that the decision-making authorities put in place a tax system taxing the most, the highest incomes and the small minority that monopolizes national wealth; so that this can be redistributed to people with low incomes.

With regards to the human capital, we propose to decision-makers to reform the secondary and tertiary education system so that it corresponds to the needs of the labour market and the development programmes of the countries. The objectives of the vast majority of sub-Saharan African countries can be summarized in the electrification of Africa, agriculture and the industrialization of Africa. In view of these different visions, countries may already seek to reorient the education system towards the training of electrical and mechanical engineers, agronomists and agricultural economists and engineers for the next ten years, for example. It will be necessary to seek to create regional universities specifically for the medium and long-term needs of countries. This will make it possible to structurally transform countries and consequently reduce the level of unemployment. It is the economic transformation that creates added value and reduces the level of unemployment. Finally, to improve the level of revenue mobilization, we thought it would be interesting and beneficial to reform the tax system in SADC countries. In this sense, we propose the establishment of national revenue offices that centralize the state's public revenues; and legal institutions that advocate more transparency and more control of corruption in the collection of revenues.

✓ **How reduce the youth unemployment rate within the SADC countries?**

With regards to the reduction of the youth unemployment rate, our results have led us to suggest to the policies makers to seek to combat corruption in all its forms effectively and to reorient the education system according to the needs of the labour market and the development programs of the countries. By significantly reducing the level of corruption and reorienting the education or

training system within the area, the SADC public authorities can be certain to reduce the youth unemployment rate.

However, the corruption problem cannot be fully eradicated. Probably no country could be without corruption (Tanzi, 1998b). However, incentives measures or policies can be put in place to discourage and reduce the level of corruption within SADC countries. According to Tanzi (1998b), we propose some directives/policies to reduce the level of corruption within the SADC countries.

First of all, there must be an honest, total and visible commitment by public authorities to the fight against corruption, for which they must first be irreproachable with regards to corruption and show a zero tolerance. We propose that public authorities develop penalties (taxes and sanctions) against any act of corruption to discourage and reduce it. Secondly, we propose to the public authorities to reduce the income inequalities and make regulations such as the tax incentives and ensure that those retained are transparent and non-discretionary as possible. Finally, to reduce the level of unemployment, we propose to the public authorities to make efforts to increase the level of wages and put in place incentives to adopt honest behaviour. We know that reducing corruption allows, to reduce the level of unemployment. But according to Enofe et al. (2016), it is also possible that reducing the level of unemployment could reduce the level of corruption.

6. CONCLUSION

In this paper, we set up an empirical investigation to analyze the effects of corruption, income inequality, education (human capital) and central government revenues on the total and youth unemployment rates in the SADC countries. The originality of the paper consists in computing the contributions of these factors to the explanation of the two types of unemployment within the SADC area. Our paper seeks to determine the economic, social or institutional phenomenon that contributes the most, to the explanation of unemployment in the SADC area, in order to rank them. The idea of our paper is to propose hierarchical and targeted economic and institutional policies, which will enable economic and political decision-makers to solve the problem of total unemployment and in particular that of young people within the SADC area. To achieve our objectives, we adopt a panel vector autoregressive model for a sample of nine (09) SADC countries over the period 2007-2016; a decade since the advent of the 2007 financial crisis. The choice of this period is motivated, on the one hand, by the availability of data for

the countries and, on the other hand, by the desire to better understand the behaviour of the unemployment rate of the SADC countries over the last decade.

This analysis first, reveals that the control of corruption and the increase in government revenues within the SADC area allow, to reduce the level of unemployment (total and youth). On the other hand, the increase in income inequality and also education levels, contribute, to raise the unemployment rates. We explain this last result by the mismatch between education/training and the labour market need and/or the development programs of the countries. Hence it necessary to reorient the education system of the SADC countries. Second, with regard to contributions of the determinants, it appears that, overall, the level of human capital and income inequality are the main variables that contribute the most to explain the level of total unemployment within the SADC area. Comes in the third position, the mobilization of government revenues as a determinant variable of the level of unemployment in the SADC countries. However, with regard to the youth unemployment rate in the area, corruption is one of the main causes. We, therefore, conclude that in order to reduce the level of total unemployment in the SADC countries, we should seek to reduce income inequality, then a better orientation of education and training to labour market needs and finally make enormous efforts in the mobilization of government revenues. With regards to the reduction of the level of youth unemployment, the eradication of corruption and the reorientation of education and training within the region should be the priorities of political and economic decisionmakers

Acknowledgements

We are grateful to the participants of the Regional Conference on Corruption and the challenge of Economic transformation in Southern Africa co-organized by the United Nations Economic Commission for Africa – Southern Africa Office (UNECA-SA) and the African Union – Southern Africa Regional Office (AU-SARO), to those of the Young Scholars Initiative Africa Convening, for helpful comments and suggestions on the previous version of the paper. All views expressed in this paper are those of the authors and do not reflect necessary those of the institutions they are affiliated with.

REFERENCES

1. Acemoglu, D. (1995). Public policy in a model of long-term unemployment. *Economica*, pages 161–178.
2. Ajie, H. and Wokekoro, O. (2012). The impact of corruption on sustainable economic growth and development in Nigeria. *International Journal of Economic Development Research and Investment*, 3(1):91–109.
3. Akaike, H. (1969). Fitting autoregressive models for prediction. *Annals of the Institute of Statistical mathematics*, 21:243–247.
4. Akaike, H. (1977). An entropy maximization principle. in Krishnajah P. (ed), Proceedings of Symposium on Applied Statistics, North Holland.
5. Ali, M. S. B. and Krammer, S. M. (2016). The role of institutions in economic development. *In Economic Development in the Middle East and North Africa*, pages 1–25. Springer.
6. Ali, M. S. B. and Saha, S. (2016). Corruption and economic development. *In Economic Development in the Middle East and North Africa*, pages 133–154. Springer.
7. Andrews, D. and Lu, B. (2001). Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models. *Journal of Econometrics*, 101(1):123–164.
8. Asiedu, E. and Freeman, J. (2009). The effect of corruption on investment growth: Evidence from firms in Latin America, sub-Saharan Africa, and transition countries. *Review of Development Economics*, 13(2):200–214.
9. Battaglini, M. and Coate, S. (2011). Fiscal policy and unemployment. Technical report, NBER.
10. Battaglini, M. and Coate, S. (2016). A political economy theory of fiscal policy and unemployment. *Journal of the European Economic Association*, 14(2):303–337.
11. Bell, D. N. and Blanchflower, D. G. (2011). Young people and the great recession. Oxford *Review of Economic Policy*, 27(2):241–267.
12. Blanchard, O. J., Jaumotte, F., and Loungani, P. (2014). Labour market policies and IMF advice in advanced economies during the great recession. *IZA Journal of Labour Policy*, 3(1):2.
13. Bouzid, B. N. (2016). Dynamic relationship between corruption and youth unemployment: empirical evidence from a system GMM approach. Policy Research Working Paper: N. 7842. World Bank, Washington DC.
14. Boz, E. and Tesar, L. (2018). Macroeconomics after the great recession. *IMF Economic Review*, 66:1–4.
15. Condratov, I. (2014). Determinants of youth unemployment: a survey of the literature. *Ecoforum Journal*, 3(2):16.
16. Contini, B. (2010). Youth employment in Europe: institutions and social capital explain better than mainstream economics. Discussion Paper No.4718. University of Torino.
17. Dell'Anno, R. and Solomon, O. H. (2008). Shadow economy and unemployment rate in USA: is there a structural relationship? An empirical analysis. *Applied Economics*, 40(19):2537–2555.
18. Dissou, Y. and Yakautsava, T. (2012). Corruption, growth, and taxation. *Theoretical Economics Letters*, 2(01):62.

19. Enofe, A. O., Oriaifoh, C. L., and Omagbon, P. (2016). Poverty and unemployment and corruption in Nigerian public sector. *IIARD International Journal of Economics and Business Management*, 2.
20. Enste, D. H. (2003). Shadow economy and institutional change in transition countries. The Informal Economy in the EU Assessment Countries: Size, Scope, Trends and Challenges of the Process of EU-enlargement in (Ed.) B. Belev, Center for Study of Democracy, Sofia, pages 81–114.
21. Hamilton, D. J. (1994). *Time series analysis*. Princeton University Press.
22. Helpman, E., Itskhoki, O., and Redding, S. (2010). Inequality and unemployment in a global economy. *Econometrica*, 78(4):1239–1283.
23. Hurd, M. D. and Rohwedder, S. (2010). *Effects of the financial crisis and great recession on American households*. Technical report, NBER.
24. Katz, L. (2014). Long-term unemployment in the great recession. Members-only Library.
25. Kebalo, L. (2017). *Extraversion et activité économique des pays de l'Afrique de l'ouest*. Editions universitaires européennes.
26. Krugman, P. (2012). *End this depression now!* W.W. Norton & Company, Inc., New York.
27. Leff, N. H. (1964). Economic development through bureaucratic corruption. *American behavioral scientist*, 8(3):8–14.
28. Levin, A., Lin, C., and Chu, C. (2002). Unit root test in panel data: Asymptotic and finite sample properties. *Journal of Econometrics*, 108(1):1–24.
29. Matthew, E. and Idowu, C. (2013). Political corruption and national development in Nigeria. *International Journal of Social Sciences and Humanities Reviews*, 4:14–23.
30. Mauro, P. (1995). Corruption and growth. *The quarterly journal of economics*, 110(3):681–712.
31. Mauro, P. (1997). The effects of corruption on growth, investment and government expenditure: a cross-country analysis. *Corruption and the Global Economy*, Institute for International Economics, Washington DC.
32. Mauro, P. (1998). Corruption and the composition of government expenditure. *Journal of Public Economics*, 69(2):263–279.
33. Mincer, J. (1991). *Education and unemployment*. Technical report, NBER.
34. Myrdal, G. (1968). *Asian Drama: An Enquiry in the Poverty of Nations*, volume 2. The Twentieth Century Fund: New York.
35. Nickell, S. (1979). Education and lifetime patterns of unemployment. *Journal of Political Economy*, 87(5, Part 2): S117–S131.
36. O'higgins, N. (2012). This time it's different? Youth labour markets during 'the great recession'. *Comparative Economic Studies*, 54(2):395–412.
37. O'Reilly, J., Eichhorst, W., G´abos, A., Hadjivassiliou, K., Lain, D., Leschke, J., McGuinness, S., Kurekov´a, L. M., Nazio, T., Ortlieb, R., et al. (2015). Five characteristics of youth unemployment in Europe: Flexibility, education, migration, family legacies, and EU policy. *Sage Open*, 5(1):1–19.
38. Perugini, C. and Signorelli, M. (2010). Youth labour market performance in European regions. *Economic change and restructuring*, 43(2):151–185.
39. Rendahl, P. (2016). Fiscal policy in an unemployment crisis. *Review of Economic Studies*, 83(3):1189–1224.

40. Rissassen, J. (1978). Modeling by shortest data description. *Automatica*, 14:465–471.
41. Saha, M. S. B. A. S. (2017). Corruption and economic development: New evidence from the Middle Eastern and North African countries. *Economic Analysis and Policy*, 54:83–95
42. Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 6:461–464.
43. Tanzi, V. (1998a). Corruption and the budget: Problems and solutions. *In Economics of corruption*, pages 111–128. Springer.
44. Tanzi, V. (1998b). Corruption around the world: Causes, consequences, scope, and cures. *IMF Staff Papers*, 45(4):559–594.
45. Tanzi, V. and Davoodi, H. (1998). Corruption, public investment, and growth. *In The welfare state, public investment, and growth*, pages 41–60. Springer.
46. Tomić, I. (2016). What drives youth unemployment in Europe? EIZ Working Papers N. 1601.
47. Wei, S.-J. (1997a). How taxing is corruption on international investors? NBER WP. N.6030.
48. Wei, S.-J. (1997b). Why is corruption so much more taxing than tax? Arbitrariness kills. NBER WP. N.6030.

1. Appendices

1.1. Presentation and proprieties of the sample and data

Table 3: List of countries and acronyms

List 1	Acronyms	List 2	Acronyms
Angola	AGO	Mauritius	MUS
Botswana	BWA	Malawi	MWI
Lesotho	LSO	South Africa	ZAF
Madagascar	MDG	Congo, Dem. Rep.	ZAR
Mozambique	MOZ		

Source : Authors

Table 4: Data, sources, definition and descriptive statistics

	Label	Source	Mean	Min	Max
Δy_{it}	GDP per capita growth (%)	WDI	2.439	-9.22	18.30
Edu_{it}	School enrollment, secondary *(% gross)*	WDI	54.195	17.78	98.82
$TRev_{it}$	Revenue (Gen. Govt.), *Percent of GDP, Percent*	IMF	25.892	9.47	53.73
coc_{it}	Contrôle of corruption	WGI	-0.318	-1.44	1.04
$URate_{it}$	Unemployment, total *(% of total labour force)*	ILO	13.167	1.30	27.42
$YURate_{it}$	Unemployment, youth total *(% of total labour force ages 15-24)*	ILO	23.635	2.23	52.29

Note: WDI for World Development Indicators (2017), IMF for International monetary fund, Sub-Saharan Africa Regional Economic Outlook (2017), ILO for International Labour Organization (2017).
Source: authors with data provided.

Table 5: Panel unit root test (Levin, Lin Chu, 2002)

	Δy_{it}	Edu_{it}	$TRev_{it}$	Coc_{it}	$URate_{it}$	$YURate_{it}$
t-stat	-6.1056	-15.6528	-1.7844	-2.2838	-3.9133	-4.4138
Prob.	(0.0000)	(0.000)	(0.0372)	(0.0112)	(0.0000)	(0.0000)

Note: Levin et al. (2002) test a common unit process in the data
Source: Authors with data provided.

1.2. Estimation of the Panel VAR model

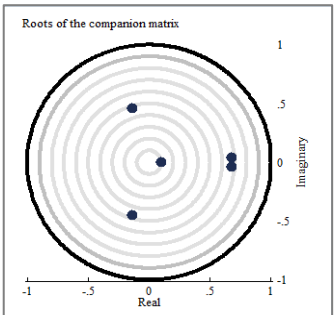
Selection of the optimal lag p

For the estimation of the vector autoregressive model on panel data, we have chosen an optimal lag $p = 1$ that minimizes the information criteria developed by Andrews and Lu (2001) such us (1) the moment and model selection criteria based on the Bayesian information criteria (MBIC; Schwarz, 1978; Rissassen, 1978; Akaike, 1977), (2) the moment and model selection criteria based on the Akaike information criteria (MAIC; Akaike, 1969) and (3) the moment and model selection criteria based on the Hannan-Quinn information criteria (MQIC)

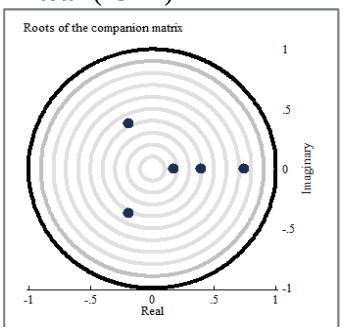
Stability test of the PVAR

After the choice of the optimal lag p identified and the estimate of the baseline model, it is important to check the state of the stability of our PVAR model by computing the modulus of each eigenvalue of the estimated model. Hamilton (1994) have shown that a vector autoregressive model is stable if all the modulus of the associated matrix are strictly lower to the unity. This stability analysis is used to validate empirically a vector autoregressive model. The stability implies that the VAR in panel data is invertible and has a vector of infinite-order of moving average. This, provides a known interpretation of the impulse response functions and that of the forecast errors of variance decomposition estimated. The results of the stability test are illustrated on the figure 4. They indicates our two model (Total unemployment and youth unemployment models) are stable.

Model 1: unemployment rate, total



Model 2: Youth unemployment rate, total (15-24)



Source: authors with data provided.

Figure 4: Stability test

Variance decomposition of forecast errors

Table 6. Variance decomposition of forecast errors (Model 1)

		$URate_{it}$	Coc_{it}	Δy_{it}	$TRev_{it}$	Edu_{it}
$URate_{it}$						
	1	100	0	0	0	0
	2	84,789	1,654	7,853	3,904	1,799
	3	82,013	1,770	7,029	3,499	5,689
	4	80,477	1,800	7,045	4,114	6,565
	5	79,105	1,770	6,975	5,155	6,995
Coc_{it}						
	1	0,478	93,005	0,008	4,338	2,171
	2	4,873	81,517	0,557	4,080	8,973
	3	4,553	76,900	0,531	6,169	11,846
	4	4,362	72,958	0,545	8,398	13,737
	5	4,601	70,150	0,524	9,772	14,954
Δy_{it}						
	1	38,505	0	43,288	18,207	0
	2	59,075	0,284	26,829	11,416	2,397
	3	58,716	0,330	27,141	11,345	2,469
	4	58,897	0,337	26,920	11,381	2,462
	5	58,957	0,351	26,860	11,356	2,476
$TRev_{it}$						
	1	18,607	0	0	81,393	0
	2	14,156	3,988	1,525	76,783	3,549
	3	18,015	5,635	1,492	69,659	5,200
	4	17,531	6,353	1,449	69,271	5,396
	5	17,256	6,656	1,450	69,153	5,486
Edu_{it}						
	1	31,180	0	14,487	5,436	48,897
	2	23,110	2,600	9,332	10,893	54,065
	3	21,028	2,500	7,524	15,309	53,639
	4	18,845	2,213	6,651	19,816	52,476
	5	17,866	2,081	6,142	22,387	51,524

Source: Authors with data provided

Table 1. Variance decomposition of forecast errors (Model 2)

		$YURate_{it}$	Coc_{it}	Δy_{it}	$TRev_{it}$	Edu_{it}
$YURate_{it}$						
	1	100	0	0	0	0
	2	91,850	6,123	1,313	0,215	0,499
	3	90,510	6,055	1,581	0,254	1,600
	4	90,190	6,112	1,572	0,327	1,800
	5	89,854	6,205	1,589	0,384	1,968
Coc_{it}						
	1	0,161	99,839	0	0	0
	2	6,610	88,819	0,420	0,005	4,147
	3	6,299	86,543	0,437	0,239	6,481
	4	6,226	84,812	0,477	0,618	7,867
	5	6,324	83,554	0,484	0,804	8,835
Δy_{it}						
	1	31,435	0,172	62,102	6,292	0
	2	54,513	0,106	37,086	5,381	2,914
	3	54,959	0,562	36,342	5,303	2,834
	4	54,832	0,712	36,278	5,341	2,837
	5	54,912	0,722	36,185	5,328	2,853
$TRev_{it}$						
	1	1,186	1,604	0	97,211	0
	2	1,287	2,217	6,223	86,907	3,366
	3	3,422	2,681	6,335	80,892	6,670
	4	3,364	2,869	6,258	79,675	7,835
	5	3,342	2,848	6,279	79,298	8,234
Edu_{it}						
	1	22,256	2,898	6,519	0,041	68,287
	2	25,490	11,930	3,889	0,562	58,129
	3	23,018	12,622	3,430	1,181	59,748
	4	21,601	13,155	3,322	2,090	59,833
	5	21,124	13,213	3,251	2,529	59,882

Source: Authors with data provided.